Community perceptions regarding challenges associated with water and sanitation: A comparative study of four selected rural communities in Ndwedwe Local Municipality, KwaZulu-Natal

Submitted by Nelile Nosipho Hlongwa

Student Number: 217019104

Thesis submitted in fulfilment of the requirements for the degree of

Master of Social Science in Geography and Environmental Management

School of Social Sciences, College of Humanities, University of KwaZulu-Natal, Durban, South Africa.

April 2024

Supervised by

Dr. Sumaiya Amod Desai

(Supervisor)

Dr. S'phumelele Lucky Nkomo

(Co-supervisor)

DECLARATION

I, Nelile Nosipho Hlongwa (217019104), acknowledge that all work presented in the thesis entitled: *Community perceptions regarding challenges associated with water and sanitation: A comparative study of four selected rural communities in Ndwedwe Local Municipality, KwaZulu-Natal* is my own work. All sources that were used have been duly recognised and referenced, and the research that has been conducted has not been submitted in any form to any other institution for the fulfilment of a degree. It is being submitted to fulfil the requirements for the degree of Master of Social Science in Geography and Environmental Management in the College of Humanities at the University of KwaZulu-Natal, South Africa.

Signature

2 April 2024

Date

The research was carried out under the supervision of Dr Sumaiya Amod Desai (University of KwaZulu-Natal) and co-supervision of Dr S'phumelele Lucky Nkomo (University of KwaZulu-Natal).

Signed:  Date: 2 April 2024

Dr Sumaiya Amod Desai

Signed: _____ Date: 2 April 2024

Dr S'phumelele Lucky Nkomo

DECLARATION 2 – MANUSCRIPT

Hlongwa, N.N., Nkomo, S.L., and Desai, SA. (Under review). “Barriers to water, sanitation, and hygiene. A mini review ”. Journal of Water, Sanitation and Hygiene for Development.

DEDICATION

To my sister, Lethiwe Hlongwa,

I am forever grateful for your love and continuous support

ACKNOWLEGEMENTS

I would like to thank the following individuals who played significant roles and without whom this research would not have been possible:

- To Dr Sumaiya Amod Desai: my supervisor, thank you for choosing to supervise my research. I would also like to thank you for your constructive criticism, dedication, guidance, and encouragement throughout the research and development of this thesis;
- To Dr S'phumelele Lucky Nkomo: my co-supervisor, who has known me from my undergraduate years, thank you for your constructive criticism, dedication, and encouragement throughout this research;
- The National Research Foundation (NRF) for funding and investing in my research;
- A special thank you to the members of the four communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze of the Ndwedwe Local Municipality for participating in this research;
- To my mom: thank you for your continuous prayers and support during my research endeavour;
- To my family and friends whose support and encouragement has made this research task possible. Your time, love and prayers will be fully rewarded.

The financial assistance of the NRF towards two years of this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and not necessarily to be attributed to the NRF.

ABSTRACT

The issue of poor access to water, sanitation, and hygiene (WASH) within Sub-Saharan Africa (SSA) is rampant. Even though WASH is a basic human right, many citizens in developing countries lack access to these services. Lack of WASH creates negative implications such as lack of productivity due to transmission of waterborne diseases which limits people from sustaining their livelihoods. Apart from the lack of WASH provision in SSA, disparities in service provision between urban and rural areas remains a challenge for development. Rural areas are lagging in achieving adequate access to WASH as compared to their urban counterpart. The recent outbreak of the COVID-19 pandemic has emphasised the importance of sufficient access to safe WASH. Thus, WASH services are therefore a necessity to all, especially to rural areas in developing countries as they are most affected from the lack of these services.

In light of the above, this study assessed community perceptions regarding challenges associated with access to WASH services in four selected rural communities in Ndwedwe Local Municipality. The overall aim of the study is to assess whether the challenges experienced by rural communities with access to WASH services are equally shared. To achieve this aim, it was first important to understand the efforts (in policy and practice) made to achieve Sustainable Development Goals (SDGs) and the current barriers to WASH provision across rural SSA. Hence, an extensive literature review was conducted for contextual understanding and evaluation of the barriers to WASH in SSA, post establishment of SDGs. A case study approach was utilised for the reviewing of current barriers to WASH provision in SSA. The overall findings of the literature review suggest that the root causes and impacts of the current barriers to WASH provision in SSA remain largely common amongst many countries, particularly in urban areas. In comparison, the current barriers to WASH provision are more complex to understand for rural communities. Thus, this study used a number of theories to explore the barriers to WASH provision in order to contextualise local community perceptions.

The sustainable livelihoods approach, political economy, political ecology, and urban bias theory were utilised to contextualise the complexity of WASH provision within these communities. This study undertook comparative research among households from four selected rural communities (known as Mkhukhuze, Msunduze, Intaphuka and Kwazini). These four communities are comparative based on the level of access to primary services and their geographical location. The Mkhukhuze and Msunduze communities have improved access to WASH services such as reticulated water and infrastructure as compared to the Intaphuka and Kwazini communities.

This study used a triangulation research approach as it utilised both quantitative and qualitative methods. The four rural communities were selected on the basis of the municipality's ongoing challenges associated with the provision of water and sanitation. This study employed snowball and purposive sampling techniques. Regarding the quantitative data, a questionnaire survey was employed. An inclusion and exclusion criteria was used to administer the questionnaires in the four communities. All four communities were included in the questionnaire survey as they do not have access to water. While households with residents who have not lived for more than five years within the communities were excluded. A total of four hundred questionnaires were administered to the four communities. Data collected from questionnaires was processed through Statistical Package for Social Science version 28, presented, and analysed descriptively. In respect to qualitative data, participatory rural appraisal (PRA) exercises were held among focus groups consisting of ten female respondents within each rural community. Inclusion and exclusion criteria was utilised to select the female participants for the PRA

exercises. The PRA methods utilised were namely problem ranking matrix, Venn diagrams, mental mapping, and transect walks. The qualitative data was analysed thematically.

Overall, the demographic results show that there were more females than males who participated in this study. Similarly, the results indicate that the majority of the households visited were female-headed, with the exception of the Kwazini community (with 57% male-headed households). With regards to educational attainment, most of the respondents in the Msunduze (66%) and Intaphuka (57%) communities did not complete secondary school. Across the communities, most respondents depended on unsustainable income sources, but 73% of the respondents in Kwazini community depended on sustainable wages as their household's primary source of monthly income.

Access to water provision is lacking among the four selected rural communities. As a result, households utilise alternative water sources such as rivers and streams with majority of respondents in Intaphuka (61%), Msunduze (49%), and Kwazini (45%). These sources are not reliable and often contaminated with domestic waste and sharing of livestock which result in a risk to the environment and human health. The Mkhukhuze community is the only community with a functional water system (borehole) and 41% of respondents indicated that they are accessing water from this infrastructure. Access to piped water is minimal with only 18% and 14% of respondents in the Mkhukhuze and Msunduze communities, respectively.

Poor sanitation at household level also exists as most respondents in Msunduze (54%) and Kwazini (52%) communities are still using pit latrines without ventilation. Some households are subjected to open defecation as 10% of respondents in the Intaphuka community do not have any sanitation facility. Lack of basic handwashing facilities is also widespread in these four communities, with the Kwazini community leading with majority of respondents (76%) unable to practice safe hygiene during the COVID-19 pandemic.

Results also reveal that there is corruption in the water supply of water tankers within the communities as truck drivers sell water illegally to residents within the four communities. To address inadequate access to WASH, suggestions such as community involvement (95%) and stakeholder partnership (90%) were motivated by the respondents in the four communities. WASH policy and reform must be implemented within rural areas to ensure adequate provision of services. Empowering and educating rural communities in water projects and maintenance of water infrastructure must be promoted to ensure the sustainability of infrastructure. Community involvement in reducing corruption in rural water distribution and water treatments in rural systems should also be encouraged to ensure sufficient access to improved WASH.

Key words: Water, sanitation, hygiene, rural, communities, WASH, Sub-Saharan Africa

TABLE OF CONTENTS

DECLARATION ..... **i**
DECLARATION 2 – MANUSCRIPT ..... **ii**
DEDICATION ..... **iii**
ACKNOWLEGEMENTS ..... **iv**
ABSTRACT ..... **v**
TABLE OF CONTENTS ..... **vii**
LIST OF TABLES ..... **xii**
LIST OF FIGURES ..... **xiv**
LIST OF PLATES ..... **xv**
LIST OF ACRONYMS ..... **xvi**
CHAPTER ONE **1**
INTRODUCTION **1**
1.1 Background 1
1.2 Motivation 6
1.3 Geographical significance 9
1.4 Aim and objectives 9
1.5 Research questions 10
1.6 Chapter outline 10
1.7 Chapter summary 10
CHAPTER TWO **11**
BARRIERS TO WATER, SANITATION AND HYGIENE IN SUB-SAHARAN AFRICA: A REVIEW **11**
2.1 Introduction 11
2.2 Methods and materials 13
2.2.1 Selection criteria and search outcome 14
2.3 Definitions of service levels of drinking water, sanitation, and hygiene 15
2.4 Results and discussion 16
2.4.1 Assessment of water and sanitation coverage in Sub-Saharan Africa 16
2.4.2 Barriers to water, sanitation, and hygiene 19
2.4.2.1 Institutional barriers 19
2.4.2.2 Economic barriers 21
2.4.2.3 Political barriers 21

2.4.2.4 Geographical barriers 22
2.4.3 Vulnerable groups within the WASH sector 28
2.4.4 Consequences of poor access to water, sanitation, and hygiene services 30
2.4.5 Persistent diseases associated with lack of water, sanitation, and hygiene provision 31
2.4.5.1 Diarrhoea 32
2.4.5.2 Cholera 33
2.4.5.3 Typhoid fever 34
2.4.6 Future recommendations 35
2.4.6.1 Promoting community involvement 35
2.4.6.2 Building stakeholder partnerships 36
2.4.6.3 Increasing investment in WASH infrastructure 37
2.4.7 Chapter summary 38
CHAPTER THREE 39
CONCEPTUAL FRAMEWORK 39
3.1 Introduction 39
3.2 Sustainable livelihoods approach 39
3.2.1 The sustainable livelihoods framework 42
3.3 Political economy 45
3.4 Political ecology 47
3.5 Urban bias theory 49
3.6 Chapter summary 51
CHAPTER FOUR 52
RESEARCH METHODOLOGY 52
4.1 Introduction 52
4.2 Research instruments 52
4.2.1 Primary data sources 52
4.2.2 Secondary data sources 53
4.3 Background to study areas 53
4.3.1 iLembe District Municipality Integrated Development Plan (2021/2022) 54
4.3.2 Ndwedwe Local Municipality Integrated Development Plan (2022/2027) 57
4.3.2.1 The four rural communities of Ndwedwe Local Municipality 58
4.4 Methodological approach 61
4.4.1 Triangulation 61
4.4.1.1 Quantitative 61
4.4.1.2 Qualitative 63

4.4.1.2 (a) Problem ranking matrix 65
4.4.1.2 (b) Venn diagrams 65
4.4.1.2 (c) Mental maps 66
4.4.1.2 (d) Transect walks 66
4.5 Ethical consideration 67
4.6 Sampling methods 67
4.6.1 Snowball sampling 69
4.6.2 Purposive sampling 70
4.6.2.1 Inclusion and exclusion criteria 70
4.7 Procedure for the analysis of data 71
4.8 Fieldwork experiences and limitations 73
4.9 Chapter summary 75
CHAPTER FIVE 76
DATA PRESENTATION, ANALYSIS AND DISCUSSION 76
5.1 Introduction 76
5.2 Demographic and household information 77
5.2.1 Access to land 88
5.3 Access to water 91
5.4 Sanitation and diseases 101
5.5 Community's coping mechanisms 112
5.5.1 Community initiatives 120
5.6 Ndwedwe Local Municipality interventions 124
5.7 Suggestions 126
5.8 Participatory exercise findings 130
5.8.1 The Msunduze community findings 130
5.8.1.1 Problem ranking matrix of the Msunduze community 130
5.8.1.2 Venn diagram of the Msunduze community 134
5.8.1.3 Mental map of the Msunduze community 136
5.8.1.4 Transect walks of the Msunduze community 139
5.8.2 The Intaphuka community findings 142
5.8.2.1 Problem ranking matrix of the Intaphuka community 142
Table 5.29 Intaphuka community's problem ranking matrix 142
5.8.2.2 Venn diagram of the Intaphuka community 144
5.8.2.3 Mental map of the Intaphuka community 146
5.8.2.4 Transect walks of the Intaphuka community 148

5.8.3 The Kwazini community findings 150
5.8.3.1 Problem ranking matrix of the Msunduze community 150
5.8.3.2 Venn diagram of the Kwazini community 152
5.8.3.3 Mental map of the Kwazini community 154
5.8.3.4 Transect walks of the Kwazini community 156
5.8.4 The Mkhukhuze community findings 158
5.8.4.1 Problem ranking matrix of the Mkhukhuze community 158
5.8.4.2 Venn diagram of the Mkhukhuze community 160
5.8.4.3 Mental map of the Mkhukhuze community 162
5.8.4.4 Transect walks of the Mkhukhuze community 164
5.9 Chapter summary 167
CHAPTER SIX 168
SUMMARY, RECOMMENDATIONS AND CONCLUSION 168
6.1 Introduction 168
6.2 Summary of key findings 168
6.2.1 Objective One: To review the barriers to WASH in SSA. 168
6.2.2 Objective Two: To assess the impacts of poor WASH on relevant diseases in rural SSA 169
6.2.3 Objective Three: To analyse the local community perceptions on the state of WASH provision in the four selected rural communities in NLM, KwaZulu-Natal. 171
6.2.4 Objective Four: To assess the effectiveness of the adaptive capacities used to counteract poor WASH in the four selected rural communities in NLM, KwaZulu-Natal. 172
6.3 Conceptual reflections 173
6.3.1 The sustainable livelihoods approach 173
6.3.2 Political economy 176
6.3.3 Political ecology 177
6.3.4 Urban bias theory 177
6.4 Recommendations 178
6.4.1 WASH policy implementation and reform 178
6.4.2 Empowering and educating rural communities 179
6.4.3 Reducing corruption in rural water distribution 180
6.4.4 Promoting water treatment methods within rural communities 181
6.5 Contribution of this study to the field 183
6.6 Conclusion 183
REFERENCES 185

Appendix 1 Questionnaire English version **221**
Appendix 2 Questionnaire IsiZulu version **236**
Appendix 3 Consent form English version **252**
Appendix 4 Consent form IsiZulu version **255**
Appendix 5 Ethical clearance letter **258**
Appendix 6 Turnitin report **259**

LIST OF TABLES

Table 2.1 Drinking water SDG service ladder…….....15

Table 2.2 Sanitation SDG service ladder ……..16

Table 2.3 Hygiene SDG service ladder……16

Table 2.4 Drinking water sources in Sub-Saharan Africa …….....17

Table 2.5 Sanitation services in Sub-Saharan Africa ……...18

Table 2.6 Overview of rural case studies in sub-Saharan Africa……..…24-27

Table 5.1 Demographic profile of respondents (in %) …….77

Table 5.2 Health issues of respondents (in %) ……...……...81

Table 5.3 Head of respondents' households (in %) ……...83

Table 5.4 Number of people living within the respondent's household (in %) ……84

Table 5.5 Type of employment of respondents (in %) …….85

Table 5.6 Respondent's main source of household's monthly income (in %) ……..87

Table 5.7 Respondents or family members who have lived elsewhere before and reasons for relocation (in %) ……...88

Table 5.8 Household's main source of water (in %) …….....91-92

Table 5.9 Reasons for unavailability of water at the source (in %) ……...94

Table 5.10 Distance to the water source and the appropriate time it takes to fetch water (in %) ……..98

Table 5.11 Respondents who perceive that travelling long distances is risky (in %) ……..100

Table 5.12 Safety of water for consumption from the source (in %) …….101

Table 5.13 Type of household sanitation (in %) …….104

Table 5.14 Water availability for sanitation purposes (in %) …….106

Table 5.15 Diseases due to poor sanitation (in %) …….....107

Table 5.16 Various diseases respondents suffer from…….……...108

Table 5.17 Vulnerability to diseases (in %) ……..….109

Table 5.18 Safe hygiene during COVID-19 pandemic and menstruation for females (in %) ……..……...…….110-111

Table 5.19 Alternative water sources (in %) ……..113

Table 5.20 Modes of carrying water (in %) ……....116

Table 5.21 Purchase of water, where respondents buy water, and the amount spent (in %)……..….118

Table 5.22 Community initiatives within the four communities (in %)……...…121

Table 5.23 Water infrastructure installed by the municipality in each community (in %).....124

Table 5.24 Rating the service of the current water supply (in %)……125

Table 5.25 Respondents suggestions (in %)……127

Table 5.26 Additional comments from respondents (in %) ……129

Table 5.27 Msunduze community's problem ranking matrix…….130

Table 5.28 Transect walks observations in the Msunduze community……..…...139-141

Table 5.29 Intaphuka community's problem ranking matrix…….142

Table 5.30 Transect walks observations in the Intaphuka community……...……..148-149

Table 5.31 Kwazini community's problem ranking matrix…….……150

Table 5.32 Transect walks observations in the Kwazini community…….……..156-157

Table 5.33 Mkhukhuze community's problem ranking matrix……...158

Table 5.34 Transect walks observations in the Mkhukhuze community……..164-166

LIST OF FIGURES

Figure 2.1 A flow chart representing the methodology for the review. Personal creation…...14

Figure 2.2 Recent outbreak of waterborne diseases in Sub-Saharan Africa. Personal creation…….35

Figure 4.1 Map illustrating the location of Ndwedwe Local Municipality within KwaZulu-Natal……..…59

Figure 4.2 Map illustrating the location of Ndwedwe Local Municipality within the iLembe District Municipality…….…..….60

Figure 5.1 Level of education received by respondents (in %)……..…..80

Figure 5.2 Number of people working within the respondent's household (in %)……..86

Figure 5.3 Household's total monthly income level (in %)……..…88

Figure 5.4 Duration the respondent has been living in the area (in %)……..89

Figure 5.5 Identifying whom collects the water (in %)……96

Figure 5.6 Number of times water is collected on a daily basis (in %)……..……..97

Figure 5.7 Containers the respondents use to fetch water in (in %)…….…....115

Figure 5.8 Items used to store water in homes (in %) …….117

Figure 5.9 Venn diagram drawn by the Msunduze community……..……134

Figure 5.10 A mental map of the current facilities within the Msunduze community……..…137

Figure 5.11 Venn diagram drawn by Intaphuka community……..144

Figure 5.12 A mental map of the current facilities within the Intaphuka community…..…..146

Figure 5.13 Venn diagram drawn by Kwazini community……..……....152

Figure 5.14 A mental map of the current facilities within the Kwazini community……..…154

Figure 5.15 Venn diagram drawn by Mkhukhuze community……....160

Figure 5.16 A mental map of the current facilities within the Mkhukhuze community…..…162

LIST OF PLATES

Plate 5.1 A borehole in the Mkhukhuze community…….92

Plate 5.2 Disposable diapers on the riverbank within the Intaphuka community……103

Plate 5.3 Stream shared with livestock within the Kwazini community……..103

Plate 5.4 Common sanitation within the Kwazini community……106

Plate 5.5 Improved sanitation within the Msunduze community…….……106

Plate 5.6 Communal tank within the Kwazini community……..114

Plate 5.7 Contaminated spring water within the Mkhukhuze community……...……114

Plate 5.8 Household's containers used to store water within the Kwazini community……....118

Plate 5.9 A dysfunctional standpipe within the Mkhukhuze community…….125

Plate 5.10 A household's dysfunctional tap with no running water withing the Intaphuka community……..……125

LIST OF ACRONYMS

ATMS : Automated Teller Machines

CBM : Community-Based Management

CLTS : Community-Led Total Sanitation

COGTA : Co-operative Governance and Traditional Affairs

DWS : Department of Water and Sanitation

GDP : Gross Domestic Product

GLAAS : Global Analysis and Assessment of Sanitation and Drinking-Water

HIV : Human Immunodeficiency Virus

HSSREC : Humanities and Social Sciences Research Ethics Committee

IDP : Integrated Development Plan

IWRM : Integration of Water Resources Management Policy

JMP : Joint Monitoring Programme

MDGs : Millennium Development Goals

NDP : National Development Plan

NGO : Non-Governmental Organisation

NLM : Ndwedwe Local Municipality

NPOs : Non-Profit Organisations

PRA : Participatory Rural Appraisal

RDP : Reconstructed Development Programme

SDGs : Sustainable Development Goals

SLA : Sustainable Livelihoods Approach

SPSS : Statistical Package for Social Science

SSA : Sub-Saharan Africa

StatsSA : Statistics of South Africa

UNICEF : United Nations Children's Fund

WASH : Water, Sanitation, and Hygiene

WHO : World Health Organisation

CHAPTER ONE
INTRODUCTION

1.1 Background

Access to safe water, sanitation, and hygiene (WASH) remains a worldwide challenge. In 2015, at least 663 million people worldwide lacked adequate access to improved drinking water sources, with more than 2.4 billion people without access to improved sanitation (Ohwo and Agusomu, 2018:310). The World Health Organisation (WHO) (2015:5) noted that 319 million people in Sub-Saharan Africa (SSA) lacked adequate improved water sources whilst 695 million people reported to be using an unimproved sanitation facility. Although this is a global issue, SSA accounts for more populations without access to improved WASH (Roche *et al.,* 2017; Armah *et al.,* 2018; Bishoge, 2021). In an effort to addressing issues of inadequate access to water and sanitation, the Millennium Development Goal (MDG) (Target 7.C) was established to halve the population deprived of access to safe water and proper sanitation by 2015 (Martinez-Santos, 2017b). As such, developing regions such as SSA, Asia, and Latin America agreed to national and international strategies to meet this goal.

At the beginning of the MDG era, the worldwide population coverage for access to drinking water as well as sanitation was at 76% and 54%, respectively (WHO/UNICEF, 2015:2). Progress was made in attaining this goal as by the end of 2015, the MDG 7 targets for these improvements for drinking water and sanitation was 88% and 77%, respectively (WHO/UNICEF, 2015:2). During the implementation of the MDGs, over 2 billion people gained access to improved drinking water and sanitation (Weststrate *et al.,* 2019:795; Trepanier *et al.,* 2021:638). The drinking water target was achieved as 89% of the universal population gained access to an improved drinking water source (WHO, 2017b:10). However, underprivileged regions such as SSA, Northern Africa, Caucasus, and Central Asia, as well as Oceania did not achieve this target (Martinez-Santos, 2017b; Armah *et al.,* 2018). Although there has been progress in enhancing access to drinking water and sanitation, SSA still lags behind with increasing numbers persistently lacking access to safe and sustainable water supply and improved sanitation.

In addressing the slow progress of meeting this goal, the upgrade from MDG 7 to Sustainable Development Goal (SDG) 6 was implemented to achieve the goal of ensuring there is available water and sanitation services managed sustainably by 2030 (WHO, 2017; Howard, 2021). Like other low-income regions, SSA failed to meet the MDG target, but still progressed during the

MDG period, with only 42% of its population gaining access to safe drinking water since 1990 (Armah *et al.,* 2018:3). Since, SDG 6 focuses on providing basic WASH services for all by 2030, to achieve this goal, all existing forms of disparities that hinder sufficient access to WASH must be addressed (Ohwo and Oduba, 2021). Despite the reported progress made on the provision of WASH amenities at both the global and regional levels, there are also differences in WASH provision that exist between and within countries (Ohwo and Agusomu, 2018).

Although WASH services have improved thus far, there are significant differences in service levels as many people still remain without these services (WHO, 2019). Unfortunately, there are various forms of inequalities within the WASH sector (between urban and rural; rich and poor; able and disabled; male and female, amongst others) that still occur (Wrisdale *et al.,* 2017; Sweetman and Medland, 2017; White *et al.,* 2017; Enfield, 2018; Kayser *et al.,* 2019). Despite the challenge of access to safe WASH being widespread in SSA, this problem is exacerbated in rural areas (Kamara *et al.,* 2017; Roche *et al.,* 2017; Boelens *et al.,* 2018; Ohwo, 2019). Historically, urban areas have always been favoured regarding the expansion of public and formal water supply and sanitation services (Dos Santos *et al.,* 2017). Studies have shown that urban areas have improved WASH services in comparison to rural areas (Roche *et al.,* 2017; Adams and Smiley, 2018; Armah *et al.,* 2018). For instance, in a study conducted in Zambia to examine the inequalities among cities and rural areas regarding access to water and sanitation facilities, it was found that the concentration of access to improved water and sanitation was in cities, while rural areas used unimproved water and sanitation facilities (Mulenga *et al.,* 2017). Similarly, in a study in Malawi, Adams and Smiley (2018) concluded that piped water was standard in peri-urban areas while rural areas depended on groundwater due to the absence of piped water systems and improved sources.

Within many countries, urban populations are far more likely to have piped water systems and sewer connections than their rural counterparts (WHO, 2017; Roche *et al.,* 2017; Armah *et al.,* 2018; Zerbo *et al.,* 2021). However, even within urban populations, the number of people with access to piped water on premises and basic sanitation has dropped with disparities existing in access between the rich and poor communities (WHO, 2017; Dos Santos *et al.,* 2017; Sinharoy *et al.,* 2019). Kamau and Njiru (2018) argue that the WASH situation in the urban slums in Kenya is below the minimum standard recommended by the WHO. Similarly, in a study conducted in a slum community in Uganda to assess the level of WASH coverage, it was

concluded that the coverage of improved sanitation and hygiene was low due to the use of a shared pit latrine that had no handwashing facility (Ssemugabo *et al.,* 2021).

Slums are areas typically overcrowded with deteriorating housing infrastructure with open sewage systems which flow just outside their doors, enter their homes during rainy seasons and contaminates the household drinking sources (Kamau and Njiru, 2018). Due to increasing populations and urbanisation, an estimated 2 billion population is expected to be living in slums by 2030 (Ross *et al.,* 2020:130). Over the next 30 years, the majority of the global population growth (90%) is projected to occur in African and Asian cities alone, with a majority of those people added in informal settlements, slums, and other underprivileged urban areas (Thomson *et al.,* 2021:31). This further adds pressure on the existing challenges in the WASH sector as these regions will not be able to cater for the growing population, leaving many with limited to no access to WASH. Similar to rural areas, slums usually lack formal sewage or waste disposal systems which exacerbates the inequality between the rich and poor (Ross *et al.,* 2020). Therefore, a need to address the marginalisation and disparities in access to WASH services is essential as it threatens the attainment of SDG 6.

Secure access to WASH is a critical human right that is vital for human welfare and dignity which assists in the development of healthy citizens who can contribute to their livelihoods (Roche *et al.,* 2017; Armah *et al.,* 2018; Meehan *et al.,* 2020). The consumption of unsafe water and poor sanitation impairs on human health as it is one of the leading contributors of infectious waterborne diseases such as diarrhoea, cholera, and typhoid fever (Nienie *et al*., 2017; WHO, 2017b). The practice of open defecation also facilitates the spread of pathogens such as bacteria and fungi that cause diarrhoeal diseases, which is one of the leading contributors to the burden of disease at the global scale (Belay *et al.,* 2022). According to WHO (2021:9) approximately 490 million people practice open defecation, while majority of this population (92%) resides in rural areas and nearly half of them are in SSA. Open defecation is more dominant in SSA countries and relates to socioeconomic status. For instance, in a cross-sectional study conducted in rural Nigeria, at least a quarter of Nigerians practiced open defecation in 2015, ranking Nigeria third in the world in open defecation prevalence after India and China (Abubakar, 2018:1455). Similarly, in a study aimed to examine the extent of toilet ownership in rural Northern Ghana, it was found that over a third of households had either never owned or no longer owned a functional toilet, while a quarter of households reported to be practicing open defecation regularly (Delaire *et al.,* 2022:1).

Globally, diarrhoea accounts for the highest mortality rates particularly in children under five years due to the prevalence of unimproved water, poor sanitation, and lack of basic hygiene (Peter and Umar, 2018; Wolf *et al.,* 2019). In 2017, diarrhoea was among the leading causes of death among all ages worldwide, with more than 1.7 million deaths, while 90% of deaths occurred in South Asia and SSA (Nguyen *et al.,* 2021:1). Although recent findings reveal that deaths associated with diarrhoea among children decreased by 34% between 2005 and 2015, this disease still remains an issue, especially in South Asia and SSA (Ayuk, 2018:259). Lack of WASH also exacerbates malnutrition and childhood stunting which leads to altered growth in children's health (Null *et al.,* 2018). Therefore, inadequate access to safe sanitation is a key health risk as it is responsible for escalating mortality rates annually.

South Africa, as one of the wealthiest and developed countries in SSA, also faces major challenges regarding access and distribution of WASH services (Pan *et al.,* 2018). Although access to clean and safe drinking water is a constitutional right, lack of access to a drinking water supply still lags with millions depending on untreated water (Clifford-Holmes *et al.,* 2017; Förster *et al.,* 2017; Al-Saidi, 2017; Coetzee and Kotzé, 2018; Pahl-Wostl, 2019). Residents of impoverished communities such as rural areas and informal settlements are left with no alternative other than to find local sources such as rivers for drinking water. Poor water provision in South Africa is exacerbated in rural areas as rural dwellers resort to the collection of water from sources such as rivers, springs, streams, lakes, ponds, wells, and rainwater harvesting to meet their domestic water needs (Edokpayi *et al.,* 2018; Abrams *et al.,* 2021). Due to lack of water treatment schemes in rural areas, water from such sources is often consumed without any form of treatment which makes rural dwellers vulnerable to waterborne diseases.

History plays a critical role in defining the root cause of the inequality between policy and water access in South Africa. The 1913 Native Land Act was the foundation of the apartheid policy as it determined people's access to land – which was a fundamental asset in agrarian South Africa (Mazibuko, 2013). This Act displaced and restricted the indigenous African population to 13% marginal land which they could own in these homelands or Bantustans, while the European descendant population had access, control and ownership of 87% of the land (Mazibuko, 2013:181). In addition to the limited size of the Bantustans, apartheid racial discrimination also prohibited non-white South Africans from having equal access to water, and the associated benefits as well as opportunities linked with this resource (Tarantino, 2019). Subsequently, the Group Areas Act of 1950, that made residential separation compulsory

between racial groups, particularly between blacks and whites, further controlled Africans' access to proper water supply and sanitation (Tempelhoff, 2017).

Post-independence in 1994, the government of South Africa initiated and adopted various water policies and programmes aimed at creating sustainable water development to improve both the quality and quantity of water supply to its citizens, especially the previously disadvantaged black population (Adom and Simatele, 2021). The water policy was modified to include the Water Service Act, in the 1994 White Paper to address the backlogs in the country's water service provision (Coetzee and Kotzé, 2018). The Republic of South African Constitution (Act 108 of 1996) was also enacted as the human right dimension with prominence to access adequate and sustainable water supply and services. Furthermore, the Water Service Act of 1997 (Act 108 of 1997) and the National Water Act of 1998 further established and empowered South African citizens with the right of access to basic water supply and sanitation (Adom and Simatele, 2021). The 2030 National Development Plan (NDP) highlights that water is recognised as an intrinsic resource in ensuring basic standard of living. Regarding hygiene and sanitation, the National Sanitation Policy of 2016 ensures that all institutions (public and private) are responsible to provide proper sanitation which includes handwashing facilities (Coetzee and Kotzé, 2018). With these policies, the NDP predicts all South Africans must have access to affordable and reliable access to WASH by 2030.

However, the legacy of unequal distribution of WASH services and infrastructure still remains in post-apartheid South Africa (Clifford-Holmes *et al.,* 2017). Particularly in KwaZulu-Natal, the South African Human Rights Commission has condemned municipalities and water service authorities within the province for violating the rights of citizens to access sufficient clean water (Comins, 2023). Its inquiry into water service delivery revealed that critical infrastructure is collapsing due to rampant neglect, lack of investment, corruption, as well as insufficient capacity to maintain the infrastructure to meet the spiralling demand for the commodity (Radebe, 2023). The commission also found that the water tanker procurement system is being abused for commercial gain, while residents who have the purchasing power and influential receive water deliveries at the expense of those without these privileges (Comins, 2023). Regardless of the established post-apartheid legislation, the province of KwaZulu-Natal still faces delays and challenges in addressing WASH challenges.

While the South African Community Survey (2016) has reported an increase in access to piped water and sanitation facilities, full coverage is still far from reality. Hemson (2016) suggests

that the presence of these facilities, particularly in rural areas, does not necessarily mean that they are operational. Even when they are operational, water quality problems arise. This highlights that it is important to look beyond the mere presence or lack of piped water. As such, the South African WASH situation is layered and multifaceted. Hence, understanding the related threats and vulnerabilities requires going beyond determining the existing number of taps and sanitation facilities available at household level.

1.2 Motivation

The outbreak of the COVID-19 pandemic has once again emphasised the importance of sufficient access to safe WASH in the public health sector (Street *et al.*, 2020; Smiley *et al.*, 2020; Desye, 2021). Since the pandemic, many African countries, including South Africa, have struggled to provide adequate water supply to its citizens due to the increasing demand for good hygienic standards to curb the transmission of this virus (Zindi and Shava, 2022). Owing to climate change and vulnerability to droughts, South Africa remains a water-scarce country with limited rainfall which measures below the world's average (Edokpayi *et al.*, 2018; Tarantino, 2019). Considering the high inequality and poverty rates in this country, the defenceless groups such as female-headed households, people living with disability, and the elderly are greatly affected by environmental changes exacerbated by climate change which further impacts on their livelihoods as they lack the earning potential (Ziervogel *et al.*, 2014; Dasgupta *et al.*, 2023). These groups often lack adaptive capacities such as purchasing water during drought conditions to sustain their livelihoods. This further deters the attainment of SDG 6 as it demands access to clean water and sanitation for all. The water insecurity challenges in South Africa also affect socio-economic growth as a clean water supply is required for citizens to ensure they maintain proper sanitation and hygiene as a corrective strategy to the COVID-19 pandemic and other infectious waterborne diseases.

A lesson learnt from the COVID-19 pandemic is that the citizens of South Africa are far from accessing proper WASH services. Local municipalities still struggle to provide clean water to the underprivileged groups, especially those residing in informal settlements and rural areas, where water supply infrastructure is not even available (Zindi and Shava, 2022). Hemson (2016) argue that the shortcomings in water provision in South Africa are associated with issues regarding accessibility, lack of water flowing from taps, as well as incomplete several water systems. However, these shortfalls in functionality of water infrastructure are predominantly found in rural areas, with high levels of interrupted supply (Hemson, 2016). Informal

settlements are also not an exception as they usually experience water shortages. As a result, failures in ensuring service delivery have become one of the causes of the frequent protests associated with poor service delivery within South Africa (Pieterse, 2014; Pan *et al.,* 2018; Twani and Soyapi, 2022). Regarding sanitation services, in 2013, there was even a 'poo protest' where people threw human faeces in public spaces, including Parliament, as a way of complaining about poor sanitation facilities in informal settlements of Khayelitsha in Cape Town (Barnes, 2018). Consequently, water and sanitation-related protests have been widespread countrywide.

In addition to the problem of dysfunctionality of water infrastructure in South Africa, deficiencies have also been reported in the quality of drinking water in rural water schemes (Hemson, 2016). Rural areas are still subjected to consuming contaminated water due to the lack of proper wastewater treatments available in these areas (Mackintosh and Colvin, 2003; Odiyo and Makungo, 2012; Hemson, 2016; Edokpayi *et al.*, 2017; Edokpayi *et al.,* 2018). A report by the South African Council for Scientific and Industrial Research has shown that over 2 million people in South Africa lack access to any safe water system (Edokpayi *et al.*, 2018:2). Studies have shown that the water treatment plants in rural systems do not meet the requirements of the South African National Standards for the quality of drinking water (Mackintosh and Colvin. 2003; Odiyo and Makungo, 2012; Hemson, 2016).

A 2002 study conducted in western and eastern provinces of South Africa, which aimed to assess the failures of rural water schemes, revealed that the majority of water samples collected did not meet the drinking water quality standards (Mackintosh and Colvin, 2003). This was due to inadequate monitoring and managing of the schemes, pump breakdown, as well as weakening of the reticulation system. Similarly, in 2006, uneven water quality was recorded in a study of fifty-five rural water treatment plants in the province of Eastern Cape, with only 18% complying with the recommended limits regarding microbiological quality specified in national water standards (Momba *et al.,* 2006:715). A study of groundwater quality in rural Mpumalanga also found that some water tested posed a threat to the health of its consumers (Mpenyana-Monyatsi *et al.,* 2012). Access to piped water, on its own, does not indicate access to safe drinking water. Access to unsafe drinking water proves that South Africa is far from achieving improved WASH particularly in rural areas.

Another challenge that hinders improved access to WASH in this country is the prevalence of sewage spillages due to impaired wastewater management infrastructure, which also negatively

impacts on the quality of water (Sindane and Modley, 2023). The weakening state of municipal wastewater and sewage treatment management in South Africa has remained one of the main contributing factors to the numerous contamination problems experienced in most underprivileged parts of the country and a leading contributor to environmental and human health issues (Herbig, 2019). As most rural and poor communities lack any form of wastewater management systems, effluents from industries are usually disposed to surface water courses or spilled within poor communities which often pose a threat to biodiversity and health to humans (Edokpayi *et al.,* 2017). The failure of municipalities to advance and maintain the wastewater treatment facilities has been an issue for many years with raw sewage spills being observed on the streets indicating the country's poor state of proper WASH provision.

The consumption of water from sources lacking treatment poses a major public health concern. As highlighted, consumption of unsafe water is one of the causes of diarrhoeal disease in children under five years particularly in developing countries in SSA (Peter and Umar, 2018; Wolf *et al.,* 2019). In South Africa, this disease has remained one of the leading causes of mortality among children, with this problem exacerbated in children infected with Human Immunodeficiency Virus (HIV) (Mackintosh and Colvin, 2003; Edokpayi *et al.,* 2018). Several episodes of disease outbreaks such as diarrhoea and cholera have been reported in South Africa due to wastewater effluents as the major contributor.

The 2000 to 2001 cholera epidemic exemplify the health risks resulting from gaps in achieving a healthy environment (Hemson, 2016). The cholera epidemic led to a devastating 114 000 cases resulting in reported 260 deaths, with the majority of incidences located in the province of KwaZulu-Natal (Hemson and Dube, 2004:1). This epidemic raised issues concerning access, functionality, and water quality, as well as highlighting the weaknesses across the rural water and sanitation landscape. Similarly, in early 2014, a diarrhoea outbreak was reported in the province of Limpopo (Edokpayi *et al.,* 2017). Also, the recent 2023 outbreak of cholera in Hammanskraal, Gauteng, which claimed 24 lives (Ngcobo, 2023:1), proves that South Africa still lacks the capability of providing proper WASH to its citizens.

Thus, this study highlights that South Africa is still struggling to achieve proper WASH provision particularly in rural areas. This comparative study aims at critically assessing the community perceptions regarding challenges associated with WASH. This study notes there is limited research on WASH access in rural South Africa and aims to fill in the gap in literature

and encourage future studies. The lack of access to proper WASH in rural South Africa hinders the country's attainment of SDG 6 which further impacts on upward socio-economic mobility.

1.3 Geographical significance

Access to WASH services is a paramount global human right necessary for achieving the SDGs in 2030 (Armah *et al.*, 2018; Akoteyon, 2019; Bishoge, 2021). Even though WHO (2019) has noted some achievements over the years, SSA countries still need to reach this goal. The global South still faces unsafe provision of WASH, with this problem exacerbated in rural areas (Roche *et al.*, 2017; Dos Santos *et al.*, 2017; Nhamo *et al.*, 2019). As such, the 2030 Agenda for reaching this goal is far-fetched, considering many countries still need to reach the SDG 6.

As geography is rooted in real-world phenomena, the lack of access to WASH is also a worldwide problem experienced at different spatial scales and places (Campbell, 2018). The key hindrance for developing countries to meeting the SDGs is the increasing inequality between urban and rural areas particularly in infrastructural facilities, leading to spatial differences in livelihood (Chaudhuri and Roy, 2017). This poses a challenge in achieving improved WASH for everyone. These geographic inequalities can be mapped which helps identify the issues (Wang *et al.*, 2019; Akoteyon, 2019). This can be helpful for policy authorities and researchers as they are vital in providing suitable and sustainable solutions.

1.4 Aim and objectives

The aim of this study is to assess community perceptions regarding challenges associated with water and sanitation in four selected rural communities in Ndwedwe Local Municipality (NLM), KwaZulu-Natal, South Africa.

The objectives of this study are to:

- Review the barriers to WASH in SSA.
- Assess the impacts of poor WASH on relevant diseases in rural SSA.
- Analyse the local community perceptions on the state of WASH provision in the four selected rural communities in NLM, KwaZulu-Natal.
- Assess the effectiveness of the adaptive capacities used to counteract poor WASH provision in the four selected rural communities in NLM, KwaZulu-Natal.
- Provide recommendations for improving access to WASH in rural communities.

1.5 Research questions

1. What are the barriers to WASH in SSA?
2. What are the impacts of poor WASH on relevant diseases in rural SSA?
3. How do local respondents perceive the state of WASH provision in the four selected rural communities in NLM, KwaZulu-Natal?
4. How effective are the adaptive capacities used to counteract poor WASH provision in the four selected rural communities in NLM, KwaZulu-Natal?
5. What recommendations can be provided to improve access to WASH in rural communities?

1.6 Chapter outline

This chapter serves as a background of the thesis, the motivation, and the geographic relevance of this study. This chapter also highlights the overall aim, objectives, and research questions of this research. Chapter two provides the literature review in a form of a review paper. The conceptual framework is discussed in Chapter three which includes the sustainable livelihoods approach, political economy, political ecology, and the urban bias theory. Chapter four discusses the methodology adopted for this study. These methods include quantitative and qualitative data methods, sampling techniques, and analysis of the data. The background to the four study areas is also discussed in Chapter four. Chapter five presents, analyses, and discusses the data collected. Chapter six assesses the research findings, provides suggestions, and presents a conclusion.

1.7 Chapter summary

This chapter outlined and briefly explained the study's background. The lack of WASH services in South Africa particularly in rural areas motivated this research. The geographic significance, aim, objectives, and research questions were also discussed. This chapter also included the chapter outline of the entire study. The following chapter reviews relevant literature surrounding WASH in SSA particularly exploring the barriers and consequences of poor WASH.

CHAPTER TWO

BARRIERS TO WATER, SANITATION AND HYGIENE IN SUB-SAHARAN AFRICA: A REVIEW

2.1 Introduction

The lack of access to drinking water has become one of the noteworthy obstacles facing humankind in this century (Roche *et al.* 2017; Armah *et al.* 2018; Ohwo & Agusomu 2018; Pichel *et al.* 2019; Bishoge 2021). This crisis ranks ahead of universal issues such as climate change extreme weather events, social instability, and food crises (Dos Santos *et al.,* 2017). According to WHO (2021:8) in 2020, an approximate 2 billion people required safely managed services, with over 1 billion people without essential services, 282 million with insufficient services, 367 million using poor sources, and 122 million drinking unsafe surface water. Secure access to water is a universal human right (Roche *et al.,* 2017; Armah *et al.,* 2018; Meehan *et al.* 2020). Unfortunately, the human population still lacks behind from attaining universal water access (Emenike *et al.,* 2017; Martinez-Santos, 2017b).

The initial step in overcoming these challenges is to ensure safe water to all populations. For this reason, water has remained firmly on the international agenda (Harlin and Kjellén, 2015). Hence, the goal of the 1990-2015 MDGs aimed to halve the population deprived of access to safe water and proper sanitation by 2015 (Target 7. C) (Martinez-Santos, 2017b). National and international initiatives were established to achieve this goal throughout developing regions such as Asia, Latin America, and Africa. As such, investments in new infrastructure projects were made and built in both rural and urban areas. This was done in the hope of achieving the target while improving people's living conditions.

The Joint Monitoring Programme (JMP) which is part of the World Health Organisation and United Nations Children's Fund (WHO/UNICEF) has a mandate to produce international estimates of progress on WASH for each country while making comparisons between urban and rural areas, respectively (WHO, 2021). The 2021 JMP report noted that during the implementation of the MDGs, over 2 billion people gained access to improved drinking water and sanitation (Weststrate *et al.,* 2019:795; Trepanier *et al.,* 2021:638). In 1990, the global coverage was at 76% and 54% for access to improved drinking water and improved sanitation, respectively (WHO/UNICEF, 2015:2). By the end of 2015, the MDG 7 targets for these improvements for drinking water was 88% and 77% for sanitation, respectively (WHO/UNICEF, 2015:2). The drinking water target was achieved as 89% of the universal population had access to an improved drinking water source (WHO, 2017b:10). For example,

China and India accounted for approximately half of the population, while the underprivileged regions such as SSA, Northern Africa, Caucasus and Central Asia, as well as Oceania did not achieve the target (Martinez-Santos, 2017b; Armah *et al.*, 2018).

Water and sanitation have been a central debate in the international sphere for decades as they are an essential element of public health and a prerequisite for a basic living condition (Pereira and Marques, 2022). The upgrade from MDGs to the 2015-2030 SDGs was implemented to achieve the goal of ensuring there is available water and sanitation services managed sustainably, which is under SDG 6 (WHO, 2021). In doing so, targets 6.1 and 6.2 indicators were then established (WHO, 2021). It is evident that the upgrade from MDGs to SDGs was needed to enhance the initial eight goals which did not initially consider water and sanitation services as critical components of worldwide sustainable development (Pereira and Marques, 2022). SDG 6.1 deals with drinking water, and 6.2 deals with sanitation – now also including hygiene and open defecation (Harlin and Kjellén, 2015). The water goal of the SDG and its related targets clearly go beyond the WASH services.

The 2017 JMP global report reported that 30% of people worldwide lacked access to clean drinking water at household level, while 60% of these people did not have access to safely managed sanitation (Ohwo, 2019:145). These recent statistics contradict the figures reported in the 2015 MDG assessment on water and sanitation as it reported that by 2015, 89% of people had access to improved drinking water (WHO/UNICEF, 2015:2). The variance in these reports reveal how detailed and comprehensive the SDGs' monitoring is concerning water and sanitation (Ohwo, 2019).

Despite the joint effort that has been achieved, WASH services still need to be improved in SSA (Pichel *et al.*, 2019; Ohwo, 2019). SSA is one of the poorest regions, associated with lack of access to adequate WASH (Roche *et al.*, 2017; Armah *et al*., 2018; Bishoge, 2021). Across the world, nearly 10% of the population lives without access to an improved drinking source, with more of this population residing in SSA compared to other regions (Dos Santos *et al.*, 2017:497). Like other low-income regions, SSA failed to meet the MDG target, but still progressed during the MDG period, with only 42% of its population gaining access to safe drinking water since 1990 (Armah *et al.*, 2018:3).

There are also ongoing disparities between urban and rural areas as well as between underdeveloped and developed nations (Roche *et al.*, 2017; Pichel *et al.*, 2019; Fotio and Nguea, 2022). Therefore, tracking inequalities in access to WASH services is essential to assess

its progress. Goal 10 of the SDGs is also impacted on this as the goal aims to reduce inequalities between and within countries (Armah *et al.*, 2018). The 2030 Agenda slogan 'leave no one behind' due to age, income, race, sex, ethnicity, disability, ethnicity, migratory status, or geographic location highlights the aim to reduce such inequalities (Armah *et al.*, 2018). Statistics show that in SSA by 2015, only 5% and 23% of the rural population had access to piped water on premises and improved sanitation, respectively, compared to the urban population with 33% and 40%, respectively (Ohwo, 2019:145). Historically, urban and wealthier areas have always been favoured regarding the expansion of public and formal water supply and sanitation services (Dos Santos *et al.* 2017). It is thus vital to address these inequalities promptly as they pose a threat to the achievement of SDG 6. The aim of this review is to evaluate the barriers to WASH particularly in SSA. The assessment of WASH coverage from the MDGs to the current SDGs is discussed while recommendations for improvement are also highlighted. The outline of this chapter includes the review methodology, definitions of service levels of WASH, barriers to WASH, vulnerable groups within the WASH sector, consequences of poor access to WASH, persistent diseases associated with poor WASH, and future recommendations to enhance adequate access to WASH.

2.2 Methods and materials

This review acknowledged and assessed literature regarding WASH barriers in SSA. The search of relevant literature was conducted from 02 April to 20 November 2023. The key databases used to obtain all information included Google Scholar (https://scholar.google.com), Scopus (https://www.scopus.com/), and ScienceDirect (sciencedirect.com). In the database, search criteria included usage of the following keywords: "barriers" "water", "sanitation", "hygiene", "services", "WASH", "facilities", "access", "inequality", "improved", "adequate" "sub-Saharan Africa", "rural", "challenges", "lack", "infrastructures", "households", "influencing", and "factors".

Papers focusing on content relevant to one or more of the topic areas were selected for review. These paper journals included, but not limited to, were the *Journal of Water, Sanitation and Hygiene for Development* (Journal of Water, Sanitation and Hygiene for Development | IWA Publishing (iwaponline.com)), *International Journal of Water and Resources Development* (https://www.scirp.org/Journal/jwarp), *European Scientific Journal* (European Scientific Journal, ESJ (eujournal.org)), the *Public Library of Science (PLOS) journal* (Home - PLOS),

and the *Local Environment: International Journal of Justice and Sustainability* ([PDF] Local Environment : The International Journal of Justice and Sustainability | Semantic Scholar).

2.2.1 Selection criteria and search outcome

This review used the following search criteria to select the relevant studies: (i) studies conducted between 2015 (end of the MDGs) and 2023 (current SDGs period), (ii) studies with qualitative and quantitative research methods (cross-sectional, observational studies, interviews, and questionnaire surveys), and (iii) studies published in the English language. Studies that had insufficient information were omitted. The researcher screened the studies based on the titles and abstracts and then proceeded to download and review the full text publications with complete information and unambiguous titles that met the requirements.

Based on the keywords provided, a total of 1053 articles were found in the search engines linked to the topic. A total of 274 duplicates were excluded while 779 articles were screened on title. After searching for full texts and 384 articles screened on abstracts, 105 articles were screened for eligibility. A total of 38 articles were then excluded after full text screening due to language, type of study, and data redundance. Only 67 articles were found legible and satisfied the set criteria and were thus selected for this review (see Figure 2.1).

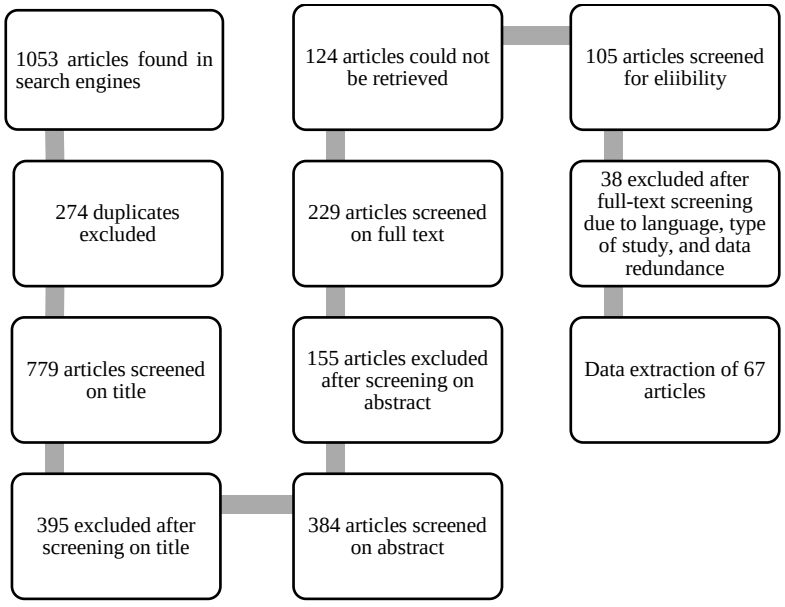


Figure 2.1 A flow chart representing the methodology for the review. Personal creation.

2.3 Definitions of service levels of drinking water, sanitation, and hygiene

The JMP has established 'service ladders' to compare progress across regions and countries globally which expands SDG's monitoring (WHO, 2021). The WHO (2021) provides five drinking water ladder definitions which are stipulated in Table 2.1. The 'safely managed' drinking water services is now included which relates to the SDG target 6.1 indicator. The ladder builds on the MDG monitoring of improved and unimproved source type and now introduces additional criteria used for SDG monitoring.

Table 2.1 Drinking water SDG service ladder

Service Level	Definition
Safely managed	This refers to access to safe and drinkable water that should not be contaminated by faeces or chemicals. This water must be accessible within households and from an improved source.
Basic	This is water that is accessed from an improved source, while the collection time, including queuing, should not surpass 30 minutes per round trip.
Limited	This is water that is accessed from an improved source, given that the collection, including queuing, exceeds 30 minutes per round trip.
Unimproved	This includes water accesses from an unprotected spring or dug well.
Surface water	This is water that is accessed directly from canal, river, lake, stream, and irrigation canal.

Source: WHO, 2021.

Like drinking water services, the WHO (2021) also provides five sanitation ladder definitions explained in Table 2.2. This ladder includes safely managed sanitation services, which relates to the SDG target 6.2 indicator. The ladder expands on the MDG indicator of improved sanitation facilities and now introduces other aspects of service quality.

Table 2.2 Sanitation SDG service ladder

Service Level	Definition
Safely managed	This is the use of improved facilities within a household that are not shared with different households. It also includes the safety disposal of excreta and treated off-site.
Basic	This only refers to improved sanitation amenities within a household that are not shared with other households.
Limited	The use of improved facilities, which can be shared among households.
Unimproved	Usage of pit latrines, and also the use of bucket latrines, or hanging latrines.
Open defecation	Disposing of human excreta in the open space, water bodies, field, bushes, or forests.

Source: WHO, 2021.

The hygiene SDG service ladder (Table 2.3) has three basic levels, which are essential, limited, and no facility (WHO, 2021). Notably, hygiene was never included as a target in MDG 7 and is now included in SDG 6.2 alongside sanitation and open defecation.

Table 2.3 Hygiene SDG service ladder

Service Level	Definition
Basic	The presence of and access to handwashing services, which includes the use of soap and water at home.
Limited	Access to handwashing services, which lack soap and or water.
No facility	Lack of handwashing service at home.

Source: WHO, 2021.

2.4 Results and discussion

2.4.1 Assessment of water and sanitation coverage in Sub-Saharan Africa

By the end of the MDGs, there was remarkable progress made regarding water and sanitation targets. By 2010, the drinking water target (88%) was met (WHO/UNICEF, 2015:25). By 2015, access to proper drinking water sources was completed, accounting for 91% of the global population compared to 76% in 1990 (WHO/UNICEF, 2015:25). As 663 million people

worldwide lacked adequate improved water sources, 319 million were located in SSA (Ohwo and Agusomu, 2018:310). This proves the differences in access between regions. However, the SSA region still needs to make progress. WHO/UNICEF (2015) revealed that only 23 countries in SSA were able to achieve the drinking water target (Table 2.4). The data from Congo, Somalia, South Sudan as well as Sudan could not be retrieved. The country with the highest percentage (100%) was Mauritius which had total improved drinking water sources. In comparison, 52% of the population in Equatorial Guinea had unimproved drinking water sources in SSA, accounting for the highest percentage. (WHO/UNICEF, 2015:67).

Table 2.4 Drinking water sources in Sub-Saharan Africa

Performance Rating	Countries
Countries that met the MDG drinking water target	Mauritius, South Africa, Ghana, Ethiopia, Djibouti, Mali, Namibia, Nigeria, Swaziland, Uganda, Gabon, Benin, Botswana, Cameroon, Senegal, Burkina Faso, Cape Verde, Guinea, Sao Tome and Principe, Reunion, Gambia, Malawi, and Guinea-Bissau (23)
Countries that missed the MDG drinking target	Mozambique, Lesotho, Niger, Democratic Republic of Congo, Seychelles, Tanzania, Togo, Chad, Zambia, Kenya, Liberia, Madagascar, Rwanda, Eritrea, Angola, Mauritania, Burundi, Central Africa Republic Zimbabwe, Cote d' Ivoire, Equatorial Guinea, Sierra Leone, and Comoros (23)

Source: WHO/UNICEF 2015

In 2015, over 2 billion people were reported to be using an unimproved sanitation facility, of which 695 million people residing in SSA (WHO/UNICEF, 2015:5). In addition, 23% of people in SSA were still vulnerable to open defecation as compared to 13% of the global average in 2015 (Ohwo and Agusomu, 2018:313). It is, therefore, not surprising that only three countries in SSA met the sanitation target namely, Seychelles, Reunion, Cape Verde amongst 95% of countries worldwide (see Table 2.5).

The global MDG water and sanitation target (7. C) for water was met, while the target for sanitation still needs to be achieved (Roche *et al.,* 2017; Armah *et al.,* 2018; Ohwo, 2019). The global target for improved sanitation was 77% for the global population, while SSA had a target of 62% (Ohwo, 2019:152). In SSA, only 30% of people gained access to proper sanitation (Ohwo, 2019:152). The region still lacks up-to-date research on hygiene services (Ohwo 2019).

However, research has shown that less than half of the population in SSA engage in handwashing with soap and running water at household level (Ohwo and Agusomu, 2018).

Table 2.5 Sanitation services in Sub-Saharan Africa

Performance Rating	Countries
Countries that met the MDG sanitation target	Seychelles, Reunion, Cape Verde (3)
Countries that missed the MDG sanitation target	Djibouti, Benin, Kenya, Liberia, Lesotho, Sao Tome and Principe, Togo, Mauritania, Senegal, Central African Republic, Gambia, Comoros, Madagascar, Mali, Mozambique, Tanzania, Angola, Cote d' Ivoire, Sierra Leone, DR Congo, Eritrea, Ethiopia, Cameroon, Malawi, Namibia, Guinea, Guinea-Bissau, Ghana, Nigeria, Mauritius, Niger, Burundi, Rwanda, South Africa, Botswana, Burkina Faso, Swaziland, Chad, Equatorial Guinea, Gabon, Uganda, Zimbabwe, and Zambia (43)

Source: WHO/UNICEF 2015

Five years into the SDG period, WHO (2021:29) notes that there has only been an increase of 4% in the global coverage of drinking water services that are safely managed. The 2021 JMP report highlights that at this slow rate, only 81% coverage will be met by 2030, while an estimated 1.6 billion people will still be left without safely managed services (WHO, 2021:8). It is no surprise that SSA still requires high acceleration as it still has the slowest progress. WHO (2021:31) reveals that only 37% of safely manged drinking water will be reached in SSA by 2030 due to its slow rate of improvement. Even though some countries such as Gambia, Nigeria, and Ethiopia met the MDG drinking water target, they may still need help to meet the SDG 6.1 water goal. WHO (2021:32) currently estimates the safely managed drinking water coverage to range from 45%, 22%, and 13% for the respective countries. It is clear that these countries still need more scope of attaining safely managed drinking water services. These figures are staggeringly low given that there is less than a decade left to reach the end of the 2030 Agenda for SDGs.

There was an increase from 47% in 2015 to 54% in 2020 regarding the sanitation global coverage (WHO, 2021:49). At this rate, only 67% coverage will be reached by 2030, while 2.8 billion people are still at risk as they would live without safely managed services. Asia is the continent with the highest progress rates; however, it is also not on track to achieve universal coverage. According to the 2021 JMP report, Lesotho is the only SSA country with the fastest

progress, with just 2% points per year. Only three countries met the MDG sanitation target (Cape Verde, Reunion, and Seychelles). Although these countries' progresses are not further documented, it can be assumed that fewer countries in SSA will meet SDG 6.2 as the current coverage of safely managed sanitation services varies from 7%, 20%, and 48% for Ethiopia, Mali, and Lesotho, respectively (WHO, 2021: 52).

Although most countries have relatively little data on hygiene, it can also be concluded that more people will be left without basic hygiene (washing hands with water and soap) by 2030. WHO (2021:71) notes that only 78% of the world population would reach the basic hygiene target, with an estimated 1.9 billion people left without basic hygiene in accordance with the global slow progress rate. SSA has yet to progress over the first five years of the SDG period regarding hygiene targets.

2.4.2 Barriers to water, sanitation, and hygiene

While WASH remains a critical component of the SDGs, many developing countries are still behind in achieving the goals, particularly SDG 6. Various barriers lead to inadequate access and provision of WASH services in SSA. A barrier is known as anything that hinders access and or use of WASH facilities and causes the use of these facilities in a way that is unacceptable (White *et al.,* 2016). There are various forms of barriers of WASH which should be explored extensively in literature. These barriers are categorised as follows: institutional, economic or financial, political, and spatial or geographical (White *et al.,* 2016; Sinharoy *et al.,* 2019; Amokwandoh *et al.,* 2020; Tseole *et al.,* 2022).

2.4.2.1 Institutional barriers

Developing countries, particularly in SSA, face institutional barriers when it comes to accessing proper WASH. Institutional barriers are challenges embedded in weak policy coordination between government agencies and other institutions, poor implementation of laws and regulations, lack of planning, and inadequate participation of communities (Sinharoy *et al.,* 2019; Amokwandoh *et al.,* 2020; Kulanyi *et al*., 2021). The legacy of laws implemented during colonialism and apartheid cannot be overlooked in the case of many countries in SSA. For instance, in South Africa, the inadequate service provision can be associated with the policies of the apartheid era which were associated with discriminatory acts between racial groups (Maphumulo and Bhengu, 2019). The deliberate impoverishment of the majority black community through inadequate provision of services was necessary to empower the elite White minority. This led to the poor majority with limited access to services.

Despite South Africa today having an advanced constitution, poor people still lack basic services (Tarantino, 2019). The lack of implementation of existing policies of WASH is a challenge that must be addressed. In redressing the past injustices of unequal access to water in South Africa, policies were adopted to create sustainable water development and facilitate proper water supply to all. These policies included the Water Service Act of 1997 and the National Water Act of 1998 (Adom and Simatele, 2021; Coetzee and Kotzé, 2018). Despite the adoption of such policies, the lack of implementation of these policies is evident in the gap between policies and lived realities of citizens (Clifford-Holmes *et al.*, 2017). For instance, in 2018, over 2.6 million households lacked access to safe drinking water, while an estimated 400 000 households lived without any toilet facility, with 29% of schools having an unimproved pit latrine or no toilet facilities (Coetzee and Kotzé, 2018:38). These statistics prove that despite the country having the best policies, there is lack of enforcement of existing strategies in place. In addition, the existing policies are outdated, complex, and lack a robust water governance structure with effective stakeholder partnerships (Clifford-Holmes *et al.* 2017). The lack of participatory governance and management in decision-making further affects the marginalised groups.

The lack of local participation in the WASH sector has been well documented (Lukasiewicz and Baldwin, 2017; Etongo *et al.*, 2018; Herrera, 2019; Ambuehl *et al.*, 2022). Poor community participation form part of the institutional barrier as there is lack of effective policies that govern communities to engage in the WASH sector. Many African countries such as South Africa, Ethiopia, Burundi, Kenya, Rwanda, Eritrea, and Uganda have adopted the integration of water resources management policy (IWRM) which is embedded in serving and encouraging public engagement in water resource decision processes and also increasing collaboration at the local level (Basco-Carrera *et al.,* 2017). However, the IWRM policy has been criticised for not delivering results that tackle real water problems (Förster *et al.,* 2017; Al-Saidi, 2017). Implementing such water reforms does not consider real-world societal processes as these policies are prescriptive and have pre-defined goals (Förster *et al.,* 2017). In addition, stakeholder engagement and participation remain low even though these are vital premises in the decision-making of IWRM (Al-Saidi, 2017). Therefore, such water reforms should be location-based and not follow universal policies and regulations. Water management issues in developing and developed nations are different. Therefore, IWRM should consider the traditional and informal institutions in African countries.

2.4.2.2 Economic barriers

The lack of prioritisation of the WASH sector has become even more evident following the outbreak of the COVID-19 pandemic (Street *et al.,* 2020; Smiley *et al.,* 2020; Desye, 2021). This pandemic placed hygiene at the core of its prevention and yet access to water supply which supports good hand hygiene is staggeringly low, particularly in the global South (Howard *et al.,* 2020). The lack of piped water on-premises has led to a major water and sanitation infrastructure deficit in many developing countries in SSA such as Kenya, Uganda, Burkina Faso, and South Africa. Despite the benefits of WASH in disease prevention being noted, many countries still lack proper investment in water supply infrastructure (Pories *et al.,* 2019; WHO, 2022). The 2022 United Nations-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) which details the latest insights on the status of WASH systems in over 120 countries, conveyed that more than three quarters of countries reported inadequate funding to implement their WASH plans and strategies (WHO, 2022:29). The lack of funding of the WASH sector implies that the international development community should reassert its obligation to WASH in both policy engagement and investment (Howard *et al.,* 2020). The SDG 6 directive to leave no one behind means that investments should reach those that require water immediately which are areas that are less urbanised and remote, with poor neighbourhoods.

Finance is required to ensure adequate provision of WASH services (WHO, 2017a). However, even when funding is accessible, governments still do not invest in infrastructure especially for sanitation more than for water (Sinharoy *et al.,* 2019). In Uganda, the WASH sector has experienced consistent low funding levels which makes the sector insufficient to meet the demands in line with the strategic investment plan projections (Kulanyi *et al.,* 2021). Notably, governments tend to fear investing in WASH particularly in rural areas or informal settlements as residents lack the earning potential, which means they cannot pay for the services to cover the investment cost of services (Emenike *et al.,* 2017; Sinharoy *et al.,* 2019). As a result, these areas have been associated with unsafe WASH and waterborne diseases.

2.4.2.3 Political barriers

In addition to economic barriers, there are also political aspects that present barriers to the implementation of WASH policies such as corruption and adoption of neoliberal policies. Corruption can take place in various forms in the WASH sector such as bribes for household-level repairs, falsification of meter readings for lower bills, and bribery for new water

connections (Breen and Gillanders, 2021). Notably, there is limited research on corruption within the sector. However, Ohwo (2019) notes that corruption levels in most countries in SSA is high and funding for development of WASH infrastructures, particularly in rural areas, is usually either outright embezzled or mismanaged, which had led to shortfalls in projected outcomes. Similarly, Breen and Gillanders (2021) argue that corruption usually occurs when funds allocated for WASH are either misused, mismanaged, or shared between contactors and agency staff in complex kickback systems. Therefore, it can be noted that corruption in the WASH sector has also exacerbated inequalities in the provision of services.

The persistent lack of uneven distribution of water and sanitation reflects poor governance and the neoliberal policies adopted by governments in African countries. These policies have encouraged privatisation of resources, restrictions on public spending, as well as free markets and trade (Hellberg, 2017). As a result, water is viewed as a commodity and not a basic right. This has facilitated corruption within the water sector as money allocated for water provision is often misused and mismanaged by those in power. Thus, the neoliberal stance has exacerbated the uneven distribution of water provision in rural communities. As a result, many African countries have adopted policies such as IWRM which are aimed to address water challenges through decentralisation of powers and the creation of water institutions to deal with water management at different levels (Förster *et al.,* 2017; Hutete and Sibanda 2022). However, such structures often change water regimes which has dire costs in the allocation and distribution of water resources among various stakeholders. In most cases, it is the vulnerable and poor who bear these consequences. These issues are intensified by the tendency of politicians, policymakers, and managers in the water sector focusing on refining institutional arrangements and regulations instead of focusing on implementation.

2.4.2.4 Geographical barriers

The location of a settlement is a factor that affects the accessibility, availability, development, and implementation of WASH. For instance, informal settlements located on the outskirts of a city or rural areas located in mountainous topography make extending WASH service infrastructure to these areas technically difficult or expensive (Sinharoy *et al.,* 2019). In such areas, it is impossible to construct lasting latrines and water connections. As a result, community dwellers resort to risky, distant, and polluted water from streams and rivers as well as practice open defecation due to lack of water and sanitation facilities.

Even though there have been notable advances made in the provision of water and sanitation, lack of WASH specifically in rural areas remains a problem in most African countries (Roche *et al.,* 2017; Armah *et al.,* 2018; Zerbo *et al.,* 2021). The existing barriers to improved WASH are a result of physical disparities experienced in most rural areas in SSA where they are associated with lack of service provision resulting in poor living conditions. Reports show that WASH coverage is improved in cities compared to rural areas (Roche *et al.,* 2017; Ohwo and Agusomu, 2018; Ohwo, 2019; Zerbo *et al.,* 2021). As many countries are seemingly on par to achieving 'nearly universal' essential water services by end of the SDGs, rural areas and other poor communities have the furthest to go. Armah *et al.* (2018) argue that there is an increased rural-urban divide with sanitation, which connects with access to clean water in SSA. Rural areas still lack functioning water infrastructure concerning the supply of clean water and are also coupled with limited access to sanitation facilities. The summary of case studies of SSA countries with the lack of WASH in rural areas is presented in Table 2.6.

Table 2.6 Overview of rural case studies in sub-Saharan Africa

Reference	Country	Overview of the study	Materials and Methods	Key Findings
Akoteyon (2019)	Nigeria	This study examined the variations in the access to water and sanitation in rural communities of Southwest Nigeria.	Purposive and random sampling techniques were utilised. Data was analysed using chi-square, factor analysis, and descriptive statistics.	Only 8% of rural households gained access to safe water supply. This study area presented poor sanitary conditions. The main water source is boreholes while open latrines are the dominant sanitation services used in this study area.
Emily and Muyengwa (2021)	South Africa	This study analysed the maintenance of municipal infrastructure and service delivery in rural areas of the Limpopo Province, South Africa, focusing on the water supply.	Qualitative and quantitative methods were used. The researcher conducted a questionnaire survey as well as structured interviews within the communities.	The results revealed that unsuitable maintenance plans, lack of financial availability, and lack of communication caused poor maintenance and service delivery.
Lebek *et al.* (2021)	South Africa	This case study aimed at examining the effects of differences in levels of water insecurity in rural households and communities.	A qualitative approach was used as interviews were conducted to stakeholders. The open-source software R was used to analyse the data.	Weak municipal provision exacerbated water insecurity in the study areas.

Adams and Smiley (2018)	Malawi	This study highlighted issues with SDG definitions and monitoring indicators and explained the ways for improving water access under the disparities between rural and urban areas.	This study employed a quantitative method as a questionnaire survey was utilised.	The study concluded that piped water was standard in peri-urban areas while rural areas depended on groundwater due to the absence of piped water systems and improved sources.
Behailu *et al.* (2017)	Ethiopia	This article aimed to reveal the determinant factors of failures of services and recommend mitigation measures for the water supply in rural Ethiopia.	A mixed method approach was utilised which included the use of questionnaires and interviews during data collection.	The drying up of water sources, lack of part supplies, lack of maintenance, and lack of cost recovery are attributed to Ethiopia's weak water supply services.
Mvongo and Defo (2021)	Cameroon	This study aimed to assess the level of water services in rural areas of Cameroon.	Qualitative and quantitative methods were employed as semi-structured interviews and questionnaire surveys were used in this study.	The low level of water services provided to the communities and the universal access to water can be improved by monitoring rural water services.
Mulenga *et al*. (2017)	Zambia	This study examined the inequalities among cities and rural areas concerning	Univariate analysis, the logistic regression, R, and the Erreygers	The concentration of access to better water and sanitation is in cities, while rural areas use unimproved

		access to water and sanitation in Zambia.	concentration index (E) were utilised in this study.	water and sanitation facilities.
Gizaw *et al*. (2023)	Ethiopia	This was a community-based cross-sectional study aimed at assessing hand hygiene practices and its factors among rural areas in northwest Ethiopia.	A structured observation was conducted. A questionnaire that was pretested was used to collect data. A review of the literature was used to prepare the questionnaire.	Most households (92.4%) lacked access to improved sanitation facilities. A few had access to proper hand hygiene practices.
Martínez-Santos (2017a)	Mali	This paper aimed to explore key determinants of water consumption from proper water sources in rural communities of Mali.	This study used interviews and spatial analyses in rural Mali to predict water use.	The results of this study showed that coverage with improved water sources is better on paper while it is lower in practice.
Gwimbi *et al.* (2019)	Lesotho	This study aimed at assessing the *E. coli* counts in drinking water in rural areas of Mohale Basin, Lesotho. The relationship between the different water sources and its protection status, sanitation, and hygiene practices was also assessed.	A mixed methodology was used in data collection. This study was also cross-sectional in design. STATA 14 software was used to analyses the data. Graphs and tables were used to present data from structured questionnaires.	Water sources in rural areas were contaminated with faeces. This posed a health risk to the water consumers. This study proposed a community-led sanitation approach, better water source protection, and hygiene education.

Salom and Khumalo (2022)	Namibia	This study investigated the factors of community management of water supplies in rural Namibia.	This paper used a mixed method for data collection. Both secondary sources and primary data sources were utilised in data collection.	The findings revealed that the committee members needed better governance leadership. Lack of training and capacity building, low level of community participation, and lack of support and coordination attributed to weak management of rural water supplies.

Source: Author's creation

2.4.3 Vulnerable groups within the WASH sector

Lack of basic WASH greatly affects everyone, but especially the vulnerable and isolated groups in society. The most vulnerable include women, children, the elderly, and people with disability. Ohwo (2019) highlights that in most cases the needs of the vulnerable are usually overlooked in policy which worsens the existing disparities regarding access to WASH services. With women and female children in control for providing water security at household level, it is not surprising that they are more vulnerable to water insecurity through exposures to waterborne diseases and increased burden of physically carrying water from its sources (Kayser *et al.,* 2019). Limited provision of water and sanitation is not only a health risk but also infringes on the dignity of the vulnerable group and ability to partake in other occupations (Wrisdale *et al.,* 2017). The chore of fetching and carrying water long distances does not only limit the time available for girl children to pursue education, which infringes on their right to education, but it also reduces the time available for women towards income-generating ventures. For instance, in Ghana, Dery *et al.* (2021) noted that girls are usually tasked with fetching water after school, and their academic performance suffers.

In many rural communities, WASH responsibilities weigh heavily on women and girls (Sweetman and Medland, 2017). Females have a larger role relative to males in WASH activities, including in the domestic labour and agriculture sector (Kayser *et al.,* 2019). The gender division of labour in rural societies worldwide puts females in charge of ensuring the family's health, hygiene, and wellbeing (Sweetman and Medland, 2017). Similarly, Asoba *et al.* (2020) emphasises that women in developing countries face most of the water and sanitation challenges as they are involved in the clean and water-based chores.

Additionally, the fundamental issues of accessing water for women include the social and sexual violence while seeking locations for clean and safe water (Baker *et al.,* 2017). In most cases, rural women access water from unprotected sources such as rivers and streams and are susceptible to harassment due to long queues and venturing into unknown areas (Roche *et al*., 2017; Grigg, 2018). Thus, women are more vulnerable to attacks and sexual assault when fetching water from rivers as well as using public sanitation particularly in rural areas and informal settlements in urban areas (Grigg, 2018). Female processes such menstruation, pregnancy, childbirth, and menopause require improved WASH to avoid infections (Sweetman and Medland, 2017). Therefore, the lack of access to safe WASH in rural areas puts women at risk of contracting diseases which impacts on their health.

Another vulnerable group that has been entirely ignored in the WASH sector is people with disability and the elderly. For example, the elderly in rural South Africa is also viewed as vulnerable to water insecurity when there is poor water supply (Wrisdale *et al.,* 2017). As the older adults sometimes struggle with disability associated with age-related changes in health, they are also categorised in one group with people with disability. White *et al.* (2017:2) highlight that access to WASH and disability relate to poverty as an estimated 80% of people with disability live in the developing world where there is limited access to safe WASH and rife poverty. Arguably, lack of access to water and sanitation is denying people with disability their basic human rights as well as an insult to their dignity and self-esteem (Enfield, 2018). For vulnerable people, their physical condition may hinder their ability to draw water from a water source or visit a latrine, but they still have the right to be able to do so easily as others.

Similar to women, people with disability also experience sexual, physical, and verbal abuse when they access water from publicly shared water sources and sanitation services (Wrisdale *et al.,* 2017). They face challenges to meeting their personal WASH needs, especially in using these services consistently, autonomously, hygienically, and without any fear of abuse and pain (Banks *et al.,* 2019). This is usually due to people with disability targeted and stigmatised for abuse because they sound, look, and act differently to the majority, with some believing that disability is transferable through contact, and some with other negative cultural beliefs towards people with disability (Wrisdale *et al.,* 2017).

Nevertheless, there has been progress in trying to address the inequalities faced by vulnerable groups regarding inadequate access to WASH services (Dwipayanti *et al.,* 2021). The push towards an inclusive WASH has progressed over the years which relates to a service for access to safe and clean WASH that considers gender equality, disability, and social inclusion (Dwipayanti *et al.,* 2021). The socially vulnerable people include people with disability, women, girls, the elderly, and people living in poverty (Enfield, 2018). It is important that their needs should be considered in all aspects of the WASH programming and also be included in all phases of decision making (Kazembe, 2017; Dev, 2023). Although all members of communities are entitled to sufficient access to improved WASH services, some require special consideration due to their physical conditions. For a long time, older people and people with disability have been overlooked and excluded in humanitarian action, thus this rights-based approach of inclusion also reflects the global commitments of the SDGs which impacts on SDG 10 as it aims to reduce any form of inequalities (Richard and Kiani, 2019).

All-encompassing WASH incorporates inclusion, equity, and access which has positive outcomes towards vulnerable people and communities. For instance, accessible latrines can increase the self-esteem of people living with disability and improve their attitudes towards these latrines within their communities (Kazembe, 2017). This can also increase the time available for disabled people to engage in other activities of their own rather than spending excessive amounts of time on water and sanitation chores. Access to WASH is thus a challenge towards vulnerable people especially those residing in rural areas. Improving WASH services in rural areas is therefore a necessity in achieving universal coverage. It requires an integration of stakeholders such as community dwellers, community organisations, government, and the private sector to work together. This would enable rural dwellers to be productive members of society without the burden of contracting waterborne diseases.

2.4.4 Consequences of poor access to water, sanitation, and hygiene services

The results of poor access to WASH infrastructure are evident. Insufficient access to WASH services has health and socio-economic consequences (Ohwo and Agusomu, 2018). Poor WASH remains the most significant contributor to water-borne diseases, which lead to mortality (Martinez-Santos, 2017b; Wolf *et al.*, 2019). Globally, there are increasing people hospitalised due to contracting diseases associated with poor water and sanitation, and fatalities due to consuming contaminated water (Martinez-Santos, 2017b). A majority of hospital wards worldwide are occupied by people consuming unsafe water, with fatalities associated with poor WASH (Martinez-Santos, 2017b). Unimproved drinking water and sanitation are one of the leading killers of children under five years and are a determinant of undernutrition in children (Martinez-Santos, 2017b; Roche *et al.*, 2017; Armah *et al.*, 2018). Poor WASH also results in the transmission of a range of neglected tropical diseases and respiratory infections (Roche *et al.*, 2017). Access to safe and adequate WASH is particularly needed for healthy living among children (Roche *et al.*, 2017; Ohwo and Agusomu, 2018). This is correct in SSA, where WASH services could be improved. Although poor WASH significantly contributes to child mortality and illnesses, it also contributes to undernutrition, poor education, and other challenges in children. Thus, safe WASH is protective against diarrhoeal diseases in children.

Even though the consequences of insufficient WASH at the household level are well documented, healthcare facilities and schools are no exception, as they are also places of high transmission of WASH-related diseases (Kanyangarara *et al.*, 2021). Ohwo and Agusomu (2018) highlight that a study conducted in 2015 by WHO on WASH in healthcare facilities,

especially in SSA, reported that many healthcare facilities lack access to proper water sources or sanitation services. Even when these facilities are in place, they do not work and are not safe and reliable for patients and workers. Similarly, Kanyangarara *et al.,* (2021:7) mention that in SSA, the availability of WASH services in healthcare facilities to prevent infections has relatively improved but still remains below the global target of 80% in various countries.

In addition, poor hygiene practices by birth attendants can potentially increase the danger of sepsis, infections, or even fatalities of both mothers and infants by 25% (Ohwo and Agusomu 2018:316). Many healthcare facilities still need essential water and sanitation services. Apart from healthcare facilities, schools also need to have adequate access to such facilities. Morgan *et al.* (2017:995) reveal that the results of a study conducted in rural schools across six SSA countries, Kenya, Mozambique, Ethiopia, Rwanda, Zambia, and Uganda, revealed that only 1% of schools in rural Mozambique and Ethiopia to 23% of schools in rural Rwanda had better water sources, proper sanitation, as well as soap and water for handwashing. Inadequate WASH is experienced in different sectors, increasing the transmission of diseases.

The socio-economic consequences of poor WASH are also evident, similar to health impacts. In Ethiopia, water insecurity and poor sanitation have decreased the Gross Domestic Product (GDP) by 38% (Ohwo and Agusomu, 2018:316). Open defecation not only poses a threat to dignity, safety, and privacy, especially for women and children, but has also contributed to the loss of revenue and productive time, including children missing school, which leads to economic losses (Abubakar, 2018; Immurana *et al.,* 2022; Ntaro *et al.,* 2022).

2.4.5 Persistent diseases associated with lack of water, sanitation, and hygiene provision

Waterborne diseases represent a human health risk globally, especially in SSA and other developing nations (Nienie *et al.,* 2017; Manetu and Karanja, 2021). Most people still practice open defecation, which leads to faecal water resource contamination (WHO, 2021). The associated waterborne diseases are mainly due to consuming contaminated water from human and animal excrement containing pathogenic micro-organisms. Poor sanitation has caused millions of people globally to contract diarrhoea and other faecal-borne diseases.

It is important to note that there are variations between countries across the continent, with those living in rural areas lacking access to improved WASH facilities putting them at risk to contract these diseases (Kamara *et al.,* 2017). Illnesses due to waterborne diseases cause deaths in low-income countries, particularly among children under five years (Manetu and Karanja, 2021). Poor hygienic practices also play a substantial role in the spread of waterborne illnesses.

Figure 2.2 showcases the distribution of waterborne diseases across SSA with recent outbreaks.

2.4.5.1 Diarrhoea

Diarrhoea is one common disease caused by poor WASH (Komarulzaman *et al*., 2017; Peter and Umar, 2018; Wolf *et al.,* 2019). Globally, diarrhoea remains a significant source of child mortality, especially in children below five years, particularly in the global South, where there are high incidence rates of unimproved water, poor sanitation, and lack of hygiene (Peter and Umar 2018; Wolf *et al.* 2019). It has been found that children from households with improved water and sanitation are still at risk of contracting the disease if they live in a community that practices open defecation as faeces contaminate the soil and water sources (Komarulzaman *et al.,* 2018). Notably, there has been a decline in diarrhoea contamination over the years since some households have improved their sanitation facilities (Peter and Umar, 2018). However, Komarulzaman *et al.* (2018) assert that exposure to faecal contamination in rural communities can wipe out the beneficial effects of good sanitation facilities in households.

The severity of the diarrhoea disease relies on the faecal pathogen type that people expose themselves to through various transmission pathways in their households or communities (Wolf *et al.,* 2019). Soucheray (2018) argues that the highest number of diarrhoea-related fatality cases in SSA in the last 15 years have been in Nigeria, Lesotho, Mali, Sierra Leone, and Benin. In a study conducted in South Africa in the province of Limpopo, the diarrhoeagenic *Escherichia coli* (*E. coli)* in water bodies was the predominant cause of diarrhoea in the province (Potgieter *et al.,* 2023). Similarly, in rural areas of Mohale Basin, Lesotho, Gwimbi *et al*. (2019) assert that water sources in the studied rural areas are highly contaminated with faeces, which pose a health risk to water users. In Uganda, diarrhoea remains among the top ten causes of morbidity, accounting for over 22% of deaths in children under five years (Omona *et al.,* 2020:1).

Statistics reveal that each year, there are over 1.7 million cases reported globally, with more cases in children (Koyuncu *et al*., 2020:2). A low WASH coverage highly contributes to fatalities related to diarrheal diseases across SSA (Zerbo *et al.,* 2021). Lack of good nutrition and vulnerability to faecal contamination are usually connected with diarrhoea, while altered growth is a consequence for children's health (Null *et al.,* 2018). For instance, in Nigeria, lack of access to WASH accounts for 90% of all deaths from diarrhoea in children (He *et al.,* 2018:2). Diarrhoea also kills more children than AIDS or any other disease and is known as a

noteworthy source of undernourishment and stunting in children (Peter and Umar, 2018; Getahum and Adane, 2021).

2.4.5.2 Cholera

Cholera is another disease that is of concern related to poor WASH. According to recent estimates, cholera is endemic in sixty-nine countries, with SSA leading in cases followed by Southeast Asia (Hsiao *et al.,* 2017). These cholera-endemic countries are found in the global South, with the rural poor suffering the most. Like diarrhoea, cholera is associated with poor sanitation facilities and insufficient clean water (Bwire *et al.,* 2017; Hsiao *et al.,* 2017; Deen *et al.,* 2020). It is spread through the faecal-oral route, either directly from person to person or indirectly through consuming contaminated aquatic environments (Deen *et al.,* 2020). This person-to-person transmission highlights that a person living with a cholera patient is more prone to contracting the disease. However, there are other risk factors for cholera outbreaks, including poverty and overcrowding (Bwire *et al.,* 2017; Deen *et al.,* 2020). Rural people can hardly afford proper healthcare and often have large families, which means they are more vulnerable to the disease.

In a study conducted in Uganda, where fishing sustains people's livelihood, the results revealed that cholera was endemic in villages that use contaminated lake water, poor sanitation, and poor hygiene (Bwire *et al.,* 2017). Poor WASH practices result in high morbidity and mortality rates of cholera, which are prevalent in rural areas (Hsiao *et al.,* 2017; Bwire *et al.,* 2017). In 2023, SSA has confirmed cholera cases in Ethiopia, Malawi, Kenya, Burundi, South Africa, Zambia, Nigeria, Somalia, the Democratic Republic of Congo, and Mozambique (WHO, 2023). Cholera also remains a health concern in Somalia, where poor sanitation is entirely blamed for the outbreak, with water shortages and lack of awareness being the highest possible causes (Abdinor *et al.,* 2021).

Cholera is a preventable and treatable disease. Even though there has been an introduction of oral cholera vaccines, which have helped curb the spread of the disease, it is still noted that improving WASH services will curb the transmission in the long term (Deen *et al.,* 2017; Hsiao *et al.,* 2017). The progress in providing universal access to clean water and water treatment is evident, however, many rural dwellers still utilise unimproved drinking water sources and poor sanitation facilities which has increased the vulnerability to the disease.

2.4.5.3 Typhoid fever

Due to its endemicity and transmission rates, typhoid fever is a tropical disease also of public health concern in Africa (Contini, 2017; Adesegun *et al.,* 2020). It is usually transmitted via the faecal-oral route and invades the gastrointestinal tract due to the consumption of contaminated food or water from either an acutely infected person or a chronic carrier (Birkhold *et al.,* 2020; Adesegun *et al.,* 2020; Kim *et al.,* 2022). Children between five and fourteen are affected mainly by increased incidence rates (Birkhold *et al.,* 2020). Typhoid fever is more common in Africa and Southeast Asia, as poverty, poor hygiene, and inadequate waste management are the most known risk factors for transmission (Prasad *et al.,* 2018; Kim *et al.,* 2022).

Without effective treatment, this disease has a case-fatality rate of 10%-30% globally (Contini, 2017:1926). While typhoid fever complications and fatalities have significantly declined in developed countries, an annual estimation of 10.9 million cases still occur in less developed countries, especially in rural areas (Birkhold *et al.* 2020:2892). In SSA alone, approximately 7.2 million cases of typhoid fever are reported annually (Adesegun *et al.* 2020:204). These figures show that countries in SSA are tending towards high incidence rates.

For instance, in South Africa, typhoid fever is a notifiable disease with a rising incidence rate from 0.1 cases per 100 000 persons to 0.4 per 100 000 persons per year from 2005 to 2020 (Adesegun *et al.,* 2020:205). In addition, there have been upsurges with outbreaks reported in Zimbabwe, Mozambique, Zambia, and Malawi (Adegesun *et al.,* 2020). In Ghana, typhoid fever is ranked among the top twenty causes of patient morbidity and mortality, with over 1% of hospital admissions from 2015 to 2017 (Fusheini and Gyawu, 2020:1). In a 2010 study conducted due to the 2009 outbreak of typhoid fever in Malawi, 748 illnesses and forty-four deaths were reported due to infections of the disease (Bennett *et al.,* 2018:1). Respondents from that study reported that poor hygiene, consuming unsafe water and food has resulted in typhoid fever transmissions (Bennett *et al.,* 2018).

Despite various interventions, such as the Water Guard for in-home water treatment in Malawi and the typhoid conjugate vaccine to prevent complications among children (Bennett *et al.,* 2020; Birkhold *et al.,* 2020), typhoid fever infections remain high in SSA. Contini (2017) asserts that there is still a need for immunisation programs in populations at greater risk in Africa. However, long-term prevention strategies should be based on improving water and

sanitation services, proper hygiene, food safety and poverty alleviation (Adegesun *et al.*, 2020; Birkhold *et al.*, 2020). There should be a focus on interventions that can be sustainable.

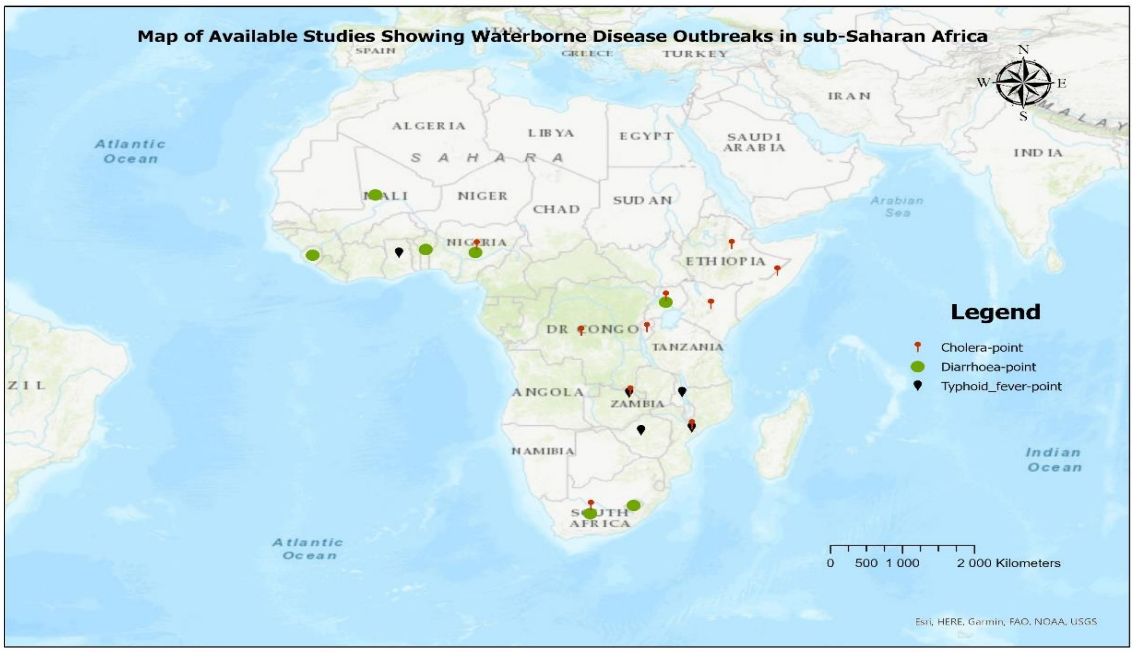


Figure 2.2 Recent outbreak of waterborne diseases in Sub-Saharan Africa. Personal creation.

2.4.6 Future recommendations

The outbreak of the COVID-19 pandemic has once again emphasised the importance of sufficient access to safe WASH in public health (Street *et al.*, 2020; Smiley *et al.*, 2020). Unsurprisingly, the pandemic severely affected SSA and other developing nations as they lacked sufficient WASH services. This section provides possible recommendations to ensure that vulnerable, predominantly rural dwellers receive adequate WASH services. The recommendations include promoting community participation in WASH projects, building stakeholder partnerships, and increasing investment in WASH infrastructure.

2.4.6.1 Promoting community involvement

It seems evident that the existing policies are failing to address challenges associated with water and sanitation in communities. Herrera (2019) argues that although SDG 6B encourages public involvement in improving water and sanitation management, participation is still a significant challenge. The lack of local participation in the WASH sector has been addressed as an institutional barrier. Adopting top-down policies which do not consider community engagement has resulted in the push for community-based management of natural resources in

SSA (Whaley and Cleaver, 2017; Etongo *et al.,* 2018). Adopting these policies is detrimental since they fail to consider real issues communities face. However, community-based management has proven to be a lasting strategy for participatory development in rural water supply projects in SSA.

Evidence of effective community engagement accelerating progress in WASH access can be supported by the positive results of a case study conducted by Hutchings *et al.* (2017) in India as community members took an initiative to develop a project together from four different villages to form an unofficial committee that took responsibility for the piped network. This piped network lasted for 20 years without any external support and was utilised sustainably. Whilst the unsupported community-managed piped water supply cases are rare, this proves they are possible. Kativhu *et al.* (2018) also emphasise that a sense of ownership from community-led projects has improved the sustainability of water supply projects in Zimbabwe, Pakistan, and Ghana. Although community-based engagement has its weaknesses, it has also shown that in some cases there has been better performance and benefits to improved water supply systems in some cases.

Similarly, a study conducted to assess the community resilience in a WASH project in Swaziland (now known as Eswatini) found that significant improvements in community participation, learning and capacity in the use and management of WASH infrastructure accelerated access to WASH (Mlenga ,2016). This also enabled preparedness of communities to face future WASH related hazards. Furthermore, community-led total sanitation (CLTS) is also known as the most effective approach to generating the demand for and use of sanitation facilities (Zuin *et al.,* 2019). CLTS addresses open defecation practices that trigger emotions to generate the demand for proper sanitation in rural communities (Crocker *et al.,* 2017). Yeboah-Antwi *et al*. (2019) reveal that the implementation of CLTS in Zambia has led to improvements in access to improved sanitation facilities, reduced open defecation, and better handwashing practices.

2.4.6.2 Building stakeholder partnerships

A critical principle of development is promoting a partnership between stakeholders in the private and public sectors to achieve sustainable development (Mazibuko, 2013; Serrat, 2017). This means that the involvement of different stakeholders at numerous levels in developing policies and programmes in rural communities is needed (Mensah, 2019). Stakeholders such as community members, local municipalities, Non-Governmental Organisations (NGOs),

traditional leaders, and the private sector must be involved in the intervention development process. Achieving the overall SDGs involves partnerships between stakeholders, who all play different roles and responsibilities (Haywood *et al.*, 2019). Even though these partnerships exist, there is a call for interventions to strengthen them. The involvement of different stakeholders at numerous levels in developing policies and programmes in rural communities is needed (Mensah, 2019). Stakeholders such as community members, governments, and the private sector must be involved in the intervention development process. Another form of partnership that has gained momentum over the years is the partnership between the public and private sectors, which should be encouraged (Ohwo, 2019). Adams *et al.* (2019) highlight that many African governments have opted for this partnership as the private sector has means of providing funding for water infrastructure in rural areas.

Not only does the private sector provide capital, but it also encourages the use of indigenous knowledge and job creation in the public sector. This is the case in Uganda as a partnership between an NGO and a community-based water project led to proper training of community members on the maintenance of the infrastructure as well as job creation (Etongo *et al.*, 2018). This is also similar to the South African case as the Working for Water programme, launched in 1995, works in partnership with local communities, to whom it provides jobs, and also with government departments including the Departments of Environmental Affairs and Tourism, Agriculture, and Trade and Industry, provincial departments of agriculture, conservation and environment, research foundations and private companies (Department of Forestry, Fisheries, and the Environment, 2023). However, there is still a need for enhanced investment in sanitation and hygiene promotion.

2.4.6.3 Increasing investment in WASH infrastructure

An increase in funding of WASH infrastructure especially in rural areas and informal settlements is necessary. Ohwo (2019) argue that no matter how well a WASH policy may be documented, without proper financing, the policy implementation will fail. However, accountability is essential to avoid misappropriation of funds through corrupt practices. In the case of the WASH project in Eswatini, Mlenga (2016) noted that increased investment in WASH infrastructure was an important facilitator to improved WASH infrastructure. Tseole *et al.* (2022) note that increased investments in WASH infrastructure have improved access and availability of clean water and enhanced better hygiene practices in SSA.

Increased investment of WASH infrastructure contributes towards the prevention of waterborne diseases which improves the people's health (Hutton and Chase, 2017). The WHO Investment Case notes that investments in WASH, both within and beyond the health sector, provided returns of three times the investment, and directly saved nearly 1 million lives between 2019 and 2023 (WHO, 2018). However, the benefits of access to WASH are often overlooked and underestimated due to the difficulty of quantifying non-economic benefits (Ohwo, 2019). Nevertheless, adequate funding and prioritisation of the sector is essential in achieving the SDG 6.

2.4.7 Chapter summary

This chapter reviewed the relevant literature on the topic surrounding WASH in SSA. The lack of safe drinking water has always been a global obstacle. The MDGs were established to reduce the number of those without access to water sanitation. SSA failed to meet this goal despite some improvements in people's access to water and sanitation. The birth of the current SDGs was established to ensure water and sanitation services are managed sustainably and available to the global population, incorporating hygiene which is inclusive in the targets. The SDGs was necessary as the MDGs initial eight goals failed to consider water and sanitation services as critical components of worldwide sustainable development.

There have been slow improvements of achieving universal access to WASH due to existing disparities between regions and countries. The inequalities between rural and urban, and rich and poor in WASH facilities are quite evident. This review, therefore, critically assessed the barriers to adequate WASH in the SSA. Various consequences of limited provision of WASH were discussed, particularly assessing the diseases associated with poor WASH. Future recommendations were highlighted to show that there is a way forward to achieving universal WASH goals in SSA. These recommendations included promoting community involvement, building stakeholder partnerships, and increasing investment in WASH infrastructure. The following chapter discusses the conceptual framework adopted in this study.

CHAPTER THREE

CONCEPTUAL FRAMEWORK

3.1 Introduction

A conceptual framework is a term that relates to all concepts and approaches that occupy the researcher's mind through planning, implementing, and concluding a research project (Kivunja, 2018). It is considered the rational conceptualisation of a research project (Ravitch and Rigaan, 2017). Furthermore, the conceptual framework provides an outline of a research project. Kivunja (2018:47) notes the following advantages of a conceptual framework in a research project:

- It enhances the consistency of qualitative data;
- improves validity of quantitative data;
- improves the dependability of results in qualitative data; and
- ensures the reliability of results in quantitative data.

This chapter discusses the sustainable livelihoods approach (SLA), political economy, political ecology, and urban bias theory. This study applied these approaches and theories in the context of the Msunduze, Intaphuka, Kwazini, and Mkhukhuze rural communities of NLM, KwaZulu-Natal. These frameworks will explain the complex nature of the key barriers to WASH within the four selected rural communities respectively and their challenges concerning inadequate access to safe WASH.

3.2 Sustainable livelihoods approach

The SLA has become one of the common approaches used in rural research as it aims to understand the lives of the poor (Serrat, 2017). It seeks to organise and discuss the factors that hinder or enhance livelihood opportunities and shows how these factors relate. Apine *et al.* (2019) noted that this approach helps to identify the assets local communities depend on, the risks they are vulnerable to, and the strategies they undertake in their lives to alleviate poverty. Mazibuko (2013) highlights that SLA is a strength-based and not needs-based approach. Moreover, this approach puts people at the core of development as it argues that people's lives should be based on their assets and what they possess to enhance their livelihoods. This research will utilise the SLA to explore the community perceptions regarding challenges associated with water and sanitation as well as coping strategies used in response to the issues

of insufficient access to WASH. In doing so, this study investigated the manner in which community members utilise their assets and capabilities to sustain their livelihoods.

Serrat (2017) highlights that SLA is based on emerging thinking concerning how vulnerable people experience life at the adversity of policies and institutions embedded within their communities. Mazibuko (2013:6) and Serrat (2017:22) note that this approach is defined by its core principles, which are used to guide policy-making processes and are as follows:

- People-centred : policies need to focus on the people who need intervention to achieve development and sustainably alleviate poverty. There should also be an understanding of the connection between distinct groups of stakeholders involved and their sentiments of people. People should be at the forefront of development as their needs are targeted.
- Responsive and participatory – for development to succeed, people experiencing poverty must identify their livelihood priorities. People living in poverty should play a significant role and facilitate the development process, while allowing their suggestions to be noted. Therefore, poor people's needs should not be dictated but poverty-stricken people should be given a platform to voice their own needs. This aligns with a bottom-up approach where people can voice their concerns and needs instead of a top-down and one-size-fits-all approach where people's needs are not considered and neglected.
- Multi-level – a multi-level approach is needed to eliminate poverty. Poverty cannot be addressed only at one level. The strategies and policies should aim to improve many aspects (from micro to macro levels) concerning people, such as education levels, health care, inequality, and economic growth.
- Partnership between the public and private sectors – it is essential that different stakeholders in both private and public sectors partner to effectively address issues. Rural areas should also be involved as their indigenous knowledge can be shared and passed down from one generation to another. This partnership is aligned with the mandate for sustainable development, which maintains that development should meet the needs of the present without compromising the ability of the future generations to meet their own needs.
- Dynamic – rural areas lack a clear definition due to its complexity which makes rural livelihoods to have evolved over the years. It is, therefore, crucial for policies and support to be conscious of the dynamism and nature of livelihoods. Policies need to be

created in a flexible manner and in line with the changing times. It is also imperative that the policies can benefit future generations.

- Sustainable – a livelihood relates to when people can earn a living and is sustainable when it justifies and identifies a balance between the five significant scopes of sustainability which are economic, cultural, social, institutional, and environmental. Economic deals with financial progress for the present and future generations. Cultural sustainability argues that beliefs and practices should not be altered so they can be passed onto future generations. Social sustainability promotes the well-being of community members for future generations. Institutional sustainability is aimed towards ensuring there is participation, justice, and compliance. Environmental sustainability ensures that resources are available for people and that these resources are used so that future generations can also have access.

As this research adopts the SLA, it is also important that the principles of the approach are embedded within this study. This research is aligned with the principles of SLA as it aimed to assess the perceptions of community members regarding challenges associated with WASH. Thus, this placed rural dwellers at the core of this study. This was done through the participatory rural appraisal (PRA) exercises within focus groups across the four rural communities with an aim to gather the challenges and insights of the rural inhabitants. Subsequently, this study aimed to investigate the various challenges the rural dwellers face, particularly regarding WASH, and their adaptive mechanisms in addressing such issues. The importance of community participation particularly in water projects has proven to have long-term sustainability (Whaley and Cleaver, 2017; Kativhu *et al.*, 2018; Hererra, 2019). Community participation is a process whereby communities are involved in making decisions that affect them (Reed *et al.*, 2018). This study adopted the responsive and participatory principle as it included the four rural communities in future decision-making regarding issues associated with WASH.

Although this study aims to improve the water and sanitation crisis within the four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze, other sectors that concern people such as education levels, healthcare, and housing should also be addressed. WASH is linked to other sectors in South Africa such as health, education and housing (Coetzee and Kotzé, 2018). This was also the case within the four selected communities as consuming unsafe water led to health risks such as diarrhoea particularly in women and

children. Poor education level was also associated with lack of WASH facilities within households in these communities. Households that had poor housing were also associated with poor WASH services. Therefore, the implication of poor WASH on other sectors called for a multi-level approach to tackle the issue of inadequate WASH provision.

It is also important to ensure policies are aligned with the dynamism of rural areas and its inhabitants. This study understood how rural areas are different from one another and ensured that each community was treated as such. Different opinions from different people within each community were therefore noted to ensure validity of the results. Rural areas have evolved and so should its policies. As is, South Africa is still regulated by outdated policies which lack effective partnerships between the public and private sector (Clifford-Holmes *et al.,* 2017). This further affects the vulnerable groups in rural areas such as women, children, the elderly, and people with disability. This study therefore also aimed to recommend policy reform within the WASH sector to ensure there is adequate access to rural areas.

3.2.1 The sustainable livelihoods framework

The sustainable livelihoods framework has many factors, such as assets, vulnerability, policies and institutions, livelihood outcomes, as well as livelihood strategies (Mazibuko, 2013; Tambe, 2022). However, for this study, the central aspect of the framework is the assets. Water is classified as an asset and plays an important role in people's livelihoods. According to Chambers *et al.* (1992:6) a livelihood is defined as follows:

> *A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.*

The analysis of capital assets of households is the core of this framework. The assets contribute to the sustainability of livelihoods. Serrat (2017:23) notes these capital assets comprise of:

- Financial capital - consists of income, access to debt and credit (formal or informal), and any other financial means. Monetary means a household can sustain a livelihood as they can purchase other assets. Nowadays, water is privatised therefore only those with financial means can purchase and use water. Therefore, a household with access to monetary means is better placed to alleviate poverty.

- Human capital - includes knowledge, skills, education, nutrition, health, education as well as the capacity to work and adapt. Changes in human capital are likely to affect other factors that account for assets. For instance, having skills, knowledge, or a good education can positively impact the ability of people to earn a living, which affects their financial capability to sustain a livelihood.
- Social capital - this refers to the capability of one to socialise with others. This involves networks and connections (kinship) between neighbours and members of a society. It also includes relations of trust, mutual understanding and collective participation in local decision-making. It is also related to certain social groups and class, which relates to the level of politics in societies.
- Natural capital - comprises of biological diversity, land, water and aquatic resources, environmental services. People cannot sustain their livelihoods without natural capital. The lack of access to land and sustainable water can threaten families' livelihoods as these resources (food and water) are needed in everyday life. Depleting natural capital is much easier in areas where poor people live, as they can find themselves exploiting the environment due to poverty. The productive land can be lost due to poor farming practices or overuse of resources.
- Physical capital - includes infrastructure, housing, communications, tools and technology, as well as water supply and sanitation. All these factors are interconnected and impact on the livelihood of families. For example, with proper road infrastructure, people may be able to access markets. The lack of a water supply forces poor people to fetch water from afar, which affects their time and other domestic chores. Such situations, therefore, remove people from participating in other activities such as earning a livelihood. Thus, physical capital has a significant role in achieving rural development.

As highlighted, the framework is based on five capital assets: financial, human, social capital, natural, and physical. This research aims to understand the community perceptions regarding challenges associated with water and sanitation through these five capitals. Financial capital unpacks the means of purchase to water which is secured through access to credit for provision of connections to the WASH service.

Human capital includes the knowledge and access to education which enhances decisions for gaining access to WASH at household level. Certain individual level factors, such as education

attainment and wealth status have a significant association with open defecation practice in SSA (Belay *et al.*, 2022). This reinforces that as education levels and wealth status within rural communities are significantly low, rural dwellers are more vulnerable to poor WASH services. Social capital creates opportunities to raise awareness and safety-net structures within the four rural communities to ensure there is access to WASH.

Natural capital determines water availability in water sources such as rivers and streams within the four Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities. Natural water sources such as rivers and streams are available within the communities for people to access water. However, the iLembe Integrated Development Plan (IDP) (2021) argues that drought conditions in the region is linked to the substantial decrease in the access to water among its households. This implies that water availability within the communities has decreased which impacts on their livelihoods. Notably, water availability on its own does not ensure enhanced livelihoods as these water sources are often contaminated with household effluents which impairs on the health of the community dwellers. When considering the physical capital, WASH related infrastructure within the four communities is lacking. The lack of piped water and flush toilets connected to the sewage systems within households implies poor WASH infrastructure available to the four communities.

In addition to WASH infrastructure, the four rural communities are still subjected to unimproved road infrastructure such as gravel roads. Although roads are a precondition for economic and social development in communities, rural areas in Africa still have unpaved roads which has been a challenge in service delivery (Porter, 2014, Sewell *et al.*, 2019; Ngezahayo *et al.*, 2019). Lack of electricity is also a prominent challenge within the four communities which infringes on their physical capital. SSA has the lowest provision of electricity than other regions which implies the lack of the basic service (Blimpo *et al.*, 2020). Electricity is not only essential at household level but also critical for the provision of other services such as healthcare, education, and other services, which can promote socioeconomic growth within the four communities.

Furthermore, water is an important component that ensures sustainable, equitable, and productive rural economies (International Labour Office, 2019). It is used for various activities essential to their livelihoods which include domestic (drinking, cooking, washing, and sanitation) and productive needs (agricultural production) (Moriarty, 2002). Sustainable water management, reliable and affordable supply of adequate water and sanitation services, and

sufficient water infrastructure are critical to improving rural livelihoods through expanding local economies, creating employment in rural areas, as well as ensuring household food security (Nicol, 2000; International Labour Office, 2019). Supplying water for these needs thus contributes to poverty alleviation within rural areas. However, the formal domestic water services fail to address how access enhances household livelihoods as the focus has widely been on the health benefits (Moriarty, 2002). Therefore, SLA emphasises the importance of water for sustainable rural livelihoods. The various benefits of water show the importance of enhancing rural economies which is applicable to the four selected rural communities of NLM. SLA is thus appropriate for this study as it is based on ensuring rural livelihoods are enhanced through gaining access to water.

3.3 Political economy

Political economy rests on politics, power relations, governance dynamics and institutional configuration (Amable *et al.*, 2019). The concept of political economy is complex in its meaning and multifaceted (Amable *et al.,* 2019; Cohn and Hira, 2020). Its purpose depends on every unique situation that is occurring. Political economy seeks to connect political and economic procedures within a society. These procedures may cover different cases, such as water distribution, water reforms or implementation of laws (Cohn and Hira, 2020). The interaction between politics and economics thus centres the question of power, resources, and how these aspects are distributed in different areas or circumstances.

Since rural issues are complex and multifaceted, through political economy lenses, one may argue that political and economic dynamics in many developing countries shape and reshape the livelihoods of rural communities (Marx, 2019; Cohn and Hira, 2020). It is widely recognised that rural communities' struggles are mainly due to the pursuit of power and influence by a variety of private and public actors (Cohn and Hira, 2020). Therefore, political economy understands that the quest for power and control over resources results in the subjection of rural communities of developing countries to livelihood-threatening conditions.

The issue of water availability and its distribution has become one of the most critical challenges facing natural resource management in this century (Xu *et al.,* 2020).Water shortage is not a result of what nature has to offer, but involves power and political decisions (Mpongwana *et al.,* 2022). Money is power which makes one afford access to essential services. Scheiging *et al.* (2020) argue that one of the main barriers to expanding basic drinking water supplies in the developing countries is financial since potential consumers need help to

afford the required services. The pursuit for power has also facilitated corruption within the WASH sector. Breen and Gillanders (2021) argue that corruption usually occurs when funds allocated for WASH are either misused, mismanaged, or shared between contactors and agency staff in complex kickback systems. The element of corruption is also evident within the four communities as water tankers have been selling water to households illegally. This has further led to conflicts within communities as vulnerable households lack the earning potential and cannot afford the basic service.

In rural South Africa, dwellers are vulnerable to water insecurity because they lack the power to pay for water services (Wrisdale *et al.,* 2017). This is also the case in the four communities of NLM as the unemployment rate is high which limits rural dwellers to pay for water services due to lack of income (Ndwedwe IDP, 2022). As a result, households depend on social grants to sustain their livelihoods. The dependence of rural South Africans on social grants has led to an increased burden of the government to cater for all its citizens' needs (Todes and Turok, 2018).

The persistent lack of uneven distribution reflects poor governance and the neoliberal policies adopted by the South African government. Neoliberalism relates to market-oriented reform policies which encourage free trade, eliminating price controls, and deregulating capital markets through privatisation (Harvey, 2007). These policies have encouraged the privatisation of resources, restrictions on public spending, as well as free markets and trade (Hellberg, 2017). As a result, water is viewed as a commodity and not a basic right. With an aim to recover the South Africa's economy, the provision of water had to be commodified and "sold" which has left many citizens without water as they cannot afford to pay for the service (Wrisdale *et al.,* 2017). This has resulted in widespread restrictions and unrest. One may agree that neoliberal policies and lack of government assistance have adverse effects on poverty instead of alleviating poverty. Since 1994, there have been some strides that have been made to improve the well-being of citizens in most rural areas. For instance, in 2001, the Free Basic Water Policy was implemented, which attempted to guarantee at least of 6000 litres of water per month per household (Hellberg, 2017). However, adequate water allocation remains stagnant with rural areas still lacking sufficient water provision due to mismanagement of funds by local municipalities (Mpongwana *et al.,* 2022). This is applicable to the four rural communities as they still lack water provision and NLM failing to provide this basic right to its residents. As a result, a series of unrest and protests have occurred within these communities as means of addressing the water issue faced within the communities.

Elements within political economy search for the underlying factors that cause a crisis and connect political and economic features with power (Cohn and Hira, 2020). This study, therefore, seeks to assess WASH challenges within Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities of NLM, KwaZulu-Natal, through political economy lenses and further identify the main drivers of skewed access to water within the identified rural communities. It is evident that there is a role of politics in the distribution of water within the four communities as the Mkhukhuze community is the only community with a functional water infrastructure compared to the other three communities. This indicates that this community is more politically affluent than the others. Similarly, some households within the four communities have access to piped water while other households rely on alternative sources such as rivers and streams. The uneven distribution of water infrastructure and access to water within and among these communities is evident which makes the political economy approach relevant for this study.

3.4 Political ecology

For a long time, insufficient access to water has been associated with increasing world population and environmental problems such as floods and droughts (Baijius and Patrick, 2019). However, this apolitical notion has been criticised for failing to address the causes of water problems (Baijius and Patrick, 2019). Political ecology, which stems from political economy, has emerged in human geography and social science to address the issue of politicisation of the environment and the political economy with land use practices, mainly focusing on the poor people in developing countries. This approach has become a framework for studying the relationship between economic, social, and political factors that affect environmental issues (LaVanchy *et al.,* 2017; Rusca *et al.,* 2017). The power dynamics within political ecology are explained by Svarstad *et al.* (2018: 353):

> *In political ecology, scholars have emphasised the exercise of power by two types of actors - those who carry out environmental interventions and those who resist them - with the authors generally supporting the latter, especially when interventions lead to the disempowerment of local communities or degradation of their environments.*

Even though this term has been used widely in recent literature, it is vital to understand its meaning. Robbins (2019) highlights that political ecology has a variety of definitions. However, its diverse implications suggest that it represents an alternative to apolitical ecology, which does not support the role of politics in studying the environment. Nevertheless, this study

adopts the definition used by Baijius and Patrick (2019:3), which states that political ecology is "an analytic focus on factors that shape relations of power among human groups that influence relations between these and diverse aspects of their environments."

As mentioned, the political ecology perspective has been used to provide insight into environmental challenges that result from unbalanced power relations working among diverse actors, which vary from social, economic and ecological terms (LaVanchy *et al.,* 2017; Baijius and Patrick, 2019). Keeler *et al.* (2020) note that it is not the amount of available freshwater that threatens biodiversity, but the unequal distribution of water resources. The uneven power perpetuates injustice as the majority, which are the vulnerable, suffer while the minority benefit (Gonzalez, 2022). This injustice is evident in political, economic, social, and environmental contexts, which often overlap and exacerbate one another.

South Africa appears as an ideal case to study the development of a political ecology approach. The impact of the apartheid regime on water is that the bulk of water favoured white farmers and urban dwellers leaving the vast majority of poor people residing in rural areas with minimal access to safe water (Cole *et al.,* 2018; Bourblanc and Blanchon, 2019; Bischoff-Mattson *et al.,* 2020). Under the apartheid regime, water issues represented a marker of extreme inequality. Even though after 1994, the South African water law and policy was completely redrafted, water issues are still highly debated in the political arena within the country (Hellberg, 2017; Cole *et al.,* 2018). Even in post-apartheid, poor and rural areas such as NLM still lack proper water provision even though it is considered a basic right.

Furthermore, environmental consequences mostly affect vulnerable groups. For instance, the recent April 2022 floods, which further destroyed the water systems and other infrastructure within NLM, proved how defenceless these communities are regarding environmental hazards (Daily News, 2022). Similarly, iLembe IDP (2021) argues that the drought conditions in the region is linked to the substantial decrease in the access to water among its households. However, this does not imply that environmental hazards such as the recent flooding events and drought conditions are the main cause of the lack of water provision in the four communities as this issue has persisted over the years. Majola (2021) noted that community members of NLM have been complaining about the lack of piped water in their household for many years prior to these environmental conditions. This demonstrates that poor water provision within NLM is not solely due to environmental hazards or degradation but is politically driven.

Despite the impacts of the recent flooding condition in NLM, water is still available but only accessible for a privileged few. Within the four communities, certain households have access to piped water on premises while the majority rely on rivers and streams. Water infrastructure such as standpipes within Msunduze have been dysfunctional for many years while the borehole in Mkhukhuze is still functional. This implies that these environmental consequences only affected the underprivileged households leaving these households and communities without access to water. In South Africa, insufficient water and lack of sanitation excessively affect defenceless groups including African women and children, the elderly, as well as people living with disability residing in rural areas (Wrisdale *et al.*, 2017). Therefore, WASH challenges in rural areas are not solely due to environmental hazards but rather at the extent of underdevelopment of these areas. This can be attributed to the case of the four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze, respectively, as they face WASH challenges at the adversity of underdevelopment.

3.5 Urban bias theory

The urban bias theory is one of the significant contributions to the evolution of contemporary ideas of political economy and is still relevant to development studies (Waldner *et al.*, 2017). This theory was introduced in 1977 by Michael Lipton as a framework for understanding how economic policy initiatives have benefited from the over-development of urban areas whilst under-developing rural areas (Arias, 2020). In turn, rural regions and dwellers should be more noticed and served. The dominant urban culture often views rural people under negative labels (Arias, 2020).

Urban bias also holds an understanding that systematic distortion in resource allocation and service delivery exists between urban and rural areas of developing countries (Arias, 2020). Often, urban areas receive excessive attention from governments, while rural areas and their institutions still need to be developed, thus failing to support rural communities particularly in developing countries (Timberlake, 2019). Arias (2020) maintains that a leading socio-political force facilitated by power relations between urban and rural areas result in a need for more essential services and facilities in rural areas. This bias against rural areas is displayed in the lived experiences of rural dwellers due to disadvantages and policy marginalisation, leading to service delivery challenges (Mohatt and Mohatt, 2020).

Additionally, many analysts have studied innovation and economic growth in cities and do not do so in rural areas (Shearmur, 2017). Also, this innovation theory contributes to the urban bias

theory (Yin *et al.*, 2019). Rural areas are also places for innovation. This implies that urban areas often develop at the expense of rural areas, as their efforts should be noticed (Timberlake, 2019; Parnreiter, 2019). Furthermore, this claim indicates that lack of service delivery in rural areas, above dysfunctional rural institutions as well as resource allocation, is due to the underdevelopment of rural areas (Shearmur, 2017).

Despite SSA lagging behind with meeting water universal coverage, it also accounts for the highest inequality between urban and rural areas regarding WASH provision (Roche *et al.*, 2017). Urban areas have improved WASH services in comparison to rural areas in developing countries. Cities have access to drinking water through piped systems, while most rural dwellers still rely on surface water (Adams and Smiley, 2018; Ohwo, 2019). However, informal settlements and slums in urban areas are no exception to poor provision of WASH as they also experience water shortages and are subjected to poor in-situ communal sanitation facilities in South Africa and SSA (Pieterse, 2014; Pan *et al.*, 2018; Twani and Soyapi, 2022). Nevertheless, the disparity between urban and rural areas is quite evident in the developing world. Rural areas are denied essential services such clean water and proper sanitation. It is thus necessary to understand that rural underdevelopment is not solely through economic and political aspects but rather through skewed infrastructural development and poor service provision.

A conducted by Mulenga *et al.* (2017) emphasises bias in WASH provision in Zambia as the findings show that the concentration of access to improved water and sanitation is among the wealthier households in cities, while poor communities in rural areas are subjected to unimproved water and sanitation facilities. This is also the case within NLM as community members still complain about living without running water and relying on flea-infested ponds and stormwater drains as they lack proper water infrastructure (Duma, 2020; Majola, 2021). Through the lenses of urban bias, one may argue that NLM's limited budget constraints (Ndwedwe IDP, 2022), and failure to cater for its communities is due to its geographical location as it consists of rural communities. The lack of prioritisation of the WASH sector is evident in the four rural communities. This theory is important for this research as NLM severely lacks infrastructure while its urban and developed local municipality counterpart, KwaDukuza, has well-improved road networks and WASH systems (iLembe IDP, 2021). This has prompted rural dwellers within NLM to migrate to urban areas of KwaDukuza, such as the town of Ballito and KwaDukuza as a way of sustaining their livelihoods. These incidents contribute to the argument of a rural-urban dichotomy regarding the delivery of services and

underdevelopment of rural areas. Thus, rural-urban water access disparities are a pivotal barrier to universal water coverage.

3.6 Chapter summary

This chapter deliberated the approaches and theories relating to the challenges associated with the lack of water and sanitation in rural areas. The sustainable livelihoods approach focuses on the importance of WASH as an asset and how it can sustain the rural livelihoods. The political economy explains how access to WASH is associated with power, with those who have the means to purchase water gaining favourable access. The political ecology approach was used to link how the lack of access to water is not solely due to environmental conditions but because of power dynamics and certain relations. The urban bias theory explains how rural areas such as the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities, respectively, are denied access to WASH simply because of their geographical location. The next chapter will focus on the research methodologies adopted to collect data of this study.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.1 Introduction

The previous chapter focused on the conceptual frameworks adopted in this study. This chapter explores the methodologies adopted focusing on data collection, sampling techniques, and data analysis. This chapter also explained the suitability of the methodologies adopted for this research. In addition, a background of the four study areas were also provided in this chapter. This study used a combination of quantitative and qualitative methods which can be referred to be as triangulation (Heesen *et al.*, 2019). For the quantitative aspect, snowball sampling was utilised to sample the four hundred respondents to complete the questionnaires within the four selected rural communities in NLM, KwaZulu-Natal. One hundred questionnaires were administered within each community of Msunduze, Intaphuka, Kwazini, and Mkhukhuze, respectively. Data collected from the questionnaires was captured into Statistical Package for Social Science (SPSS) version 28. For the qualitative aspect, participatory exercises were employed namely problem ranking matrix, Venn diagrams, mental maps, and transect walks. Purposive sampling was utilised to identify and sample the focus groups consisting of ten females in each respective community within the participatory exercises. Data collected from these exercises was analysed thematically. Data collected assisted in exploring and achieving the research aim through responding to the study's objectives on water and sanitation challenges within the four selected rural communities in NLM, KwaZulu-Natal.

4.2 Research instruments

Ajay (2023) notes that there are different methods used to gather information in research which are categorised into primary and secondary data. Primary data is factual and original data whilst secondary data is the analysis and interpretation of primary data (Baldwin *et al.*, 2022). This study utilised both primary and secondary data sources in its data collection process. Secondary data was also used in other chapters such as literature review and conceptual framework.

4.2.1 Primary data sources

Primary data is collected at the source or first-hand by the researcher with a specific research question (Voleti, 2019). Its main advantage is that it is tailored to the researcher's purpose (Sylvia, 2018). According to Sharma (2022:2):

The term "primary data" refers to information obtained directly from people who experienced an event or situation first hand. It is more reliable since it is based on actual research. Because primary data has not been tampered with by humans, it is more trustworthy than secondary data.

The primary data sources incorporated in this study were questionnaire surveys and participatory techniques.

4.2.2 Secondary data sources

This is data that is readily available to be used by a researcher (Johnston, 2017). The advantages of using secondary data sources are that it is efficient as it takes less time to collect and analyse and it is easy to access as it is usually published to the public (Weston *et al.*, 2019). In this study, secondary data included a variety of WASH literature obtained from academic journals, government documents, policies, newsletters, academic books and dissertations.

4.3 Background to study areas

KwaZulu-Natal, also referred to as the "garden province", is a province of South Africa that was officially created in 1994 when the Zulu Bantustan of KwaZulu and the Natal Province were merged (Kwa Zulu-Natal Provincial Profile, 2016). It is located in the country's southeast, sharing the Indian Ocean borders with Swaziland, Mozambique, and Lesotho countries. Pietermaritzburg is the country's capital city with Durban as the largest city. In July 2021, the KwaZulu-Natal and Gauteng provinces made headlines as its people engaged in public protests, which turned into the looting of retail centres, warehouses, industrial centres and food markets after the imprisonment of former president Jacob Zuma (Tatsvarei *et al.,* 2021). This implies that provinces' looting, burning and violence were politically motivated (Makonye, 2022). These acts destroyed the economy, leaving the marginalised groups to suffer.

Additionally, this province has experienced flooding in recent years (Olanrewaju and Reddy, 2022; Letsatsi and Kruger, 2022; Grab and Nash, 2023). These floods have caused extensive damage to houses and infrastructure, displacements of thousands, and fatalities. The floods that were experienced in Durban in April 2019 alone caused damage to over two hundred homes, damage to road infrastructure, and recorded fifty-one fatality cases (Olanrewaju and Reddy, 2022:2). Similarly, in April 2022, the province of KwaZulu-Natal experienced yet another extreme flooding condition. These floods are viewed as the deadliest on record in the country as fatalities confirmed amounted to 435, with several people still unaccounted for (Bouchard *et al.,* 2022:3). The floods damaged homes, roads, and many other infrastructures.

In NLM, the reported missing community members were later found, and some were buried following the floods (Daily News, 2022). The KwaZulu-Natal Co-operative Governance and Traditional Affairs (KwaZulu-Natal COGTA) stated on 16 April 2022 that the floods also destroyed water and power supply systems, which contributed to the existing challenges faced by the communities concerning water provision as well as electricity (KwaZulu-Natal COGTA, 2022). In 2021, it was reported that the taps have not had running water for over six years, with water tankers not reaching all areas in NLM, which forced community members to fetch water in faraway streams (Majola, 2021). In some instances, the elderly who are poverty stricken had to use their pension money to pay other community members to gather water for them from these outlying streams (Majola, 2021). After the recent floods, the DWS then ensured the affected communities that they would be assisting with water tankers and have environmental health practitioners monitor and identify any water-borne or diarrheal diseases (KwaZulu-Natal COGTA, 2022)

Statistics of South Africa (StatsSA) (2016) notes KwaZulu-Natal as the second most populous province in the country after Gauteng (StatsSA, 2016). KwaZulu-Natal is classified as the third smallest province by land size in the country (KwaZulu-Natal Economic Profile, 2021). This province accounts for the second most significant contribution of the country's GDP at approximately 16%, after the Gauteng province (KwaZulu-Natal Economic Profile, 2021). This province consists of a highly diversified agricultural sector associated with its summer rainfall and subtropical climate (KwaZulu-Natal Provincial Profile, 2016). The principal language of the province is IsiZulu, with eleven districts. One of these districts is eThekwini, which is a metropolitan municipality, while the other ten are district municipalities (KwaZulu-Natal Provincial Profile, 2016). For this research, four rural communities were chosen, namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze, all of which are situated within NLM (Ward 15), under the iLembe District Municipality of KwaZulu-Natal.

4.3.1 iLembe District Municipality Integrated Development Plan (2021/2022)

The iLembe District Municipality is situated on the east coast of KwaZulu-Natal between eThekwini Metropolitan in the south and King Cetshwayo District in the North, and borders the Indian Ocean (StatsSA Community Survey, 2016; iLembe Economic Profile, 2021). This district covers a total area of 3 269 km^2 with a total population of 654 612 (StatsSA Community Survey, 2016). According to the iLembe's IDP (2021/2022) this district comprises of four Local Municipalities: Mandeni, KwaDukuza, Maphumulo, and Ndwedwe.

Most rural inland areas are traditional areas characterised by subsistence farming and controlled by traditional authorities according to the land tenure system, where the land is mainly owned by the Ingonyama Trust (iLembe IDP, 2021). Furthermore, the Mandeni and KwaDukuza Local Municipalities are situated north of Ndwedwe, and they serve as commercial farming hubs (31%), which are privately owned sugarcane fields (iLembe IDP, 2021:14). The district lies in between Durban and Richards Bay, giving it access to both harbours for trade purposes (iLembe Economic Profile, 2021). Due to its biodiversity, such as the Isimangaliso Wetland Park and Drakensberg Mountain, and rich heritage on Zulu culture, the district has gained tremendous tourist attraction (iLembe IDP, 2021).

Since establishing the Municipal Local Government Structures Act (Act No. 117 of 1998), the district has generated five IDPs to date (iLembe IDP, 2021). Following the 2017 and 2018 iLembe IDP, the 2021 and 2022 IDP highlights the municipality's commitment to speedy service delivery, poverty alleviation and addressing job creation. In addressing these fundamental issues that the district municipality faces, the iLembe 2021 and 2022 IDP undertakes an inclusive review and analysis of the district and its local municipalities.

The district has faced economic and infrastructural backlogs as well as developmental challenges (iLembe Economic Profile, 2021). Therefore, these serve as the starting point for municipal service delivery, performance, and monitoring as objectives and strategies to address these challenges and backlogs. The iLembe IDP (2021:19) notes the following challenges which impact the development of the district and should be taken forward in the IDP process:

- An increase in settlement densification has occurred in places of significant access to roads and local nodes;
- rural areas lack essential services and continued service delivery backlogs;
- majority of the youth is unemployed, which is coupled with poverty;
- poor waste management practices, particularly in rural areas, refuse removal is only limited to cities;
- bulk water supply is still a major challenge which needs urgent attention;
- a large population still lacks sufficient access to clean water as they still obtain water from rivers and streams. This poses a health risk and implicates the provision of social services; and

- rural areas still use poor sanitation, pit latrines (with or without ventilation), bucket system or no sanitation system, which further strains the environment and the health of rural dwellers.

The iLembe IDP (2021/2022) highlights a significant decrease in people accessing quality piped water between 2011 and 2016. From 2011 to 2016, it was reported that there was an overall decrease from 81% to 70% of people accessing quality water within the district (iLembe IDP, 2021:71). NLM had the highest decrease of 30%, from 70% to 40%, of people accessing quality water (iLembe IDP, 2021:71). The municipality argues that drought conditions experienced in this country is associated with the significant decrease (iLembe IDP, 2021). This explains the urgency of the issue of water provision in this district. In terms of the issue of water and sanitation in the district, the iLembe IDP (2021/2022) notes that majority of the rural dwellers within the district still rely on contaminated surface waters, with close to 15% of the population still lacking basic sanitation or relying on pit latrines or even no system at all.

Remarkably, the district has established the iLembe Water and Sanitation Master Plan to address the issue of water and sanitation (iLembe IDP, 2021). The master plan was adopted by the Council in 2017 and is primarily informed by the Spatial Development Framework – which aims to reduce service backlogs and ensure future demands for water and sanitation provision are met (iLembe IDP, 2021). It is a long-term plan of 20 years intended to create and deliver sustainable water and sanitation infrastructure services (iLembe IDP, 2021). According to the iLembe IDP (2021/2022) water projects across the four local municipalities have been created, and some have already been implemented, which include:

1. The Ndulinde Sub-Regional Water Supply Scheme and the Macambini Sub-Regional Water Supply Scheme in Mandeni Local Municipality.

2. The Lower Thukela Regional Bulk Water Scheme and the Southern Regional Bulk Water and Sanitation Project in KwaDukuza Local Municipality.

3. The Balcome/KwaSizabantu Sub-Regional Water Supply Scheme and the Maphumulo/KwaDukuza Sub Regional Water Scheme in Maphumulo Local Municipality.

At NLM, there is a proposed uMshwati Bulk project, which is in collaboration with Umgeni Water, to supplement the water supply to the Ndwedwe area, which is currently being served through a borehole supply (iLembe IDP, 2021). Some areas are already receiving bulk supply,

such as Nondabula (Ward 9) and Mkhukhuze, while others are still waiting on the implementation phases (iLembe IDP, 2021).

4.3.2 Ndwedwe Local Municipality Integrated Development Plan (2022/2027)

NLM is one of the four local municipalities of the iLembe District Municipality. It is situated along the sea to the eastern part of KwaZulu-Natal (Ndwedwe IDP, 2022). The local municipality lies further inland and borders the eThekwini Metro to the south, 20km from the King Shaka International Airport and Dube Trade Port (StatsSA Community Survey, 2016). NLM is mainly rural and is located in the proximity of towns such as Tongaat, Verulam, Shakaskraal, and Groutville and is characterised by disadvantaged areas (Ndwedwe IDP, 2022).

As of 2016, the municipal area accommodates a total population of 143 117 and extends the size to 1 153 km^2 (StatsSA Community Survey, 2016). The dominant population group is black, and the language is IsiZulu (StatsSA Community Survey, 2016). There are more women than men, while the working group belonging to the category of 15 to 64 years of age is leading compared to other age groups (StatsSA, 2016). Approximately 68% of Ndwedwe consists of traditional settlements with nineteen traditional authority councils, and the remainder of the land comprises of commercial farmlands (Ndwedwe IDP, 2022:5). NLM has 19 Wards and a total number of 37 Councillors (Ndwedwe IDP, 2022:16).

As the local municipality is tribal, it is coupled with challenges and backlogs, which are addressed in the Ndwedwe IDP (2022:19), and they include poor communication between relevant stakeholders, which often leads to service delivery protests:

- Prominent lack of service delivery which pose a threat of protests;
- absence of proper road infrastructure and maintenance;
- lack of revenue base, with limited budget for the municipality;
- the high unemployment rate of 66.3%, which leads to communities living in abject poverty; and
- ongoing need for regular access to safe drinking water.

In trying to respond to the issue of water provision, the local municipality has partnered with Umgeni Water to form the Umgeni Water Infrastructure Master Plan (2021/2022) (Ndwedwe IDP, 2022). Many water projects from the master plan have been designed and implemented

in some areas such as eMona and Ozwathini. These projects include the unsheathing Regional Bulk Water Supply Scheme and the Maphumulo Bulk Water Supply Scheme (Ndwedwe IDP, 2022). The Regional Bulk Water Supply Scheme aims to supply the central and southern areas of Ndwedwe with water, while the Maphumulo Bulk Water Supply Scheme will supply the northern parts of NLM (Ndwedwe IDP, 2022).

4.3.2.1 The four rural communities of Ndwedwe Local Municipality

This study focuses on four rural communities of NLM that are entirely tribal or traditional comprising of Msunduze, Intaphuka, Kwazini, and Mkhukhuze. Tribal or traditional relate to communities consisting of a homogenous group of people that share a common language and customs (Young, 2017). According to StatsSA Community survey (2016), the Msunduze community has approximately 2715 households and 53.5% of households are female-headed. Approximately 10% of households have flushing toilets connected to the sewage system, while over 40% rely on pit latrines without ventilation. The primary water sources are local water schemes such as the uMshwati Bulk and rivers or streams (StatsSA, 2011; Ndwedwe IDP, 2022). The uMshwati Bulk Water Supply Scheme is currently the local water scheme which distributes water within parts of NLM through borehole pumps (Gafoor and Beater, 2018). Additionally, the Intaphuka community is also a tribal area within NLM with 1194 households, with 57% female-headed households (StatsSA Community survey, 2016). Three quarter of households (75%) rely on the local water scheme, followed by stagnant waters and river sources comprising of under 10% (Ndwedwe IDP, 2022:88). Approximately, 40% of the households have pit latrines without ventilation, with approximately 20% having toilets with ventilation (StatsSA Community survey, 2016).

With 648 number of households and 47.8% female-headed households, the Kwazini community has over 40% of households relying on pit latrines with no ventilation, and approximately 20% using chemical toilets (Ndwedwe IDP, 2022:122). The primary water sources are rivers and the local water scheme (StatsSA, 2011). Furthermore, the Mkhukhuze community is the smallest community in terms of the total number of households (219) compared to the other communities. Over half of the households are female-headed (54.3%). StatsSA Community survey (2016) mentions that all households rely on the local water scheme for water while over 40% of households depend on pit latrines, 30% of households depend on pit latrines with ventilation, and over 15% of households have access to chemical toilets.

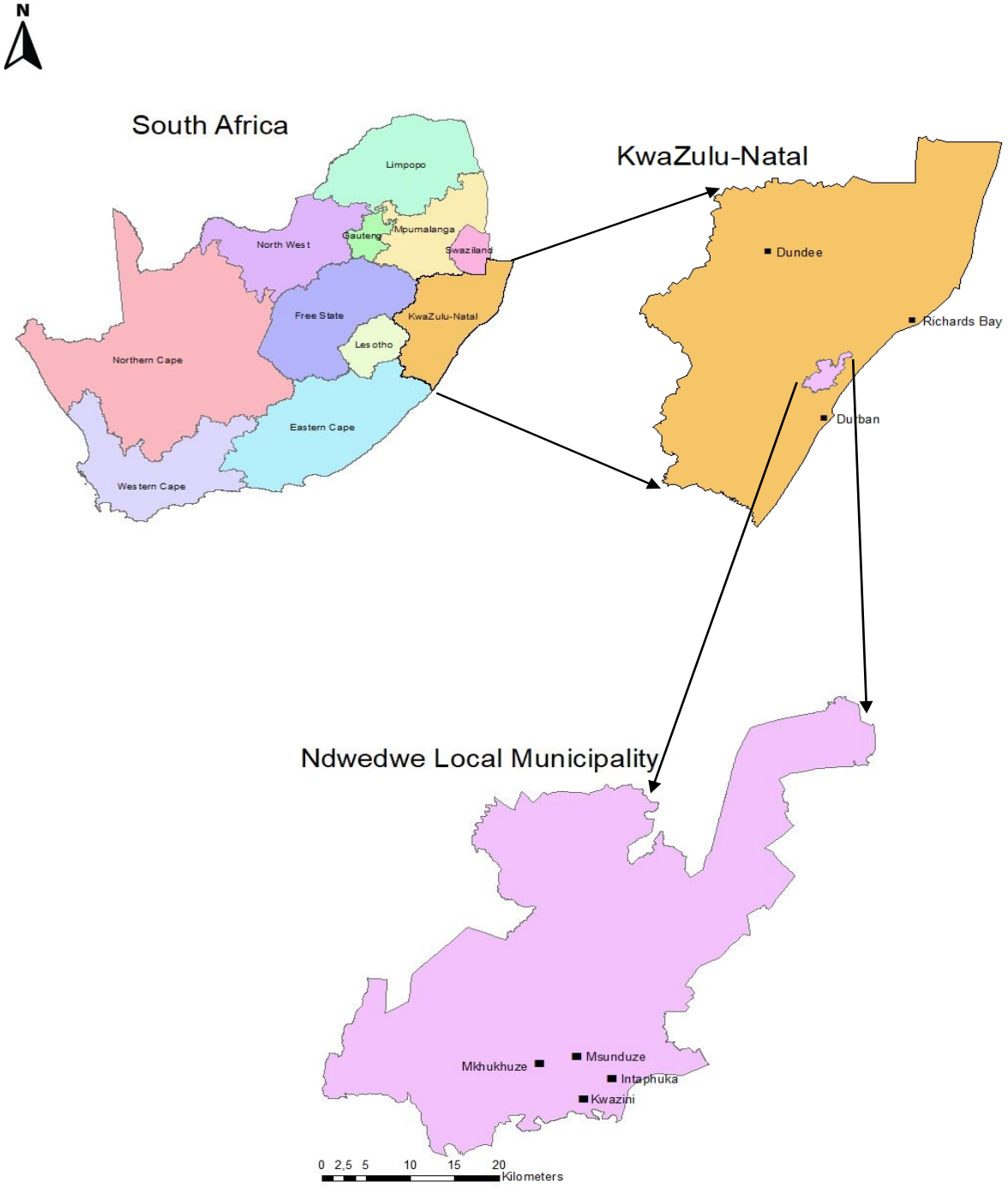


Figure 4.1 Map illustrating the location of Ndwedwe Local Municipality within KwaZulu-Natal

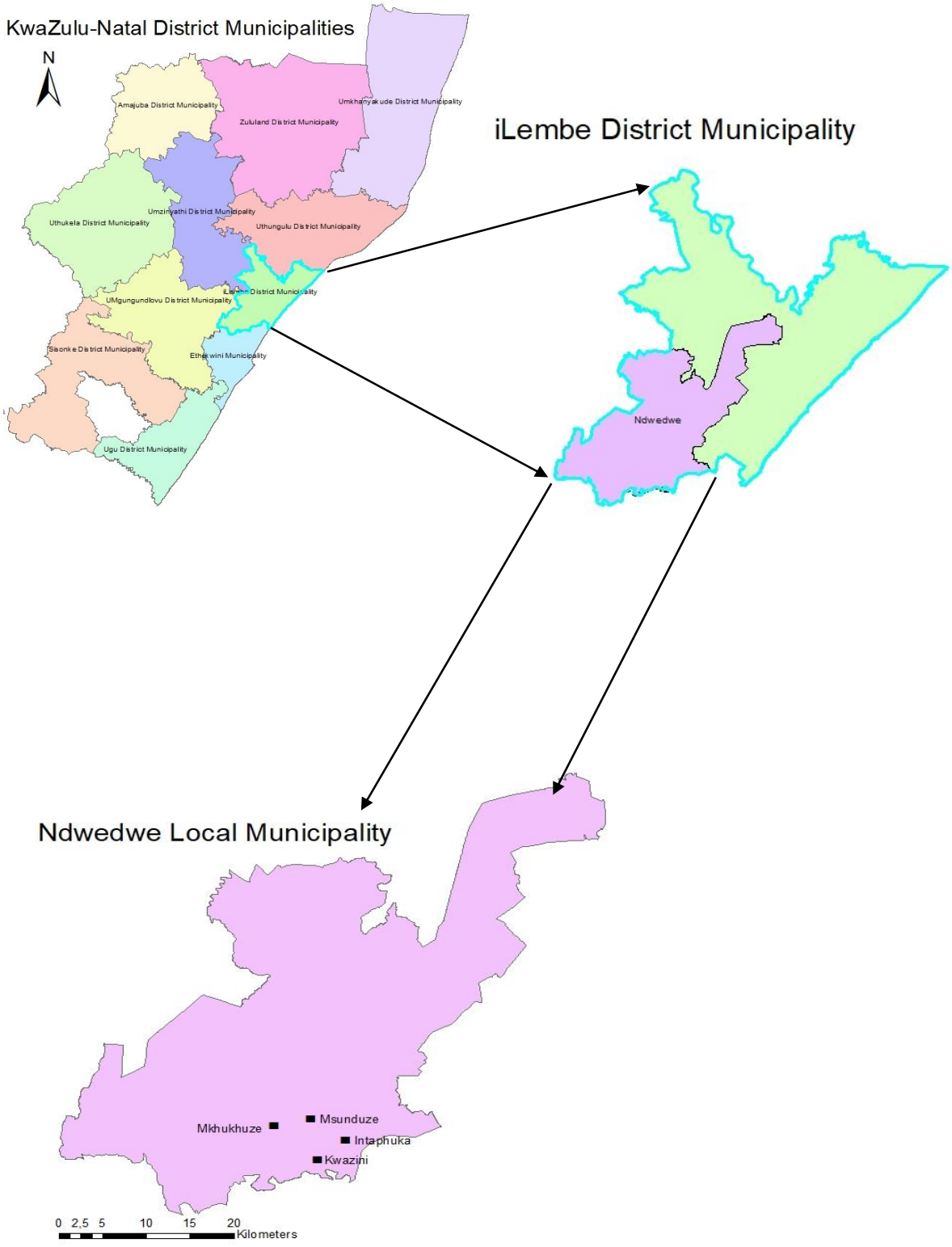


Figure 4.2 Map illustrating the location of Ndwedwe Local Municipality within the iLembe District Municipality

4.4 Methodological approach

This section seeks to describe the various processes used in the comparative study between the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities respectively. These study areas are comparative based on the level of access to amenities. Shahrokh and Miri (2019) assert that a comparative study is a study that analyses phenomena and combine them to gather points of differentiation and similarity. The manner in which the research was undertaken will be explained further in detail.

4.4.1 Triangulation

This study adopts a triangulation method. Over the years, research triangulation has gained popularity as researchers have become more sophisticated in generating and testing theories (Bans-Akutey and Tiimub, 2021). The basis of triangulation is that it utilises mixed methods, both quantitative and qualitative (Heesen *et al.,* 2019). Triangulation enables the researcher to combine findings from two or more rigorous approaches to provide a clear understanding of the results (Natow, 2020). Noble and Heale (2019) note that triangulation increases the validity and credibility of findings which allows the researcher to better understand the research issue.

This study utilised both the quantitative and qualitative research methods. The quantitative method explored the perceptions of community members regarding challenges associated with water and sanitations. The qualitative method aimed to explore the key challenges faced in the rural communities through engaging with rural dwellers and placing them at the forefront of discussions.

4.4.1.1 Quantitative

Quantitative research deals with quantifying and analysing data in order to acquire results (Apuke, 2017). This research method is regarded as the organised inquiry about phenomena through the collection and analysis of numerical or statistical data to describe, explain, and predict research interests (Adedoyin, 2020). Quantitative research methods include questionnaires, surveys, and experiments as they are easy to quantify. Due to large sample sizes, results from quantitative research are used as a representative of the population which forms a general view of the entire population (Queirós *et al.,* 2017). This allows a reliable measurement of results which can be used in statistical analysis. This data is further interpreted and analysed using tables and graphs.

Although the use of quantitative methods is less time consuming, there are also limitations associated with utilising these methods. Quantitative research methods tend to take snapshots of phenomenon and overlook the respondents' experiences and feelings (Rahman, 2016). Furthermore, quantitative researchers fail to develop thoughtful understanding of explanations involved in respondents' viewpoints (Xiong, 2022). The detachment of researchers from respondents makes it difficult to probe into issues within its natural settings through scientific methods. This makes it challenging for researchers to critically examine the dynamic and complex contexts of phenomena.

In this study, a quantitative method comprised of a questionnaire survey which was administered to the four selected rural communities (in order to obtain the general community views). The recruitment process was conducted two days prior to the initial questionnaire survey. The researcher, with the aid of the field assistant, visited every fifth household (to cover a larger area) in each community to spread the word of the research to be conducted and recruit the respondents within the four communities. Only members above 18 years of age were used for the questionnaire.. A questionnaire comprises of various questions to gather data from respondents and is often designed with the intention of statistical analysis for the responses (Heap and Waters, 2019). The use of questionnaires is the most widespread and commonly used technique for data collection in community-based evaluation research and in the field of Social Sciences (Singh, 2017). The main advantage of utilising a questionnaire is that it aids in gathering information on attitudes, behaviours, knowledge, facts, opinions, challenges, and other relevant information (Dalati and Gómez, 2018). A questionnaire survey has become a practical form of collecting data from large samples within study areas.

This study conducted questionnaire-based face-to-face interviews with a structured questionnaire consisting of open and closed-ended questions within the four rural communities. Singh (2017) asserts that this tool effectively collects demographic information such as race, home language, ethnicity, and additional information on the population used as the study area. Thus, allowing the sample of the population to be represented, which allows the researcher to conclude their findings through the data collected in the questionnaire. The questionnaire used for this research comprised of a variety of questions, which were separated into themes. The following themes included demographic and household information, access to water, the link between sanitation and diseases, community coping mechanisms and initiatives, municipality interventions, suggestions, and additional comments.

4.4.1.2 Qualitative

Qualitative research focuses more on understanding a research phenomenon in a humanistic or idealistic approach (Cropley, 2023). Even though quantitative approach is a widely used reliable method, qualitative method is useful in understanding people's beliefs, attitudes, experiences, behaviour, and interaction (Pathak *et al.,* 2013). Qualitative research is thus concerned with aspects of reality that cannot be quantified while focusing on social relations (Stahl and King, 2020). This type of research provides researchers with process-based narrated stories that are linked to the human experience. Nassaji (2020:427) defines qualitative research as follows:

> *Qualitative research can be broadly defined as a kind of inquiry that is naturalistic and deals with non-numerical data. It seeks to understand and explore rather than to explain and manipulate variables. It is contextualized and interpretive, emphasizing the process or patterns of development rather than the product or outcome of the research.*

However, qualitative research approaches sometimes focus more on meanings and experiences leaving out contextual sensitivities (Rahman, 2020). As it is more applicable in smaller sample sizes, the issue of generalisability to the whole population of the research is raised as the results do not necessarily represent the whole population. The main methods usually used in qualitative research are interviews, focus groups, and observations (Sharma, 2022). The interviews can be semi-structured or structured depending on the depth of questions, focus groups are group discussions facilitated by a researcher who has guidelines to lead the group, whilst observations include the researcher to observe the study area, to get more in-depth information of the setting of an area (Denny and Weckesser, 2022). Interviews and focus groups are more flexible and non-standardised as they have great interest in the respondents' perspectives and experiences. This makes respondents more relaxed and less pressured to communicate to the facilitator.

This study performed participatory rural exercises within focus groups from the four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze. The focus groups within the participatory exercises consisted of ten females per community and per exercise ranging from 30 to 65 years of age. These females were selected due to their accessibility during the questionnaire survey and their willingness to engage in the PRA exercises as opposed to males. PRA is a participatory approach that emphasises and encourages local knowledge (Mustanir *et al.,* 2017). This approach is rooted in the belief that community

members should be primary agents of change in respect to development (Chambers, 1992; Sandham *et al.,* 2019). Thus, enabling rural people to share, enhance and analyse their knowledge of their living conditions. Chandra (2010:290) notes:

> *PRA is a flexible, low cost and time saving set of approaches and methods used to enable workers to collect and analyse information in terms of past, present and future situations to understand the rural populace and the condition that exists in rural areas which would provide a thorough and comprehensive idea regarding problems, potentials, resources and solutions to formulate realistic development practitioners to achieve the desired goals within specific time.*

PRA allows societies to do their analysis, appraisal, and planning. It emerged in the late 1990s due to the biases against rural areas, which led to underdevelopment (Macaulay, 2017). Participatory development is based on the premise that it is important to identify and build upon strengths already present in communities. Numerous research studies and practical projects have documented that the involvement of people helping themselves is critical to the success of development strategies (Whaley and Cleaver, 2017; Kanyamuna and Zulu, 2022; Ambuehl *et al.*, 2022). This implies that rural or local people's views are essential in rural development. Participatory development is rooted in the thought that it is vital to work on the communities' strengths. Development programmes must allow people to help themselves to be successful and sustainable (Mustanir *et al.,* 2017; Macaulay, 2017). The various advantages of PRA include inclusion of indigenous knowledge and wisdom of those affected in decision-making, less reliance on imported or foreign technologies, community empowerment, as well as capacity building (Chandra, 2010). This approach aims to create community awareness facilitated by rural people based on the issues and challenges they face within their families. PRA utilises visualisation and exercises to facilitate stakeholder information-sharing, analysis, and action.

PRA is the most appropriate method to identify situations in rural areas. As this study is based on the perceptions of rural communities, it is necessary to adopt PRA. The aim is to engage with rural dwellers within the rural communities of Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively on their perceptions regarding WASH challenges as they experience these issues first-hand. This will ensure that their complaints and suggestions are being noted and voices have a platform to be heard. Overall, the benefit is to make this research more credible and dependable. This study used four techniques of PRA within the four selected rural

communities which are problem ranking matrix, Venn diagrams, mental maps, and transect walks.

4.4.1.2 (a) Problem ranking matrix

Matrix ranking is an important PRA technique used by researchers for various planning purposes (Campbell, 2002; Cavestro, 2003; Mahesh *et al.*, 2017). Problem ranking is a ranking method in PRA which helps prioritise the problems and needs of rural people in an area (Waniganeththi, 2017). This method can uncover the most critical problems of a community. This ranking can be undertaken with key informants or villagers that share the same interests with the community dwellers. The researcher asked the group of respondents in Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities respectively in NLM to list all the challenges experienced in the community on index cards. The problems were then compared against each other and marked in order of priority. This assisted the researcher to know which problems should be prioritised in the development processes. The advantage of using this method is that it can be applied to the illiterate and uneducated groups in a community, which implies there is slight to no bias.

4.4.1.2 (b) Venn diagrams

A Venn diagram is a method that is used to understand the importance of issues in a specific community and the relationship among them in terms of importance (Cavestro, 2003). The main aim of this method is to depict key institutions, individuals and organisations, and their relationship with the local community (Waniganeththi, 2017). On the diagram, each institution is represented by a circle. The size shows the importance or significance in terms of power within the community, while the degree of overlap between the circles depicts the level of interaction that occurs.

As the four rural communities of NLM are ruled by rural structures, it is important to highlight the hierarchy of institutions within the communities. According to Chigbu (2013) rural governance relates to the relationships between the actors and institutions involved in attaining rural development. It is the processes and activities involved in making decisions and taking actions that influence rural affairs (Chigbu, 2013). The four selected rural communities in NLM are governed by traditional leadership (chiefs and *izinduna*) which has implications on which institutions benefit and gets left behind. The vulnerable, especially women, are rarely incorporated in decision making in rural areas which makes them face poverty (Ofori-Sasu *et al.*, 2023). Thus, this method is essential to this study as it shows the roles of the locals and

how they perceive the institutions that are part of their communities. The method was conducted by asking the respondents to list the institutions in the community and discuss the importance of each institution and their roles. Thereafter, the circles were drawn to represent the institutions depending on the respondents' information.

4.4.1.2 (c) Mental maps

Mental maps are essential to geography as they depict different aspects of rural life such as social issues, infrastructure, natural resources, and economic activities (Castellar and Juliasz, 2018; Götz and Holmén, 2018). Participatory mapping is one of the most useful tools as it generates pictures and any aspect of the physical reality (Cavestro, 2003). Mental maps in PRA have become one of the most popular methods as they seek to explore the spatial dimensions of the reality of people in a rural area (Maulani *et al.,* 2020). Mental maps are different from general maps as they are made by local people and not by experts, and they are also not drawn to scale. The illustration results describe the habitation patterns such as housing, social infrastructure such as roads, schools, drainage systems, and natural resources such as rivers and streams (Maulani *et al.,* 2020). The mental mapping exercises were carried out within each of the focus group within the four rural communities (Msunduze, Kwazini, Intaphuka, and Mkhukhuze) of NLM in this study to depict how the rural dwellers perceive their surroundings and how relevant these features are to them. The maps were drawn on the floor using large posters and coloured pens. The respondents were able to see the mental map and picture the researcher's interpretation of the discussions. The researcher used Microsoft Paint to represent the mental maps drawn by the respondents.

4.4.1.2 (d) Transect walks

Transect walks are field-based observations of rural societies by directly observing the environment and the community resources (Mustanir *et al.,* 2020). They are also systematic walks done to explore an area with the figures in society. Rojas *et al. (*2021) note that transects are an essential participatory method to learn about land-use and cover of a community while tapping into local perceptions of environmental change. Transect walks also require a collaboration among community dwellers and researchers to uncover detailed information about the local environments. This study also adopted this PRA method to observe the surroundings and potential issues that hinder access to water and sanitation within the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities of NLM. The researcher questioned, probed, and listened intently to the local members of the four communities of

NLM. The researcher carried a diary and a pen during this process to note down the dates and times of the walks and the observations. The researcher conducted the transect walks from seven o'clock in the morning until half past five in the afternoon across the four selected rural communities from the 28th of April until 11th of June 2023. During the walks, the researcher probed respondents about issues within the communities to help identify problems and opportunities.

4.5 Ethical consideration

Before the researcher could commence fieldwork, an ethical clearance process had to be undertaken. A gatekeeper's letter from the councillor of NLM had to be signed for permission to administer questionnaires and engage in PRA exercises in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities of NLM, respectively. The ethics office required this letter with a questionnaire which was bilingual in English and IsiZulu versions and consent forms, both English and IsiZulu versions (Appendix 3 and 4). Full ethical clearance was approved by the Humanities and Social Sciences Research Ethics Committee (HSSREC) (Reference number: HSSREC/00004974/2022) (Appendix 5). Data collection could only commence when the ethics office granted full ethical clearance, which was issued on the 8th of December, 2022. Data was collected from 25th of February 2023 until 26th of August 2023. All respondents' identities were protected, and respondents' confidential details will not be mentioned or published in any research chapters.

4.6 Sampling methods

There are two primary sampling methods used in research which are probability and non-probability sampling. Probability sampling is when each member of a target population has an equal chance of being selected (Stratton, 2021). The probability sampling methods include random sampling techniques such as stratified, simple, systematic, and cluster randomisation. The advantage of this sampling is that there is less risk of bias of the results. Non-probability sampling is defined as "an approach in which the sample is selected based on the subjective judgement of the researcher instead of random selection" (Berndt, 2020:224). There are various forms of techniques part of non-probability sampling which include snowball recruiting or sampling, purposive sampling, convenience sampling and quota sampling (Stratton, 2021). This study adopted a non-probability sampling method which included snowball and purposive sampling.

When conducting research that targets populations, it is often not possible to collect data from the entire population, hence the need for sampling populations which form as a representative of the entire population (Sharma, 2017; Stratton, 2021). This study adopted two methods of non-probability sampling to sample the population namely snowballing and purposive sampling. The Ndwedwe IDP (2022:29) notes that the total population for the entire municipality is approximately 143 117, as according to the 2016 community survey. These statistics are outdated as the population could have increased over the years due to population growth in the country. The 2022 Census results are yet to be published. Thus, this study could only use the 2011 Census and 2016 community survey data.

A sample of ten percent of the total number of households in each community was chosen for this study. Each rural community is heterogenous and has different number of households. For instance, the Msunduze community approximately has 2715 households, Intaphuka with approximately 1194, Kwazini with 648, and Mkhukhuze with 129 (StatsSA, 2011). Due to lack of recent data, the number of these households may have increased over the years. This placed the research's sample of approximately 272 households in the Msunduze community, 119 in the Intaphuka, 65 in the Kwazini, and 13 in the Mkhukhuze community. However, for consistency in this research, one hundred questionnaires were administered within each community, respectively to ensure validity and reliability of the results. Due to the high sample size of four hundred respondents for the quantitative aspect and limited timeframe for the data collection process, the questionnaire was administered to both genders to ensure efficiency of the process.

The questionnaire was administered to the household head or any household member over the age of eighteen. Notably, the researcher may find more than one respondent per household, which increased the number of respondents. The four rural communities were selected on the basis of the municipality's ongoing challenges associated with water and sanitation which have made headlines on local newspaper outlets over the years (Duma, 2020; Majola, 2021; Daily News, 2022). The 2022 floods in KwaZulu-Natal further destroyed water systems within NLM which contributed to the existing challenges faced by the communities concerning water provision as well as electricity (KwaZulu-Natal COGTA, 2022). Additionally, the Ndwedwe IDP (2022) also highlights that a large number of communities including the four selected communities still lack access to proper water and sanitation facilities. Thus, this motivated the researcher to select these four rural communities of NLM as case studies for this research.

4.6.1 Snowball sampling

Snowball sampling is one of the common methods of sampling in research, central to which are the characteristics of referral or networking (Wohl *et al.,* 2017; Marcus *et al.,* 2017; Leighton *et al.,* 2021). The researcher usually initiates the fieldwork with a small number of respondents who thereafter refer the researcher to other respondents willingly (Leighton *et al.,* 2021). Thereafter, the researcher uses his or her social networks to establish initial links, with more respondents gaining, resulting in an increasing chain of respondents (Parker *et al.,* 2019). This sampling method is most common when the researcher is not familiar with the study area as the respondents help in recruiting other respondents faced with similar challenges. Snowball sampling is also useful when the target population is hard to access as initial respondents recruit other respondents (Mweshi and Sakyi, 2020). However, the main disadvantage of utilising snowball sampling is that sampling error cannot be calculated and degree of confidence in interpretation cannot be determined as random selection is not used (Berndt, 2020).

The snowball sampling method was utilised in administering one hundred questionnaires per community respectively. This method was useful as the researcher is not familiar with the study area. The researcher selected the first household based on the presence of an unimproved pit latrine without ventilation and poor housing structure. This indicated to the researcher that the household also lacked piped water infrastructure within the household based on the state of the household infrastructure. It is also difficult to access these four rural communities as there is poor road infrastructure. Therefore, the initial respondents referred the researcher to other households that also lacked access to water and sanitation which helped this process to be faster and efficient. This sampling method was helpful as the time to administer the questionnaires door to door was reduced significantly. However, there were potential biases of using the snowball sampling approach such as the inability to ensure sample diversity as this is a necessary condition for valid research findings. Potential respondents with smaller networks may have also been underrepresented as they were less likely to be referred to by the respondents. An inclusion and exclusion criteria was used to administer the questionnaires in the four communities. All four communities were included in the criteria as they do not have access to water. Households with residents who have not lived for more than five years within the communities were excluded in the questionnaire survey as they may not have sufficient information regarding challenges associated with WASH within their respective communities.

4.6.2 Purposive sampling

A purposive sampling is a non-probability method that is subjective in its respondents (Klar and Leeper, 2019; Berndt, 2020). Purposive sampling has characteristics that are defined for a purpose that is relevant to the study (Andrade, 2021). This sampling method allows researchers to make generalisations from the studies sample (Sharma, 2017). The benefit of using this sampling technique is the improved matching of the sample to the aim and objectives of the research (Campbell *et al.*, 2020). Thus, utilising this method improves the study's rigour and trustworthiness of the data and its results especially in qualitative research. However, purposive sampling is prone to bias especially if the rules or criteria for judgement are poorly documented and explained (Berndt, 2020).

The focus groups for the participatory exercises were purposively selected within the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities, respectively. This was done with the aid of a field assistant who has been residing in the Msunduze community for approximately 40 years. The field assistant is also familiar with the Intaphuka, Kwazini, and Mkhukhuze communities. The focus groups within the participatory exercises consisted of ten females per community and per exercise ranging from 30 to 65 years of age. The sample size of ten respondents per community made it easier for the researcher to facilitate the respondents and engage with them. The respondents engaged voluntarily. The respondents within the Msunduze community consisted of ten females from 40 to 60 years, in the Intaphuka community the respondents were ten females from 30 to 60 years of age. The ten females within the Kwazini community were between the ages of 30 to 65 years, while in the Mkhukhuze community the ten females were over 40 years of age. It cannot be ignored how WASH responsibilities lie heavily on women in rural SSA (Baker *et al.*, 2017; Sweetman and Medland, 2017; Grigg, 2018; Ngarava *et al.*, 2019; Kayser *et al.*, 2019). Thus, the reason for choosing only females in the participatory exercises highlights how women shoulder more burden when it comes to WASH-related activities. Also, the females were also more accessible during the administration of questionnaire process and were more willing to engage in the PRA exercises as opposed to males. The participatory exercises therefore placed women at the forefront of their struggles and development.

4.6.2.1 Inclusion and exclusion criteria

Establishing inclusion and exclusion criteria for study participants is a standard, required practice when conducting high-quality research (Meline, 2006; Patino and Ferreira, 2018).

Inclusion criteria are defined as the key features of the target population that the investigators will use to answer their research question (Hornberger and Rangu, 2020). Typical inclusion criteria include demographic, clinical, and geographic characteristics. As mentioned, this study purposively selected females to participate in the PRA focus group exercises. The following inclusion criteria were used to select the female participants for the participatory exercises:

- Adults above 18 years of age;
- permanent residents who have at least lived in the community for over five years to be able to provide sufficient insight on the WASH challenges within the community;
- available to participate in the exercises; and
- responsible for the collection of water.

In contrast, exclusion criteria are defined as features of the potential study participants who meet the inclusion criteria but present with additional characteristics that could interfere with the success of the study or increase their risk for an unfavourable outcome (Patino and Ferreira, 2018). The following exclusion criteria were utilised to select the females using a purposive sampling strategy for the participatory exercises:

- Visitors within the community;
- refusal to give informed consent; and
- any acute or chronic condition that would limit the ability of the respondent to participate in the study.

4.7 Procedure for the analysis of data

Upon acquiring ethical clearance, data collection began within the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities respectively. The respondents were requested to participate in this research provided they read and signed the informed consent forms. The willingness to withdraw from participating was also ensured. Further clarification and explanation of the informed consent form were provided if necessary. Thereafter, the questionnaires were administered to respondents over 18 years of age. Data was then transcribed. Although some respondents were reluctant to participate as the questionnaire was lengthy, the researcher helped read out the questions to the respondents which made the process

easier and faster. Furthermore, the data was also translated from IsiZulu to English prior to analysis.

The responses from the questionnaires were uploaded and analysed via SPSS version 28. SPSS is a statistical software package that analyses data electronically (Miller, 2017; Abu-Bader, 2021). SPSS allows to capture data from descriptive statistics and analyses datasets. Descriptive statistics are used to summarise data in an organised manner by describing the relationship between the variables in a sample (Kaur *et al.,* 2018). These descriptive statistics allow the researcher to summarise the data through calculations, tests, and converting the results into graphs and tables. The data from SPSS was also analysed in Microsoft Word and Excel to generate the researcher's own graphs and tables. The main advantage of using SPSS is that the analysis takes less time and is cost-efficient. Since four hundred questionnaires were administered to the communities, this package was therefore efficient and useful for this study.

A range of participatory methods were used to collect the qualitative data. The participatory techniques that were employed were problem ranking matrix, Venn diagrams, mental maps, and transect walks. These participatory exercises were used in this research to gain the communities' insights and explore their challenges. Thus, the focus groups within the exercises were essential as they were interactive opposed to the use of a questionnaire as it creates an unequal power relation between the researcher and respondents. The problem ranking matrix exercise assisted the researcher in uncovering the critical problems faced within the four rural communities. This also assisted in prioritising the issues that were raised by the community respondents. The use of the Venn diagrams provided the key institutions found within the four communities and how they interact with one another and with the local communities at large. Mental mapping showed the spatial dimensions of the reality of rural communities. The mental maps depicted the features found within the communities such as roads, houses, vegetation, rivers, and other infrastructure. Transect walks assisted the researcher in observing and noting down the surroundings of the rural communities and the potential issues that hinder access to water and sanitation within the Msunduze, Intaphuka Kwazini, and Mkhukhuze communities respectively.

In terms of the analysis of qualitative data, the data from the participatory exercises was analysed thematically. Thematic analysis is a method that analyses and reports patterns or themes within data and reduces the data in a flexible manner while it merges with other data analysis methods (Castleberry and Nolen, 2018; Vaismoradi and Snelgrove, 2019). This

method is commonly used to analyse qualitative data across different disciplines. Where relevant, the data from the participatory exercises were compared to the data from the questionnaires.

4.8 Fieldwork experiences and limitations

The researcher had to take a preliminary visit to these four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze to investigate the state of water provision before considering the four communities as prospective study areas. After choosing the four communities, the researcher took two field trips to the councillor's office for two days to acquire the gatekeeper's letter. The initial site inspection trip took place on the 25th of July 2022, was unsuccessful as the councillor was out of office. On the second site inspection, which took place on the 2nd of August 2022, the councillor granted the researcher permission to distribute the questionnaires and undertake in the participatory exercises within the four communities by granting the gatekeeper's letter. The role of a councillor in South Africa is to represent its people in the municipality and co-operate with other councillors in the best interest of the community, as well as communicate the needs of the community to the municipal council and the council processes to the community (Kanyane, 2017). The councillor was helpful as he also reassured the researcher that the four communities selected were suitable for this study. The councillor also administers these four rural communities.

The researcher had to reside at a relative's home in the Msunduze community, which is in close proximity to the Intaphuka, Kwazini, and Mkhukhuze communities, respectively. Due to the prescribed timeframe stipulated by the ethics office to carry out data collection and the researcher's other schooling curriculum, the researcher had to stay at the relative's home and conduct research during weekends, public holidays, and semester vacations. This severely limited the researcher's ability to collect extensive data as time was limited.

Before administering the questionnaires, instructions were given to inform the respondents of the purpose and description of this research study. Respondents were assured of their confidentiality as their personal information was not required. The respondents were asked to voluntarily sign the consent forms, ensuring their will to partake in this study. This form also highlighted that the respondents could withdraw at any point during participation.

During the questionnaire survey, the researcher assisted and clarified any questions the respondents were unsure of. However, the researcher encountered minimal issues pertaining to the clarity of the questions as the IsiZulu version of questionnaires was available, which most

respondents requested as it is their first language. The issue of language being a barrier between the respondents and researcher was not a problem as IsiZulu is both the researcher and respondents' first language. The researcher was accompanied by a field assistant familiar with the study areas as the researcher does reside within the four selected communities. The role of the field assistant was to direct the researcher within the communities and facilitate the data collection process.

One of the significant challenges that the researcher faced during the data collection process was that community dwellers were not keen to participate in either the questionnaire survey or participatory exercises. They felt that the water and sanitation challenges in their areas has been investigated and reported on for many years, and yet there have not been any improvements in addressing these issues. Therefore, they did not see the reason to engage in this project. Another limitation was that the elderly respondents were often illiterate, and the researcher had to help them read and illustrate where to tick their applicable responses. This was mainly an issue during the questionnaire survey and not the participatory exercises, as they were not required to write in the latter. The mental maps were an exception as it was easy since they drew what they perceived of their communities while the researcher was the transcriber and facilitator.

The researcher also encountered an issue with gathering respondents for the participatory exercises as community members were not keen on engaging in this topic. The researcher had to gather the respondents on several days within one community. As the respondents knew that the researcher was not originally from these areas, they were initially sceptical to respond or engage in the survey and exercises. However, with the presence and aid of the field assistant, the respondents eased up to the researcher and engaged in the survey and exercises.

It is also important to note the researcher's positionality in terms of the research and how it could have influenced the types of responses provided by the researcher. Research positionality reflects the position that the researcher has chosen to adopt within a given research study (Holmes, 2020). It influences both how research is conducted, its outcomes, and results (Rowe, 2014). It also influences what a researcher has chosen to investigate. As the researcher positioned herself as a concerned citizen who has also experienced water shortages in her community, this could have influenced the types of responses provided due to the subjectivity nature of the issue.

4.9 Chapter summary

This chapter highlighted and explained on the relevant methodologies utilised to collect and analyse data in this research. Primary and secondary data sources were used to collect data in this study. A triangulation research method was used. Snowball and purposive sampling methods were utilised to select the respondents of the questionnaire and participatory exercises respectively. The strengths and weaknesses of each methodological tool used was also elaborated in this chapter. The background information of the respective four rural communities NLM sheds light on existing challenges which pose additional threats for accessing water and sanitation services. The ethical considerations and fieldwork experiences encountered during data collection was also elaborated in this chapter. The following chapter presents, analyses, and discusses the data collected in this study.

CHAPTER FIVE

DATA PRESENTATION, ANALYSIS AND DISCUSSION

5.1 Introduction

The previous chapter focused on the research methodology adopted in this study when collecting data within the four selected rural communities in NLM, KwaZulu-Natal namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively. This chapter presents, analyses, and discusses the data collected from administering questionnaires within the four selected rural communities in NLM concerning challenges associated with access to water and sanitation. The data from participatory exercises is also presented, analysed, and discussed further in this section. The data was collected and analysed quantitatively and qualitatively. Quantitative data was collected through the administration of questionnaires and analysed through SPSS statistics version 28. Qualitative data collected through focus groups within participatory exercises which was analysed thematically. A total of four hundred questionnaires were administered within each of the four selected rural communities in NLM. The participatory exercises consisted of a total of forty respondents. The administration of questionnaires and the PRA exercises were through the main indigenous language in the four communities which is IsiZulu. All data was then transcribed and translated into English.

The data from the questionnaire is divided according to the following themes:

- Demographic and household information;
- access to water;
- sanitation and diseases;
- community's coping mechanisms and initiatives;
- Ndwedwe Local Municipality interventions; and
- suggestions.

The data from participatory exercises is divided according to the following themes:

- Problem ranking matrix;
- Venn diagrams;
- mental maps; and
- transect walks

5.2 Demographic and household information

A snowball sampling method was utilised in this study to sample the households within the four selected communities which resulted in a total of four hundred respondents. One hundred questionnaires were administered within each selected rural community namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively. This section will illustrate the demographic and household information of households in each of the four rural communities. Demographic data included the respondents' gender, age, disability, marital status, level of education, type of employment and health issues of respondents. The household information in included household head, number of people working in the household, main source of household's income and total monthly income. Ziegenfuss *et al*. (2021) note that demographic survey questions are essential to describe the population of responders, illuminate potential differences, and ultimately advance equity.

Table 5.1 Demographic profile of respondents (in %)

Demographic variable	Categories	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Gender	Male	41	40	40	44	41
	Female	59	60	60	56	59
Age	18-25	19	16	23	23	20
	26-35	24	29	31	29	28
	36-45	17	19	18	22	19
	46-55	19	21	21	16	19
	56-65	13	10	7	8	10
	> 65	8	5	-	2	4
Disability of respondents	Yes	7	3	1	-	3
	No	93	97	99	100	97
Marital status of respondents	Single	80	74	85	85	81
	Living with partner	2	7	6	5	5
	Married	13	15	7	7	11
	Separated	-	1	-	-	-
	Widowed	5	3	2	2	3
Migrant labourer spouse	Yes	13	13	-	-	5
	No	92	87	100	100	95

Table 5.1 illustrates the demographic profile of respondents within the four selected rural communities. The results indicate that in each of the four communities, more females were sampled in the questionnaire survey in comparison to males. The Intaphuka and Kwazini communities sampled 60% of females, 59% in Msunduze and 56% in Mkhukhuze,

respectively. The Mkhukhuze community had the majority of males (44%) sampled while the Msunduze community had the least (41%) of males.

The low percentage of males in all communities can be attributed to rural-urban migration. Migration in any region has typically been understood as a male phenomenon, as it is usually males who migrate to neighbouring cities for work (Mbiyozo, 2018). For instance, in a study in Nigeria to determine the factors that influence rural-urban migration of youths, the findings of that study revealed that there was a majority (68.8%) of male migrants in comparison to 31.1% of female migrants (Alarima, 2018). This means more females are left in rural areas than the male population. This can also be attributed to the results of this research. Furthermore, according to StatsSA (2016), the dominating group of NLM are IsiZulu speakers. The respondents of this study were South African citizens and belonged to the African race. This corresponds with the Ndwedwe IDP 2022/2027, which states that most of the population are black Africans, who comprise of approximately 142 104 of the total population. This can be attributed to the establishment of the homeland areas or Bantustans, which left most of the black population displaced in rural areas with poor, minimal essential services and infrastructure (Phillips, 2017).

From Table 5.1, 31% of respondents in the Kwazini community were between the ages of 26 to 35 years, 29% in the Intaphuka and Mkhukhuze communities, respectively, and 24% in the Msunduze community. Twenty-three percent of respondents in the Kwazini and Mkhukhuze communities were between the ages of 18 to 25, respectively, 19% in Msunduze, and 16% in the Intaphuka community. These are the two leading age groups in terms of respondents which correlates with the Ndwedwe IDP (2022) as it mentions that the municipality's highest population is 20 to 39 years.

While the greater than 65 years age group accounted for at least 8% in Msunduze, it is alarming that the Ndwedwe IDP (2022) notes that the greater than 75 years of age group has a higher population than the ages of 40 to 65 years which is in contrast to the findings of this study. The Ndwedwe IDP (2022:31) has noted a slow increase of 0.19% in population growth per year from 2011 to 2016 as well as of a trend in terms of migration of the youth from rural local municipalities such as Maphumulo and Ndwedwe of iLembe District to coastal and more urban municipalities such as Mandeni and KwaDukuza. This may attribute to the increase of older populations within NLM. This encourages rural decline, a global issue as the world changes to

promote urbanisation and industrial development (Liu and Li, 2017; Li *et al.*, 2019). Thus, rural-urban migration has a considerable impact on population growth in rural areas.

With regards to disability, majority of the respondents did not live with a disability with all of the respondents in Mkhukhuze not living with a disability, followed by 99% of respondents in Kwazini, 97% in Intaphuka, and 93% in Msunduze. Although there was a minority of respondents who lived with a disability across the four communities, the issue of inadequate access to WASH greatly affects this group. People living with a disability and the elderly are considered vulnerable to water insecurity during shortages of water supply in South Africa (Wrisdale *et al.*, 2017). The physical condition of people living with disability hinders them to collect water from common water sources in rural areas such as rivers and streams and also visiting a poor latrine. People living with a disability also face challenges in meeting their personal WASH needs, especially in using these services consistently, autonomously, hygienically, and without any fear of abuse and pain (Banks *et al.*, 2019). This impacts on the human rights of these people while diminishing their dignity and self-esteem (Enfield, 2018).

Furthermore, Dassah *et al*. (2018) highlight that people living with disabilities also lack access to public health care due to obstacles such as affordability, availability, acceptability, and geography. In particular, the limited availability of healthcare facilities and low quality of care means that those needing healthcare services frequently have to travel for care, which is costly. Vergunst *et al.* (2017) argue that in South Africa, there is "triple vulnerability," which includes poverty, disability, and rurality. People with disabilities face more hindrances to accessing health care than those without disabilities, especially in rural African countries (White *et al.*, 2017). Transportation problems worsen the barrier of geographic distance (Dassah *et al.*, 2018). The lack of proper road infrastructure exacerbates transportation problems in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities. Poor roads in rural areas also impacts on the access to markets as rural dwellers have to pay high transportation fares (Porter, 2014; Nkomo *et al.*, 2019). However, due to poverty and lack of income these rural dwellers are severely impacted by poor road infrastructure. Even though access to proper transport is essential for the economic and social development of SSA, there have been limited efforts in addressing this issue which further impacts on the production of rural areas (Porter, 2014).

Table 5.1 also illustrates that the majority (85%) of respondents in the Kwazini and Mkhukhuze communities were single, 80% in Msunduze, and 74% in Intaphuka. In terms of the married

category, there were 15% of respondents in the Intaphuka community, 13% in Msunduze, 8% in Mkhukhuze, and 7% in Kwazini. This table also demonstrates that all respondents in the Kwazini and Mkhukhuze communities had spouses who were migrant labourers, 92% in Msunduze and 87% in Intaphuka.

Thirteen percent of respondents in the Intaphuka and 8% from Msunduze communities respectively had a spouse who was a migrant labourer. This reinforces the notion of rural-urban migration as men migrate to cities for job opportunities. Also, this increases the number of female-headed households in rural areas. The absence of men requires women to assume the role of household heads as family life and gender roles shift due to migration (Choithani, 2020; Nyoni and Kollamparambil, 2022). This often leads to changes in gender power relations within households.

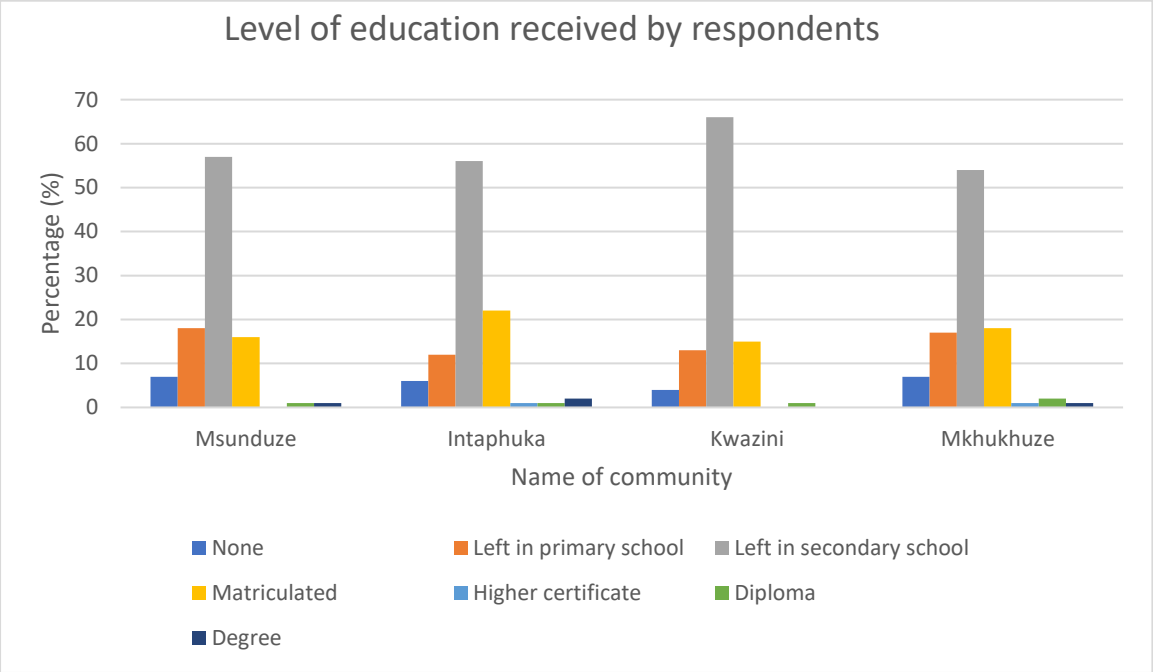


Figure 5.1 Level of education received by respondents (in %)

Figure 5.1 above shows that most respondents across the four communities left secondary school. The Kwazini community has most (66%) respondents who left secondary school, while the Msunduze, Intaphuka, and Mkhukhuze communities had 57%, 56%, and 54% of respondents, respectively. The Intaphuka community had the majority of respondents (22%) that are matriculated, the Mkhukhuze community (18%), then the Msunduze community with 16%, and the Kwazini community with 15%. Eighteen percent of the respondents in the

Msunduze community left in primary school, and 17% in the Mkhukhuze community. While 13% and 12% left primary school in the Kwazini and Intaphuka communities, respectively.

Poverty is rife in many African countries, which has severe implications for providing quality education (Du Plessis and Mestry, 2019). Rural schools have challenges that are unique to their environment. Various barriers lead to the poor education system in African countries, such as insufficient funding from the state, underqualified teachers, lack of resources and infrastructure, and lack of parental interest in children's education (Du Plessis and Mestry, 2019; Gallo, 2020). South Africa has poor education standards compared to other countries in the SSA region (Nortje, 2017). Rural areas in South Africa are mainly characterised by poor educational systems (Mlambo, 2018). Rural areas' lack of proper basic and higher education systems has also exacerbated rural-urban migration, where people move to the cities to acquire these services (Mercandalli and Losch, 2017). However, the apartheid legacy of rural black communities receiving Bantu Education cannot be overlooked. This sector in rural areas still lack access to proper quality education compared to its counterparts which must be addressed expeditiously (Burger and Christian, 2020).

Table 5.2 Health issues of respondents (in %)

Health issues suffered by the respondents	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Tuberculosis	3	2	-	-	1
Influenza	31	31	39	40	35
Diabetes	20	22	21	17	20
High blood pressure	3	12	13	9	9
Skin rashes	-	4	-	5	2
Cholera	-	-	-	-	-
Bilharzia	-	-	-	-	-
Asthma	3	2	1	-	2
Cancer	-	-	-	-	-
Sinus infection	15	13	17	13	15
Arthritis	7	1	-	-	2
Diarrhoea	18	13	8	16	14

Table 5.2 depicts the health issues that the respondents have suffered from in the four selected rural communities in NLM. The most common health issues that the respondents have suffered from are influenza, diabetes, sinus infection, and diarrhoea, respectively. As such, 40% of respondents in the Mkhukhuze community suffered from influenza, 39% in Kwazini, and 31% in the Msunduze and Intaphuka communities respectively. Most respondents who suffer from

influenza also suffer from sinus influenza. Influenza is closely linked to sinusitis infection which normally escalates during the Winter and Spring seasons. It is not surprising that it is the most common health issue in this study as the questionnaires were administered during the winter season. Influenza is the most common illness people suffer, and this correlates with a study by Cohen *et al.* (2021), where it was found that in the rural province of Mpumalanga, South Africa, majority of the households (79%) had one or more influenza-positive individuals. Barry *et al.* (2021) also notes that influenza is a dominant cause of illness in Africa and can lead to fatality if not treated.

Diabetes has also become a common disease in rural SSA. Atun *et al.* (2017) argue that diabetes has become one of the causes of mortality in SSA, along with HIV/AIDS, malaria, lower respiratory infections, and diarrhoeal diseases. In this study's findings, 22% of respondents in the Intaphuka community suffered from diabetes, 21% in Kwazini, 20% in Msunduze, and 17% in Mkhukhuze.

Although arthritis has one of the lowest percentages with only 7% of respondents in Msunduze, and a percent in the Intaphuka community, it is essential to highlight that rural dwellers also suffer from this health issue. In a study conducted in Zambia and Kenya (East Africa), musculoskeletal issues, mainly osteoarthritis, were more common in rural areas compared to cities, with most of the patients being female and above the age of 58 (Kuo *et al.*, 2022). The respondents suffering from arthritis in this research were older than 56, and this health issue increases with age.

The respondents also stated that the distance to the nearest clinic in the Msunduze community ranges from 2 to 10 kilometres. In the Intaphuka and Kwazini communities, the distance ranges from 6 to 15 kilometres, respectively, while in Mkhukhuze, the distance ranges from 6 to 10 kilometres. There is only one community health centre in the town of Ndwedwe which caters for all four communities. This implies that these rural dwellers have to travel a long duration and pay high taxi fares to access the facility which is also exacerbated by poor road infrastructure.

Table 5.3 Head of respondents' households (in %)

Head of household and category	Categories	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Household Head	Respondent	30	20	12	14	19
	Father	16	21	29	21	22
	Mother	28	25	20	32	26
	Grandfather	8	9	13	7	9
	Grandmother	11	14	15	13	13
	Brother	3	6	8	6	6
	Sister	4	5	3	7	5
Household category	Male-headed	33	45	57	40	44
	Female-headed	67	55	43	60	56

Table 5.3 above indicates that the majority of respondents (32%) were headed by mothers, 28% in Msunduze, 25% in Intaphuka and 20% in Kwazini. Thirty percent of respondents in the Msunduze community were the household heads, the Intaphuka community with 20%. Mkhukhuze and Kwazini had the lowest number of respondents who were household heads, 14% and 12%, respectively. Twenty-nine percent of respondents in the Kwazini community were headed by fathers, 21% in Intaphuka and Mkhukhuze, respectively, and 16% in Msunduze.

Female-headed households dominate across the Msunduze, Intaphuka, and Mkhukhuze communities, except for the Kwazini community. From Table 5.3 it is evident that the majority of respondents (26%) mentioned that their households were headed by their mothers. Only the Kwazini community had most respondents (29%) with fathers as households in comparison to 20% with households headed by their mothers. Sixty-seven percent of the respondents in the Msunduze community are female-headed, 60% in Mkhukhuze, then the Intaphuka community with 55% of the respondents. In contrast, the Kwazini community had more male-headed households (57%) compared to 43% female-headed households. However, these figures correlate with the StatsSA (2011) figures, which mention that the female-headed households in Msunduze, Intaphuka, and Mkhukhuze are 53.5%, 51.7%, 54.3% respectively, while the Kwazini community accounted for 47.8% of female-headed household.

Female-headed households are increasingly becoming a social phenomenon in developing countries, especially in rural areas, and are among the most vulnerable groups that confront challenges (Yoosefi *et al.*, 2020). Rural areas have become female as most men migrate to urban areas and neighbouring countries for improved livelihoods (Thobejane and Nyathi,

2018). Most of these women who are left behind sustain themselves through the agricultural labour force and subsistence farming as they have limited options due to illiteracy or lack of schooling. Apart from migration, other factors that lead to an increase in female-headed households include divorce, spouse death, increased life expectancy among women, or abandonment by husbands (Yoosefi *et al.*, 2020). This has led to shifts in gender roles and interruptions of family structures.

Table 5.4 Number of people living within the respondent's household (in %)

Number of people living within respondent's household	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
1	-	-	-	-	-
2	-	-	-	-	-
3	1	-	-	-	-
4	5	-	-	-	1
5	10	-	1	-	3
6	43	31	5	5	21
7	29	36	34	23	31
8	-	-	-	-	-
9	8	24	58	58	37
10	4	9	-	-	3
> 10	-	-	2	14	4

Table 5.4 shows that 58% of respondents in the Kwazini and Mkhukhuze communities have nine people living in their households. Forty-three percent of respondents in the Msunduze community have six people residing within their households, and 36% in the Intaphuka community have seven people living in their households. Surprisingly, there were no respondents, with eight residing within their households. This is also the case with the lower numbers (1 and 2), as only a percent of respondent has three people living within their household in the Msunduze community. The highest percentage in the categories of the number of people living within the respondents' households was nine, which is 37%, which means many households have many people to cater to their needs. This has an implication on household food security as household size is a significant determinant of household food security. Drammeh *et al.* (2019) highlight that larger family sizes put a burden on food consumption and more likely experience food insecurity in comparison to smaller family sizes.

Table 5.5 Type of employment of respondents (in %)

Type of employment respondents hold	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Unemployed	40	42	64	54	50
Domestic	17	14	7	8	12
Laboured	15	22	14	16	17
Business owner	2	2	-	-	1
Manager	-	1	2	4	2
Technical	-	1	1	2	1
Artisan	-	-	-	1	-
Professional	1	3	1	1	1
Child support grant holder	7	5	3	5	5
Old age pensioner	14	8	6	9	9
Disability grant holder	4	2	2	-	2

Table 5.5 showcases the type of employment held by the respondents in the four selected rural communities. This table illustrates that 64% of respondents in the Kwazini community were unemployed, while Mkhukhuze had 54%. In comparison to the Intaphuka and Msunduze communities who had 42% and 40% unemployed respondents, respectively. Twenty-two percent of respondents in the Intaphuka community are laboured workers, while 17% in the Msunduze community are domestic workers. Notably, laboured workers are mainly males while females hold the domestic jobs. Two percent of respondents across the four communities held managerial and professional positions, while a percent held business owner and technical positions. A significant total of 16% of respondents across the four communities were grant holders, which comprise of the child support grant, old age pension, and disability grant.

The staggeringly high percentages of unemployment across all four communities coincide with the statistics provided by Ndwedwe's IDP 2022/2027, which reveal that NLM and Mandeni Local Municipality have the highest unemployment also encompassing the youth, at 49% and 58%, respectively, amongst the other two local municipalities in the iLembe District which are Maphumulo and KwaDukuza. Even though unemployment declined from 67.8% to 49% from 2001 to 2011, it is clear that NLM is not absorbing its human resources, which can be attributed to outward migration (Ndwedwe IDP, 2022).

Rural Africa is facing high under-employment and unemployment, which has resulted in an influx of people into urban areas (Mercandalli and Losch, 2017; Nga-Ndjobo and Abessolo, 2023). The lack of people being absorbed in high-skilled jobs due to poor education levels is evident in NLM (Ndwedwe IDP, 2022). However, contrary to this, another prevailing narrative is that the rural African youth is rapidly exiting agriculture and entering other sectors such as industry and services, as rural areas are still not equipped for, resulting in high unemployment rates and rural-urban migration (Mabiso and Benfica, 2019).

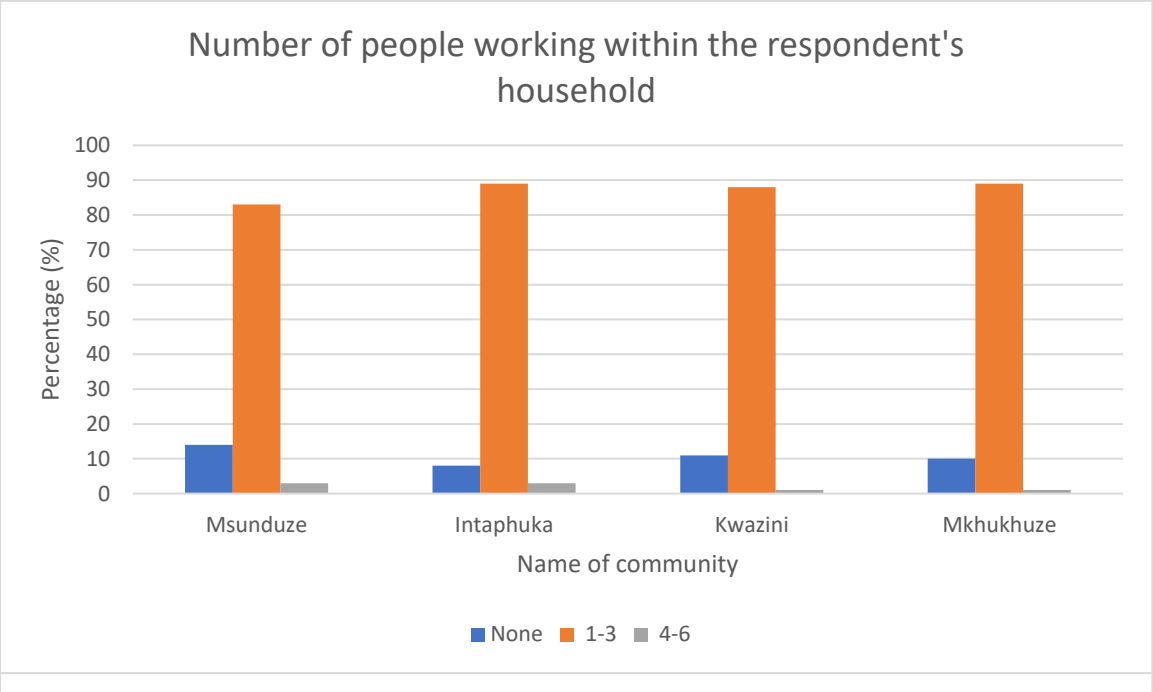


Figure 5.2 Number of people working within the respondent's household (in %)

Figure 5.2 above depicts that the Intaphuka and Mkhukhuze communities have the majority (89%) of the respondents, with 1 to 3 people working in their households. This is followed by the Kwazini and Msunduze communities, with 88% and 83% with 1 to 3 people working in their households, respectively. A significant proportion of respondents had no people working in their households, with 14% in the Msunduze community and 11% in the Kwazini community respectively. Ten percent of respondents in the Mkhukhuze community and 8% in the Intaphuka community did not have people working in their households. The Msunduze and Intaphuka communities have 3% of 4 to 6 working in their households, while the Kwazini and Mkhukhuze communities have a percent of 4 to 6 people working. No more than seven people worked in any households across the four communities. This implies that a significant number of households are vulnerable to household food insecurity and poverty.

Table 5.6 Respondent's main source of household's monthly income (in %)

Main source of monthly income in each household	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Child support grant	4	1	4	3	3
Remittances	5	3	1	6	4
Salary	23	20	15	33	23
Wage	56	58	73	50	59
Pension	8	12	5	8	8
Disability grant	4	2	2	-	2
Informal income	-	4	-	-	1

Table 5.6 showcases that most respondents (73%) in the Kwazini community depend on wages as their household's primary source of monthly income. Wages are the highest main source of monthly income in their households across the four rural communities. The Intaphuka community had 58% of respondents while 56% were in Msunduze, and 50% in the Mkhukhuze community dependent on wages. However, wages are not stable as they are based on contractual jobs. Francis and Webster (2019) note that even though the minimum wage has recently increased, there is still non-compliance with ensuring people receive the minimum wage. Plus, since these jobs are usually not protected by unions, workers get exploited easily.

A significant portion of respondents (33%) in the Mkhukhuze community have salaries as their main source of income, 23% in Msunduze, 20% in Intaphuka, and 15% in Kwazini. Surprisingly, the Ndwedwe IDP 2022/2027 states that 28% of its population is employed in the formal sector, with only 4% highly skilled. Fourteen percent of the population is semi-skilled or unskilled, while 10% are skilled, and 8% working in the informal sector. These figures also relate with the results of this study, as 60% of the household's leading source of income is wages. These jobs include short-term tender employment and domestic work. This means that a large population of the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities are semi-skilled or unskilled.

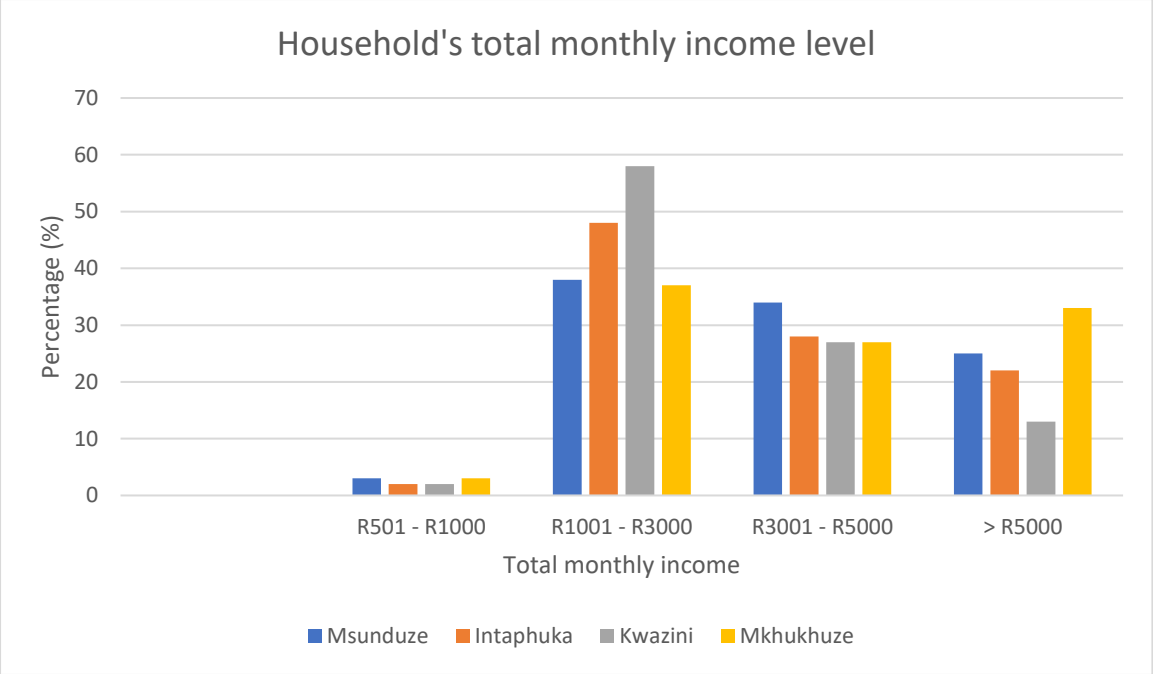


Figure 5.3 Household's total monthly income level (in %)

From Figure 5.3 above, it is evident that the Kwazini community has the majority of respondents (58%) with a household monthly income ranging from R1001 to R3000, with 48% in the Intaphuka community. In comparison, the Msunduze and Mkhukhuze communities had 38% and 37% respectively. Thirty-four percent of respondents in the Msunduze community had a total household monthly income of R3001 to R5000, with 27% the Kwazini and Mkhukhuze communities also in this category respectively.

The Mkhukhuze community has a significant 33% of respondents with their household's total monthly income of greater than R5000, 25% in the Msunduze community. In contrast, the Intaphuka community has 22% of respondents and 13% in the Kwazini community within this total monthly income range. Three percent of respondents in the Msunduze and Mkhukhuze communities have a total household income of R501 to R1000. In contrast, the Intaphuka and Kwazini communities have 2% of respondents in this household income level. The R501 to R1000 range monthly income is from households that use child support grants as their primary source of monthly income and other informal jobs.

5.2.1 Access to land

This sub-section examines the respondents access to land. Land is an intrinsic component of economic development of which farmers and communities base their livelihoods (Akinola, 2018). Land is a natural asset which enhances rural livelihood options and provide a sense of

security especially in cases where there is limited formal employment (Bob, 2008; Mazibuko, 2013). Access to land promotes subsistence and small-holder farming in rural areas which enhances food security at household level (Fan and Rue, 2020, Nara *et al.*, 2020). This study explores the duration respondents have lived in these areas and if they have previously lived elsewhere before.

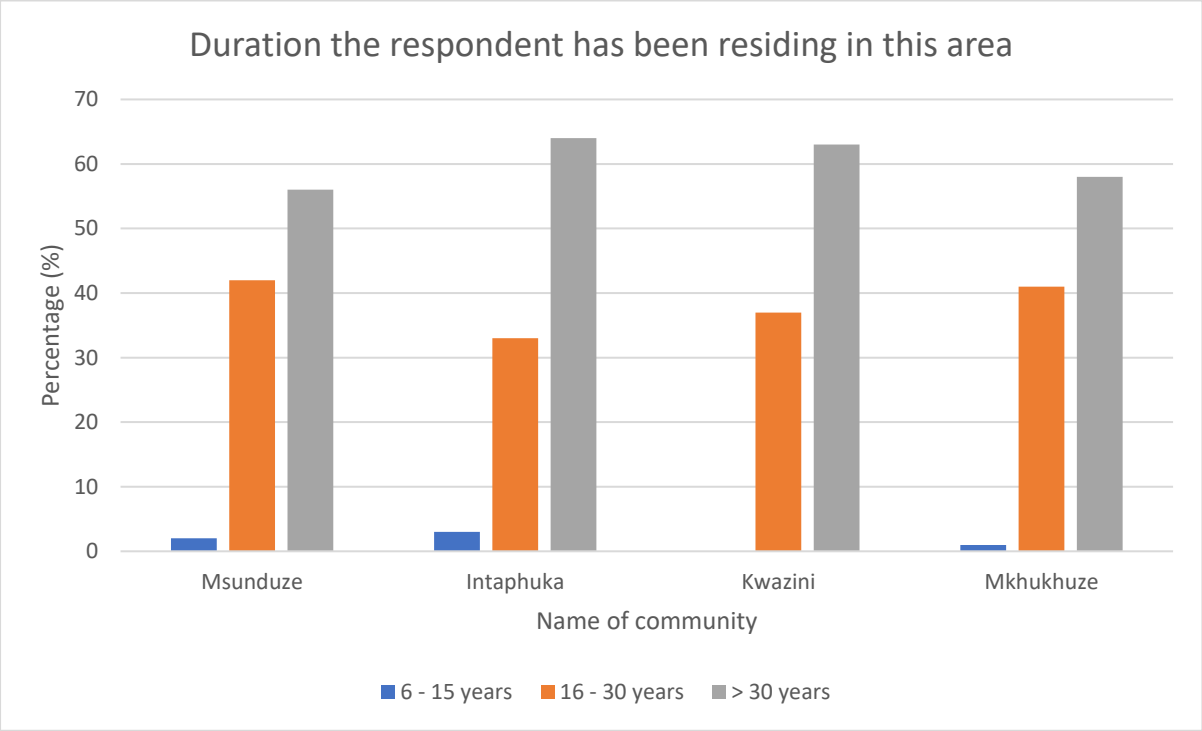


Figure 5.4 Duration the respondent has been residing in this area (in %)

Figure 5.4 depicts that most respondents (64%) have resided more than 30 years in the Intaphuka community, and 63% in the Kwazini community. Fifty-eight percent of respondents in the Mkhukhuze community and 56% in the Msunduze community have resided in the respective areas for more than 30 years. Forty-two percent of respondents in the Msunduze community and 41% in the Mkhukhuze community have resided in these rural communities for 16 to 30 years, respectively. The lowest number of respondents falls within the 6 to 15 years category, with 3% of respondents in the Intaphuka community, 2% in the Msunduze community and a percent in the Mkhukhuze community. All the respondents across the four rural communities indicated that their families own the land where they live.

According to the sustainable livelihoods approach, land is a natural asset which people need to sustain their livelihoods (Mazibuko, 2013; Serrat, 2017). Productive land is essential to rural areas as they practice agriculture through subsistence and small-holder farming and creates food security at household level. Raidmi and Kabiti (2019) assert that agriculture is one of the

priority sectors in South Africa and is a key engine for sustainable development and economic growth. Its aim is to increase food security and reduce poverty through supporting smallholder farmers at household level within rural areas. Apart from land being a natural asset, Swyngedouw and Ward (2022) note that land is also classified as a component of business assets as it plays significant role in business investment strategies. As all respondents across the four rural communities indicated that their families own the land where they reside, this is an indication that they have the means to sustain their livelihoods through food production.

Table 5.7 Respondents or family members who have lived elsewhere before and reasons for relocation (in %)

Respondents or family members who have lived elsewhere before and reasons for relocation	**Msunduze (n=100)**	**Intaphuka (n=100)**	**Kwazini (n=100)**	**Mkhukhuze (n=100)**	**Total (n=400)**
Yes	4	2	-	1	2
No	96	98	100	99	98
Reasons for relocation					
Did not relocate	96	98	100	99	98
Forced removals	-	-	-	-	-
Better prospects	3	2	-	1	2
Increase family's income	1	-	-	-	-

Table 5.7 shows that all of respondents in the Kwazini community have never resided elsewhere before, 99% in the Mkhukhuze community, 98% in the Intaphuka community, and 96% in the Msunduze community. Four percent of respondents in the Msunduze community have lived elsewhere and relocated to the community. Three percent of respondents moved for better prospects while a percent of respondent moved to increase their family's income. Two percent of respondents in the Intaphuka community and a percent of respondent in the Mkhukhuze community moved for better prospects. None of the respondents in the Kwazini community have lived elsewhere before.

Many factors force people to migrate to any area. Van Hear *et al.* (2020) argue that these factors can be understood as forces leading to the start of migration and the spread of movement. On the one hand migration has been associated with moving from rural to urban areas due to better prospects for job opportunities to sustain their livelihoods (Awumbila, 2017). On the other

hand, there is a significant migration of urban residents to rural areas, which is the case in the Msunduze, Intaphuka, and Mkhukhuze communities, respectively. This is referred to as counter urbanisation which encompasses movements from urban to less urbanised areas, including rural areas (Bosworth and Bat-Finke, 2020). Píša and Hruška (2019) reveal that those who migrate to rural areas expect to improve the quality of their life, which can be seen as an essential opportunity for the renewal of rural economies. Those who move to rural areas treat these areas as retirement spaces where they feel closer to nature. Although this is viewed as a first world scenario, people still perceive rural areas as spaces to move to when they are old and retired to be closer to their ancestral homes (Crankshaw and Borel-Saladin, 2019).

5.3 Access to water

Secure access to water and sanitation are critical human rights which are essential for human welfare, through supporting health and livelihoods (Roche *et al.,* 2017; Armah *et al.,* 2018; Meehan *et al.,* 2020). However, studies have shown that rural areas still lack basic provision of improved water services (Mulenga *et al.,* 2017; Akoteyon, 2019; Ohwo, 2019; Emily and Mulengwa, 2021; Salom and Khumalo, 2022). Water is essential to rural dwellers not only for consumption and prevention of diseases but also to enhance food production through agricultural practices. Access to water for irrigation of crops is key to producing sufficient food especially for small-scale farmers in rural Africa (Mango *et al*., 2018). This enhances food security at household level and alleviates poverty.

Table 5.8 Household's main source of water (in %)

Household's main source of income	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Borehole	-	-	-	41	10
River	49	61	45	25	45
Stream	6	7	22	-	9
Rainwater tanker	23	19	15	11	17
Water tanker	-	-	15	-	4
Local water scheme	-	-	-	-	-
Spring	-	-	-	-	-
Dam	-	-	-	-	-
Pool	-	-	-	-	-
Water vendor	-	-	-	-	-
Piped tap water	14	5	-	18	9

Tap within household	8	8	3	5	6

Table 5.8 depicts that 61% of households in the Intaphuka community use the river as their main source of water, 49% in the Msunduze community, and 45% in the Kwazini community. This implies that many households in the four rural communities lack access to piped tap water. However, the Mkhukhuze community relies on borehole water with a significant 41% of respondents. The Mkhukhuze community seems as the only community with functioning water infrastructure that was installed by the local municipality.

Plate 5.1 A borehole in the Mkhukhuze community

A substantial number of households also use rainwater tankers as their main water source as they are situated far from the river source and do not have access to piped water. Twenty three percent of households in the Msunduze community depend on rainwater tankers, 19% in the Intaphuka community, with 15% in the Kwazini community, and 11% in the Mkhukhuze community. Eighteen percent of households in the Mkhukhuze community use piped tap water in their homes as their main source of water, 14% in the Msunduze community and 9% in the Intaphuka community. None of the respondents in the Kwazini community have access to piped water in their homes.

The respondents pointed out that many households in their respective communities no longer have running water in their homes despite having water metres and taps installed within their

homes. It has been many years since their taps had running water resulting in the use of nearby rivers, streams, and rainwater tankers as their main source of water. These sources of water need rainfall which makes them unreliable. The Msunduze and Intaphuka communities both have 8% of households who have functional taps within their households as their main water source, 5% in the Mkhukhuze community and 3% in the Kwazini community. The uneven distribution of water between and amongst these communities has led to persistent conflicts. Lebek *et al.* (2021) notes that conflicts arise among communities with different levels of water services with some communities having access to water infrastructure while other communities lack water provision. The Mkhukhuze community being the only community with a functional water infrastructure has led to conflicts amongst these communities. As a result, there have been incidences of damage to the borehole infrastructure.

The Kwazini community is the only community that rely on water tankers as a main source of water even though they deliver water once a week. Also, illustrations indicate that this community has the highest households (22%) of households who collect water from streams. It can also be identified which communities are more affluent than the other. For instance, the Intaphuka community may be perceived as less wealthy as the majority of households (61%) use the river as their main water source when compared to only 25% in the Mkhukhuze community. The Mkhukhuze community also has the borehole which is the only community with a functional water infrastructure which is not the case in other communities. When analysing the figures for access to piped tap water, the Mkhukhuze community holds the highest percentage of households as 18% have functional piped water as compared to the households of the Kwazini community who stated that they no longer use piped water as their main water source.

Access to piped water is an issue in the iLembe District and Ndwedwe Municipality. From 2011 to 2016, Ndwedwe had a decrease of 30% in access to quality pipe water (Ndwedwe IDP, 2022:37). Rural areas are still severely affected by the lack of water provision in SA as compared to urban areas, with many rural dwellers still obtaining water from rivers and streams which are usually contaminated (iLembe IDP, 2021). This problem seems to be endemic to rural SSA as Winter *et al.* (2021:1) highlight that one in eight households in rural areas of SSA obtain drinking water from a piped system while the rest depend on improved and unimproved sources located far from their houses.

Furthermore, a study conducted by Akoteyon (2019) in rural Nigeria reveal that only 8% of the households interviewed gained access to safe water supply with major available water supply and sanitation facilities being boreholes and open latrine. Similarly, in Malawi, Adams and Smiley (2018) concluded that peri-urban areas used piped water while rural areas relied on groundwater due to absence of piped water networks. This proves that there is rural-urban dichotomy when it comes to access to water. Mulenga *et al.* (2017) highlights another point of interest which is that wealthier houses in both rural and urban areas tend to have access to improved water and sanitation. This is also evident among the four rural communities of this study as the Kwazini community seems to be left behind in access to piped water, with only 6% of households using piped water as their main source of water.

Table 5.9 Reasons for unavailability of water at the source (in %)

Reasons for unavailability of water at the source in	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Lack of rain	41	40	8	28	29
Lack of municipal action	29	36	55	47	42
Lack of infrastructure	30	24	37	25	29

Table 5.9 shows that in the Kwazini community, the majority (55%) of respondents blamed the lack of municipal action for the unavailability of water in the area. The Kwazini community seems to be the least developed communities in relation to the Msunduze, Intaphuka, and Mkhukhuze communities respectively, as it has the least number of households with piped water. The Mkhukhuze community had 47% of respondents who also blamed the lack of municipal action, while the Intaphuka and Msunduze communities had 36% and 29%, respectively. The lack of municipal action is closely linked to the lack of piped water or dysfunctional piped water in households. The respondents felt the local municipality must address the issue of lack of water extensively.

Forty-one percent of respondents in the Msunduze community and 40% in the Intaphuka blamed lack of rain for the unavailability of water at the source. The respondents in these communities mentioned that during the dry season, rivers tend to deplete when there is little rain, and rainwater tankers at home do not access water. The iLembe IDP 2021/2022 argues that drought conditions in the region is linked to the substantial decrease in the access to water

amongst its households. Surprisingly, only 8% of respondents in the Kwazini community complained about the lack of rain, and 55% responded that lack of municipal action is the cause of the unavailability of water at the source meanwhile, the community's primary sources depend on rain.

Thirty-seven percent of respondents in Kwazini blamed lack of infrastructure for the unavailability of water source. The respondents mentioned that as their primary water sources are rivers and streams, the water is not readily available as the sources depend on the rainy seasons. Thus, lack of infrastructure has a role in the inadequate access to water as having proper water infrastructure would create a variety of water sources to be available for the community. Thirty percent of respondents in the Msunduze community also blamed lack of infrastructure. This is because the standpipes, which were installed by the municipality many years ago, have been dysfunctional and vandalised due to lack of maintenance. Standpipes are vertical pipes that are connected to a water supply and provide water to a community or public space (Keener *et al.*, 2010). These are one of the common alternatives to piped connections in informal settlements and rural areas. Twenty-five percent of respondents and 24% in Mkhukhuze and Intaphuka, respectively, also blamed the lack of infrastructure for the unavailability of water at the source. Hove *et al.* (2019) relate vandalism to community frustration with the failure of water service delivery and to disappointment resulting from broken promises. Vandalism of standpipes is a manifestation of prevailing conflicts over water, which in turn are a symptom of water stress and insecurity (Calow *et al.*, 2010).

Like the Msunduze community, the Intaphuka community also has damaged standpipes that have not been working for many years, of which their complaint is valid. The Mkhukhuze community is the only one with a water infrastructure, a borehole that caters to some residents. However, more than one borehole is needed to cater for all households, as some live further away and obtain water from the river. Thus, inadequate water infrastructure is a serious issue across the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities, respectively.

In South Africa, all municipalities have the responsibility to develop and maintain infrastructure to ensure water services are delivered to their respective communities. However, it has been noted that some municipalities are facing severe problems concerning maintenance of infrastructure and rehabilitation necessary for providing potable water and sanitation services (Toxopeüs, 2019; Emily and Muyengwa, 2021). Poor maintenance is usually blamed on financial and capacity constraints. If municipalities had sound economic management and

technical skills, then there would be less issues regarding maintaining infrastructure. Toxopeüs (2019) notes that although municipalities get support in the manner of funding from provincial and national governments, they still fail to deliver on projects due to inadequate quality of labour and poor planning. This leads to targets remaining unmet and severely delayed.

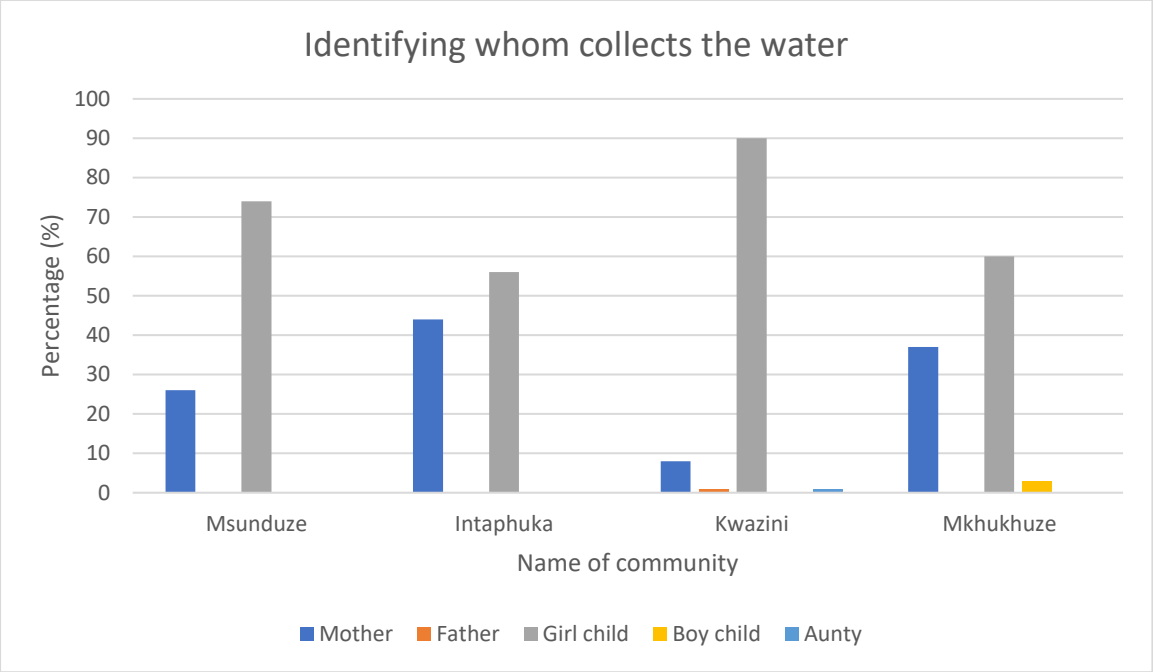


Figure 5.5 Identifying whom collects the water (in %)

Figure 5.5 indicates that majority (90%) of respondents in the Kwazini community stated that the female child is responsible for collecting water from the source in their households, and 74% in the Msunduze community. While 60% and 56% in the Mkhukhuze and Intaphuka communities also stated that the responsibility for water collection lies on the female child. Forty-four percent of respondents mentioned that the mother of the household is responsible for collecting water in the Intaphuka community, and 37% in the Mkhukhuze community. In the Msunduze community, 26% and 8% in the Kwazini community stated that the mother is the one who collects water.

The Mkhukhuze community is the only community with minimal respondents (3%) who stated that male children are also responsible for collecting water for their households. In addition, an unexpected response was received from the respondents of the Kwazini community, as one percent of respondent mentioned that the household's father collects water. He is a single father to young children who still cannot collect water as it will be dangerous for them to collect water. This household lives further away from the river, and he collects the water by car with

his children. Also, in the Kwazini community, only a percent of respondent stated that the aunty is responsible for collecting water for their household.

The responsibility for collecting water lies heavily on females. In many rural communities, the issue of water and sanitation weighs heavily on women and girls as they experience the burden differently than their male counterparts (Sweetman and Medland, 2017; Baker *et al.*, 2017; Kayser *et al.*, 2019). Women face most water and sanitation challenges as they are involved in clean and water-based chores (Asoba *et al.*, 2020). The burden placed on women and girls for fetching women is incredible (Pommells *et al.*, 2018; Dickin *et al.*, 2021). In Ghana, Dery *et al*. (2021) noted that girls are usually tasked with fetching water after school, and their academic performance suffers. This is evident in this study as the overall percentage of female children who fetch water across the four selected rural communities is 70%. Water-fetching responsibilities for women also reduces the time allocated towards income-generating ventures and the time available for leisure (Kayser *et al.*, 2019). Therefore, this burden further exacerbates poverty within women.

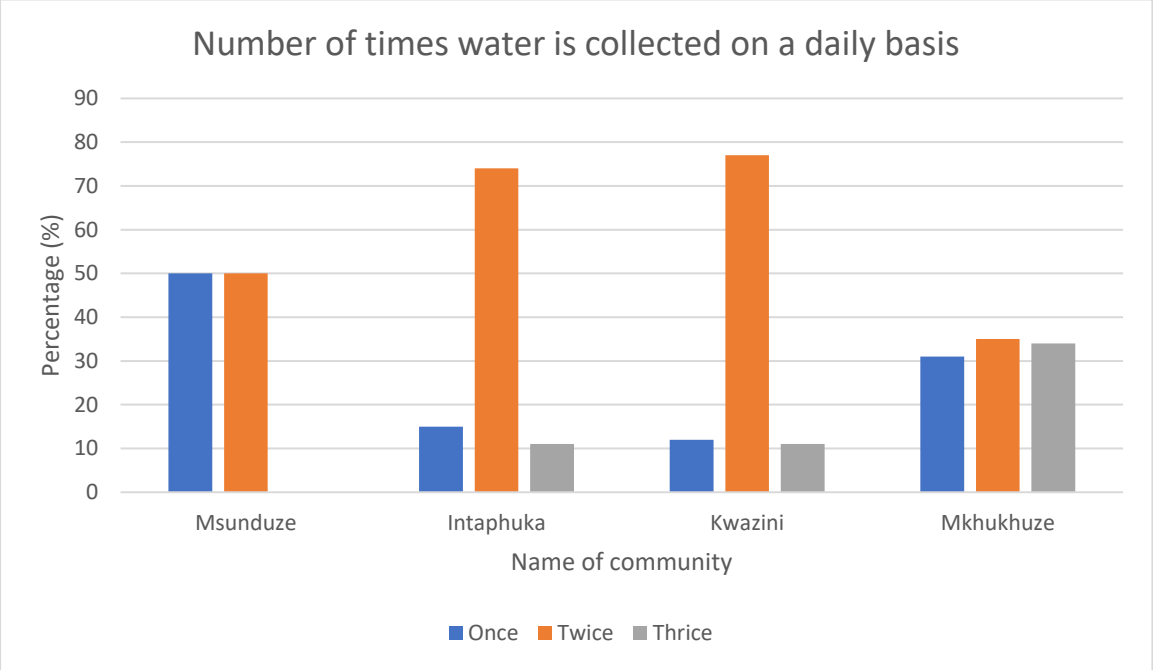


Figure 5.6 Number of times water is collected on a daily basis (in %)

Figure 5.6 depicts that the Kwazini community has the majority (77%) of respondents whose household collect water twice on a daily basis, with 74% in the Intaphuka community. Fifty percent of respondents in the Msunduze community indicated that water is collected once on a daily basis, with 31% in the Mkhukhuze community. The Msunduze community is the only community with households that only collect water once and twice on a daily basis. In contrast,

the Intaphuka, Kwazini, and Mkhukhuze communities also have households that collect water once, twice, and thrice on a daily basis.

Thirty-four percent of respondents in the Mkhukhuze community indicated their households collect water thrice on a daily basis, while both the Intaphuka and Kwazini communities with 11% of respondents. Thirty-one percent of respondents in the Mkhukhuze community indicated their households collect water once on a daily basis, 15% in the Intaphuka community, and 12% in the Kwazini community. The study found that households that collect water once or twice on a daily basis are either small families, have alternative water sources such as rainwater tankers, or reside far from the water source, which means they cannot make several walks. Those households that collect water thrice on a daily basis are either large families, lack enough storage to accumulate water or reside closer to the source, making it easy to walk back and forth.

Table 5.10 Distance to the water source and the appropriate time it takes to fetch water (in %)

Respondents who walk a long distance to the water source	**Msunduze (n=100)**	**Intaphuka (n=100)**	**Kwazini (n=100)**	**Mkhukhuze (n=100)**	**Total (n=400)**
Yes	55	48	64	38	51
No	45	52	36	62	49
Distance to the water source					
< 1km	51	52	36	62	50
1km	41	33	56	35	41
2km	8	15	8	3	9
3km	-	-	-	-	-
> 3km	-	-	-	-	-
Appropriate time it takes to fetch water					
30 minutes	41	21	8	33	26
1 hour	22	26	23	10	20
1 hour and 30 minutes	26	24	46	25	30
2 hours	11	19	13	26	17
2 hours and 30 minutes	-	10	10	6	7

Table 5.10 illustrates that on the one hand, 64% of respondents in the Kwazini community walk a long distance to the water source, and 55% in the Msunduze community. On the other hand, 62% of respondents in the Mkhukhuze community, and 52% in the Intaphuka community do not walk long distances. Sixty-two percent of respondents in the Mkhukhuze community walk a distance of less than 1km, with 52% in the Intaphuka community, and 51% in the Msunduze community. Fifty-six percent of respondents in the Kwazini community walk a distance of 1km to the water source while there are also 41% in the Msunduze community in this category. The Intaphuka community had 15% of respondents who walk a distance of 2km to the water source, and 8% in the Msunduze and Kwazini communities, respectively.

Regarding the appropriate time it takes the respondents to fetch water, 46% of respondents in the Kwazini community take approximately an hour and thirty minutes, 41% who take approximately thirty minutes in the Msunduze community. Twenty-six percent of respondents in the Mkhukhuze community take two hours to fetch water, 25% who take an hour in the Intaphuka community. Eleven percent of respondents in the Kwazini community take approximately two hours and thirty minutes to fetch water, 10% in the Intaphuka community, and 6% in the Mkhukhuze community.

From the results of this study, it is clear that most respondents walk long distances to the water source and usually take more than 30 minutes to fetch water. The average time needed to fetch water in SSA is approximately 30 minutes per trip (Geere and Cortobius, 2017). This is not the case in the study areas, as only 26% of the respondents took 30 minutes to fetch water, leaving 74% taking more than 30 minutes. Many of these respondents have large families, meaning they are obliged to engage in multiple trips, increasing the total time spent per day. A study of twenty-four SSA countries conducted in 2016 estimated that about 13 million adult women and over 3 million female children spend more than 30 minutes each day fetching water for their households (Sweetman and -Medland, 2017:155). This is significant as it highlights the role of women and girls in fetching water and how much approximate time is used to fetch water.

Table 5.11 Respondents who perceive that travelling long distances is risky (in %)

Respondents who perceive that travelling long distances is risky	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Yes	50	57	88	37	58
No	50	43	12	63	42

The level of risk when travelling long distances to fetch water is indicated in Table 5.11. Eighty-eight percent of respondents in the Kwazini community perceive travelling long distances to fetch water as being risky, compared to 12% who did not perceive travelling distances risky. This is not surprising as 46% of respondents take an hour and thirty minutes to fetch water at the water source. In the Intaphuka community, 57% of respondents also perceived travelling long distances risky. Half of the respondents from the Msunduze community perceived travelling long distances to fetch water risky, while the other half did not perceive being at risk. In the Mkhukhuze community, majority of respondents (63%) did not perceive travelling long distances risky. This is the only community with more respondents who did not perceive travelling long distances to fetch water risky.

The findings of this question indicated that majority of respondents who perceived travelling long distances to fetch water risky were females. These female respondents do not have piped water in their households and are compelled to collect water from other sources. For some female respondents in the four communities, these water sources are far from their homes and have to walk long distances. These respondents pointed out that there have been incidences of women being harassed whilst at the water sources and have a feeling of anxiousness as they walk alone. A solution derived by these respondents in the four communities is to walk and fetch water in groups or ask their brothers to accompany them to create a sense of safety. Two respondents in the Msunduze community stated:

> "*I definitely do not perceive being safe walking alone to the river as I may get harassed by men. My younger siblings accompany me, especially early in the morning or the afternoon."* (February 2023, Respondent 7).

> *"There have been many incidents whereby young girls are attacked by older men after fetching water from the river; we fear for our children as they are*

the ones who are tasked with this responsibility." (February 2023, Respondent 12).

Baker *et al*. (2017) noted that fundamental issues of accessing water for women include social and sexual violence while seeking locations for clean and safe water. Rural women often access water sources such as rivers and streams, which are unprotected and are susceptible to crime due to long queues (Grigg, 2018). Likewise, Roche *et al.* (2017) agrees with Grigg (2018) by reiterating that women are more vulnerable to attacks and sexual assault such as rape when fetching water from rivers as well as using public sanitation. In reports from Ethiopia, Kenya, Liberia, Haiti and refugee camps in Somalia and Sierra Leone, there are documented physical and sexual harassment as well as fear of sexual violence faced by women as they share sanitation facilities or openly defecate (Kayser *et al.*, 2019).

5.4 Sanitation and diseases

Waterborne diseases represent a human health risk in developing regions such as SSA and in South Africa (Hemson, 2016; Edokpayi *et al.*, 2017; Nienie *et al.*, 2017; Manetu and Karjanja, 2021). Due to practices of open defecation, faecal water resource contamination has been prevalent (WHO, 2021). Poor sanitation has also caused millions of people globally to contract diarrhoea and other faecal-borne diseases. As such, waterborne diseases have resulted in high mortality rates particularly to children under five years (Peter and Umar, 2018; Wolf *et al.*, 2019). It is no surprise that a majority of hospital wards worldwide have been occupied by people consuming unsafe water, with fatalities associated with poor WASH (Martinez-Santos, 2017b). Thus, the transmission of waterborne diseases such as diarrhoea, cholera, and typhoid fever have become dominant in SSA.

Table 5.12 Safety of water for consumption from the source (in %)

Safety of water for consumption from the source	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Yes	27	28	29	56	35
No	73	72	71	44	65

Table 5.12 indicates the safety of water for consumption from the source. Seventy-three percent of respondents in the Msunduze community deemed the water unsafe for consumption from its source, 72% in the Intaphuka community, and 71% in the Kwazini community. Fifty-six

percent of respondents in the Mkhukhuze community felt the water was safe for consumption from the source, while 44% deemed it unsafe. This reveals that the water from the borehole is potable. The Mkhukhuze community has a borehole where most dwellers access water as mentioned in Table 5.8. The respondents perceived that the river water is unsafe for consumption as it is contaminated with waste and other pollutants. Mkhukhuze is the only community with many respondents who deem the water safe for consumption from the water source compared to the other three communities.

It is important to note that some respondents who deemed the water unsafe are those who fetch water from rivers, streams, or rainwater tankers. There are many reasons that the respondents explained why water is not safe for consumption from its source, which includes polluting water with waste. The respondents complained about people discarding diapers and other household waste in the rivers and streams. Some respondents mentioned that poor sanitation facilities contaminate water as their waste gets washed into the river, the same water they consume. Ohwo (2019) also argues that rural areas lack sustainable water sources and often use contaminated surface water as they still practice open defecation. Respondents from the Intaphuka, Kwazini, and Mkhukhuze communities, respectively, stated:

> "*The water from the river is no longer drinkable as people discard their disposable diapers and other waste by the river, sometimes this waste ends up in the river due to strong winds and rainfall."* (March 2023, Respondent 11).

> *"We share these water bodies with livestock, so I am not surprised that the water is no longer safe. We have no choice but to consume these waters despite our right to proper water."* (June 2023, Respondent 14).

> *"Some traditional healers perform certain rituals in the rivers and discard their candles and dead chickens in the same water we use for drinking and cooking."* (April 2023, Respondent 26).

Plate 5.2 Disposable diapers on the riverbank within the Intaphuka community

Plate 5.3 Stream shared with livestock within the Kwazini community

According to the 2030 South African National Development Plan (NDP0, most municipalities have not met the water conservation targets set by NDP, with a majority of households having no access to a reliable service. Informal settlements and rural households are most vulnerable as they lack this basic service. In efforts to redress this, the 2018 presidential campaign, Thuma Mina, has called to reduce this burden by encouraging communities to lead their own approaches to planning, financing, and maintenance of water infrastructure (Jacobs-Mata *et al.*, 2019). This helps communities to articulate their priorities and choose the technical designs that best suit their needs. According to Ndwedwe IDP (2022) the municipality also embarked on this campaign with the aspiration to improve service delivery with the help of the community dwellers. In addressing the water crisis, the municipality has embarked on cleaning rivers to ensure its residents acquire clean water. However, cleaning of rivers does not truly address the real issue of inadequate supply of piped water within the municipality.

Table 5.13 Type of household sanitation (in %)

Type of household sanitation	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
None	7	10	1	3	5
Flush toilet (connected to sewage system)	10	7	5	15	9
Flush toilet (with septic tank)	14	13	18	12	14
Chemical toilet	-	-	-	-	-
Pit latrine (with ventilation)	11	24	19	45	28
Pit latrine (without ventilation)	54	33	52	20	40
Bucket toilet	4	13	5	5	4

Table 5.13 indicates that the majority (54%) of households in the Msunduze community use pit latrines without ventilation, 52% o in the Kwazini community, 33% in the Intaphuka community. However, it is evident from Table 5.13 that the Mkhukhuze community has the majority of respondents (45%) who indicated that their household sanitation were pit latrines with ventilation, and 24% in the Intaphuka community.

A pit latrine or pit toilet is a sanitation technology used for onsite waste management which consists of a hole in the ground with a reinforcing material to contain excreta (Orner *et al.,* 2018). The addition of a vent pipe to a simple pit latrine is one way of reducing the nuisance of flies in the cubicle if the cubicle is kept clean and dark, effectively control odour and flies while still allowing users to clean themselves with hard materials such as newspaper and leaves

According to StatsSA (2011), pit latrine without ventilation is the most common type of sanitation across the four communities, with 44.2% of households in the Msunduze, 41.2% in the Kwazini community, 38.9% in the Intaphuka community, and 42.3% in the Mkhukhuze community. According to these figures, the Intaphuka community has the least number of households who utilise pit latrines without ventilation. However, this contradicts the results of this study as the Mkhukhuze community has the least respondents (20%) whose household sanitation were pit latrines without ventilation.

Eighteen percent of respondents in the Kwazini community utilise flush toilet with septic tank within their household, with 14% in the Msunduze community. Fifteen percent of respondents in the Mkhukhuze community utilise flush toilets connected to sewage, 10% in the Msunduze community. At the same time, there are also 7% and 5% in the Intaphuka and Kwazini communities, respectively. These households have functional piped water as their toilets are connected to the sewage system. These statistics correspond with the figures presented by the StatsSA (2011), as 8.8% of households in the Msunduze community have flush toilets connected to the sewage system, 11.5% in the Intaphuka community, and 2.6% in the Kwazini community. In 2011, households in the Mkhukhuze community had yet to receive flush toilets connected to the sewage system (StatsSA, 2011). Currently, the results of this study indicated that 15% of households had flush toilets connected to the sewage system. Thus, implying that the data received from StatsSA was outdated. It is noticeable that the Mkhukhuze community has developed over the years regarding access to basic services such as water and sanitation.

It is significant to note that there are still households that do not have access to any sanitation as the Intaphuka community leads with 10% of respondents with no sanitation, 7% in the Msunduze community, while there are also 3%, 2% in Mkhukhuze and a percent in the Kwazini community respectively. The iLembe IDP 2021/2022 highlights that rural communities within the district still rely on pit latrines or no sanitation system at all, which severely strains the environment and causes health risks. Belay *et al.* (2022:22) mention that 494 million people worldwide still practice open defecation, with more acute figures in the SSA region and rural areas. This amplifies that open defecation is still an issue in many impoverished rural communities.

A noteworthy portion of respondents still use the bucket toilet system, with the Intaphuka community leading with 13% of respondents, with the Kwazini and Mkhukhuze communities with 5% respectively. In comparison, the Msunduze community has 4% of respondents also using the bucket toilet system. After a steady decline of six years, consumer units serviced with a municipal bucket toilet jumped from 42 434 in 2019 to 47 130 in 2020, with increases reported in seven of South Africa's overall municipalities (StatsSA, 2020). There has been a promise that bucket toilets would be abolished under every president after Nelson Mandela (Saba, 2020). These promises have yet to be fulfilled. Saba (2020:1) argues that more than 12 000 homes in South Africa still use bucket toilets. This implies that this country still lags meeting the SDG 6 target. Plate 5.4 and 5.5 below depicts the sanitation facilities within the

Kwazini and Msunduze communities, respectively. Plate 5.4 is a degraded pit larine with ventilation with a broken door while Plate 5.5 showcases an improved household sanitation provided by the municipality. The degraded sanitation does not ensure privacy of users which is risky for women and female children as they are vulnerable to sexual harassment such as rape when utilising shared sanitation facilities (Roche *et al.*, 2017; Grigg, 2018).

Plate 5.4 Degraded communal sanitation within the Kwazini community

Plate 5.5 Improved sanitation within the Msunduze community

Table 5.14 Water availability for sanitation purposes (in %)

Water availability for sanitation purposes	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Yes	30	16	6	25	19
No	70	84	94	75	81

Table 5.14 showcases the water availability for sanitation across the four rural communities. Majority (94%) of respondents in the Kwazini community do not have water available for sanitation purposes, and 84% in the Intaphuka community. The Mkhukhuze and Msunduze communities have 75% and 70%, respectively. The respondents mentioned that lack of water means that they do not have adequate water for sanitation purposes. The municipality has promised the communities to deliver water but still needs to do so (Majola, 2021). In return, the households must use the little water they collect for sanitation. Respondents within the Intaphuka community mentioned:

"We do not have enough water for sanitation purposes as the municipality no longer sends the water tankers to deliver water in this community." (March 2023, Respondent 27).

"We last had running water from these taps in 2017, which means the little that we collect, we have to prioritise drinking and cooking." (March 2023, Respondent 37).

Table 5.15 Diseases due to poor sanitation (in %)

Contraction of diseases due to poor sanitation	**Msunduze (n=100)**	**Intaphuka (n=100)**	**Kwazini (n=100)**	**Mkhukhuze (n=100)**	**Total (n=400)**
Yes	50	11	-	4	16
No	50	89	100	96	84
Family members contracting diseases due to poor sanitation					
Yes	35	25	1	2	16
No	65	75	99	98	84

Table 5.15 depicts the contraction of diseases due to poor sanitation by respondents and their family members. All of the respondents in the Kwazini community stated that they did not contract any diseases due to poor sanitation practices, 96% in the Mkhukhuze community, and 89% in the Intaphuka community. However, half of the respondents in the Msunduze community contracted diseases due to poor sanitation practices. In terms of the respondents' family members contracting diseases due to poor sanitation, there were 99% of respondents in the Kwazini community who did not have family members who contracted diseases. This is Mkhukhuze community had 98%, 75% in the Intaphuka community, and 65% of respondents in the Msunduze community. Thirty-five percent of respondents in the Msunduze community had family members who contracted diseases due to poor sanitation, with 25% in the Intaphuka community.

It is surprising that the majority of respondents stated they did not contract diseases due to poor sanitation despite lack of WASH is prevalent within the four communities. This may imply that the respondents were embarrassed to mention this issue to the researcher and perceived this topic as being taboo. Furthermore, the majority of respondents were aged between 26 to 35 years which implies that they are a healthy group who is self-aware of diseases associated

with poor WASH and took precautions such as washing of hands with soap and water after defecating.

However, Ritchie and Roser (2021) assert that unsafe sanitation is one of the world's most significant health and environmental problems, especially for people experiencing poverty. Poor WASH services significantly contribute to waterborne diseases as they allow for easy transmission of a range of diseases and respiratory infections (Martinez-Santos, 2017b; Roche *et al.*, 2017; Wolf *et al.*, 2019; Prüss-Ustün *et al.,* 2019). These outcomes also cause a massive disease burden globally and can lead to mortality (Freeman *et al.*, 2017). As mentioned, many hospital wards worldwide are occupied by people suffering from diseases linked to poor WASH, and more people die from contaminated water (Martinez-Santos, 2017b). This proves that poor sanitation leads to a variety of infections and diseases.

Table 5.16 Various diseases respondents suffer from (in %)

Various diseases respondents have suffered from	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Diarrhoea	20	11	-	5	9
(COVID-19)	41	20	4	12	20
Cholera	-	-	-	-	-
Malaria	-	-	-	-	-
Typhoid fever	-	-	-	-	-
Poliovirus	-	-	-	-	-

Table 5.16 depicts the diseases associated with poor WASH respondents have suffered from. Diarrhoea and COVID-19 are the only diseases respondents have suffered from. Forty-one percent of respondents in the Msunduze community have suffered from COVID-19, 20% in Intaphuka, 12% in Msunduze, and 4% in Kwazini. Twenty percent of respondents in the Msunduze community have suffered from diarrhoea, 11% in Intaphuka and 5% in Mkhukhuze.

Diarrhoea is one of the common diseases caused by poor sanitation (Komarulzaman *et al.,* 2017; Peter and Umar, 2018; Wolf *et al.,* 2019). It is mainly transmitted through consuming contaminated drinking water due to poor hygienic practices (Peter and Umar, 2018). People living in rural areas are more susceptible to this disease as they depend on rivers, mainly contaminated due to open defecation. This might be the case in the four rural communities namely Msunduze, Intaphuka, Kwazini and Mkhukhuze as most respondents rely on the rivers and have stated they have suffered from diarrhoea.

The outbreak of the COVID-19 pandemic has once again revealed the importance of sufficient access to safe water and sanitation in public health (Street *et al.,* 2020; Smiley *et al.,* 2020; Desye, 2021). Studies show that access to WASH services is crucial in protecting health of humans during outbreaks of infectious diseases like the COVID-19 (Anim *et al.,* 2020; Donde *et al.,* 2021; Desye, 2021). To protect public health during outbreaks such as COVID-19, basic hygiene practices such as hand washing with water and soap is the most practical and effective means of interrupting the transmission of several diseases causing virus and bacteria, thus reducing the transmission of the disease (WHO, 2019; Alzyood *et al.,* 2020; Desye, 2021). Consequently, approximately 40% of households worldwide lack access to basic handwashing facilities (Hannah *et al.,* 2020:773). The situation worsens in SSA as sanitation and hygiene services are inadequate.

Table 5.17 Vulnerability to diseases (in %)

Those who suffer the most from diseases	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Men	-	-	-	-	-
Women	16	2	-	2	6
Children	84	94	100	98	94

Table 5.17 shows a contrast between men, women, and children who suffer from diseases caused by poor sanitation. Children suffer more from diseases than women. Men were not classified as a group that suffered more from diseases caused by poor sanitation. All of the respondents in the Kwazini community stated that children suffer more from diarrhoea, 98% in the Mkhukhuze community, 94% in the Intaphuka community, and 84% in the Msunduze community. Sixteen percent of respondents in the Msunduze community stated that women suffer from diarrhoea and COVID-19, with 2% in both the Intaphuka Mkhukhuze communities, respectively.

The respondents mentioned that children suffer more from diarrhoea, while women suffer from both diarrhoea and COVID-19. Children are more vulnerable to diarrhoea as they are usually in contact and play with the soil, drink contaminated water from running streams and rivers, and do not practice proper hygiene. Some respondents also highlighted that the children's immune system is not strong enough to fight the bacteria and results in them being sick. As women are burdened with water-related chores, they are also at risk of contracting diarrhoea

and COVID-19 as they are subjected to contaminated water and poor hygiene. One respondent in the Mkhukhuze community stated:

> *"Children are more vulnerable to diarrhoea as they play and eat the sands once they start crawling and walking."* (April 2023, Respondent 27).

The results above show that children suffer more from poor WASH-related diseases, mainly diarrhoea. Globally, this disease is still one of the significant causes of fatalities in children under five years, especially in developing nations, where there are high rates of inadequate water and poor sanitation (Peter and Umar, 2018; Wolf *et al.,* 2019). Diarrhoea has accounted for approximately 1 billion cases in children and killed more children than HIV/AIDS, Cholera, Malaria, or any other disease (Koyuncu *et al.,* 2020:2). It is also known as a leading cause of undernourishment and stunting in children due to poor nutrition and exposure to faecal contamination (Null *et al.,* 2018).

Remarkably, there has been a decline in diarrhoea contamination over the years as some households have improved their sanitation facilities (Peter and Umar, 2018). However, children living in rural areas are still in danger of contracting the disease if they live in a community that practices open defecation as it leads to contamination of soil and water sources that the community share. (Komarulzaman *et al.,* 2018). This means that exposure to faecal contamination in rural communities can eliminate the beneficial effects of good sanitation practices among households.

Table 5.18 Safe hygiene during COVID-19 pandemic and menstruation for females (in %)

Practice of safe hygiene during COVID-19 pandemic	**Msunduze (n=100)**	**Intaphuka (n=100)**	**Kwazini (n=100)**	**Mkhukhuze (n=100)**	**Total (n=400)**
Yes	38	28	24	36	32
No	62	72	76	64	68
Practice of safe hygiene during menstruation (applicable to females only) (%)					
Inapplicable	52	53	45	51	50

Yes	22	26	43	37	32
No	26	21	12	12	18

Table 5.18 depicts the respondents' practice of safe hygiene during the COVID-19 pandemic and during menstruation, which only applies to female respondents. The results show that the majority of respondents (76%) in the Kwazini community did not practice safe hygiene during the COVID-19 pandemic, 72% in the Intaphuka community, 64% in the Mkhukhuze community, and 62% in the Msunduze community. Safe hygiene, in this case, referred to washing hands at home with soap and water and using alcohol-based hand sanitisers.

While some respondents complained about the obvious reasons for not practising safe hygiene during the pandemic, which is the lack of safe and clean water for handwashing, many also complained about the unaffordability of alcohol-based sanitisers every month as they have large families. Many respondents and their family members are unemployed and have contract jobs, thus, having to spend what they earn on essentials such as food and clothing. They also did not see the point in buying water for handwashing, as it wastes money. Safe hygiene is not a priority for some respondents.

> *"How are we expected to practice safe hygiene whilst we have been living without running water for years? That is asking the impossible from us as rural dwellers."* (March 2023, Respondent 38).

When one considers that personal hygiene features in most community-based measures to curb the spread of COVID-19 are associated to access to improved WASH, it is obvious to emphasise why the disease has significantly impacted SSA (Ekumah *et al.,* 2020). This suggests that the region bears a higher rate of COVID-19 for the same reasons it suffers from other infectious diseases associated with poor WASH (Evans *et al.,* 2020). Less than 17% of the rural population in all the SSA communities have access to basic handwashing facilities and sanitation systems (Kayode *et al.,* 2020:5). This reinforces how vulnerable communities are at significant risk of contracting the disease.

Furthermore, as the insufficient access to sanitation facilities and safe water exacerbates the transmission of the virus, rural dwellers are in danger of infection and mortality (Ekumah *et al.,* 2020). Access to piped water and proper sanitation infrastructure reduces disease transmission (Alzywood *et al.,* 2020). Moreover, Makinde *et al*. (2021) noted that access to safe drinking water and the availability of soap for handwashing in households can potentially

reduce the disease. Proper hand hygiene can remove up to 97% of the virus, thus reducing the transmission of the disease (Makinde *et al.*, 2021:3).

In terms of practicing safe hygiene during menstruation (which was only applicable to females), 43% of respondents in the Kwazini community practice safe hygiene during menstruation, 37% in the Mkhukhuze community, 26% in the Intaphuka community, and 22% in the Msunduze community. In contrast, the Msunduze community accounted for 26% of respondents who do not practice safe hygiene during menstruation.

Safe hygiene, in this case, referred to having adequate water to clean oneself, washing hands with soap before and after using menstrual products, and safely discarding sanitary pads. These respondents from the four selected rural communities did not quickly respond to this question as they felt it was taboo to speak freely about menstruation. This could imply that some respondents were scared to explain that they did not practice safe hygiene during menstruation. Those respondents who do not practice safe hygiene once again blamed the lack of water, sanitation facilities, and proper use of menstrual products. Some female respondents in the four communities namely Msunduze, Intaphuka, Kwazini and Mkhukhuze perceived that they were too occupied with household chores and did not have the time to practice safe hygiene during their menstrual period.

Women and girls face more significant challenges accessing WASH than men due to their needs such as menstruation (Baker *et al.*, 2017; Kayser *et al.*, 2019). They can also respond to the challenges of using unsafe practices, which may increase the vulnerability of contracting hygiene-related diseases such as reproductive tract infections (Baker *et al.*, 2017; Kayser *et al.*, 2019). Menstruation, pregnancy, and childbearing require clean water and improved hygienic sanitation in order to avoid infections (Sweetman and Medland, 2017). It is therefore important for females to access sufficient water for their needs to enhance their health.

5.5 Community's coping mechanisms

Coping is known as thoughts and behaviour mobilised to manage internal and external situations (Algorani and Gupta, 2023). Community adaptive mechanisms are usually a means of resisting to external shocks such as climate change or climatic hazards (Peng *et al.*, 2019). In relation to SLA, a livelihood is sustainable when it can resist external shocks and stress (Mazibuko, 2013; Serrat, 2017). In the Pacific Islands, rural community-based adaptations are critical in ensuring the sustainability of water infrastructures (McNamara *et al.*, 2020). This

section explores the communities' coping mechanisms regarding issues of water shortages. In this section, questions revolving around alternative water sources, storage of water and modes of carrying water are explored.

Table 5.19 Alternative water sources (in %)

Alternative water sources used	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Well communal	-	-	-	-	-
River	40	38	76	27	45
Borehole	-	-	-	33	8
Dam	-	-	-	-	-
Public taps	-	-	-	-	-
Flowing streams	15	17	20	-	13
Rainwater tanks on site	66	55	11	20	38
Water tankers	5	19	7	-	8
Spring	-	-	-	18	5
Communal tank	-	-	18	-	5

Table 5.19 shows that majority of respondents (76%) in the Kwazini community use the river as an alternative source, 40% in the Msunduze community, 38% in the Intaphuka community, and 27% in the Mkhukhuze community. Sixty-six percent of respondents in the Msunduze community utilise rainwater tanks as alternative water sources, 55% in the Intaphuka community, while 20% in the Mkhukhuze community, and 11% in the Kwazini community also used rainwater tanks as alternative sources.

All four communities use rivers and rainwater tankers as alternative sources. The Kwazini, Intaphuka and Msunduze communities also use flowing streams as alternative water sources with 20%, 17%, and 15% of respondents, respectively. Nineteen percent of respondents in the Intaphuka community use water tankers, 7% in the Kwazini community and 5% in the Msunduze community. The respondents in the Mkhukhuze community mentioned that they do not view water tankers as alternative sources as they only receive water from tankers once in two months if they are lucky. One of the alternative sources is water from a spring, with 18% of respondents using it for laundry, cleaning, and irrigation, and not for drinking as it is contaminated by livestock.

All respondents across the four communities perceive these alternative sources as unreliable. Rivers, springs, streams, and rainwater tankers require rain water. Without the rain, they do get depleted. The borehole in the Mkhukhuze community only functions occasionally. After many community members have used it, the borehole becomes dysfunctional, thus making it unreliable. The Kwazini community is the only community with a communal tank where water tankers pour water for community members to collect water as their alternative source (Plate 5.6). Eighteen percent of respondents use the communal tank as an alternative. Furthermore, all respondents also stated that the walking distance is more extended to the alternate water sources than the distance to the primary water sources. Respondents within the Kwazini community highlighted:

> *"The communal tank is unreliable as the water gets finished in one day after the water tanker has filled it. Now imagine if the water tanker delivers water when you are not home. That means I would not have water for a week. It is simply not reliable."* (July 2023, Respondent 27)

> *"The river and stream sometimes get dry, and water in our rainwater tankers gets depleted due to lack of rain, which makes these sources unreliable."* (July 2023, Respondent 46).

Plate 5.6 Communal tank within the Kwazini community

Plate 5.7 Contaminated spring water within the Mkhukhuze community

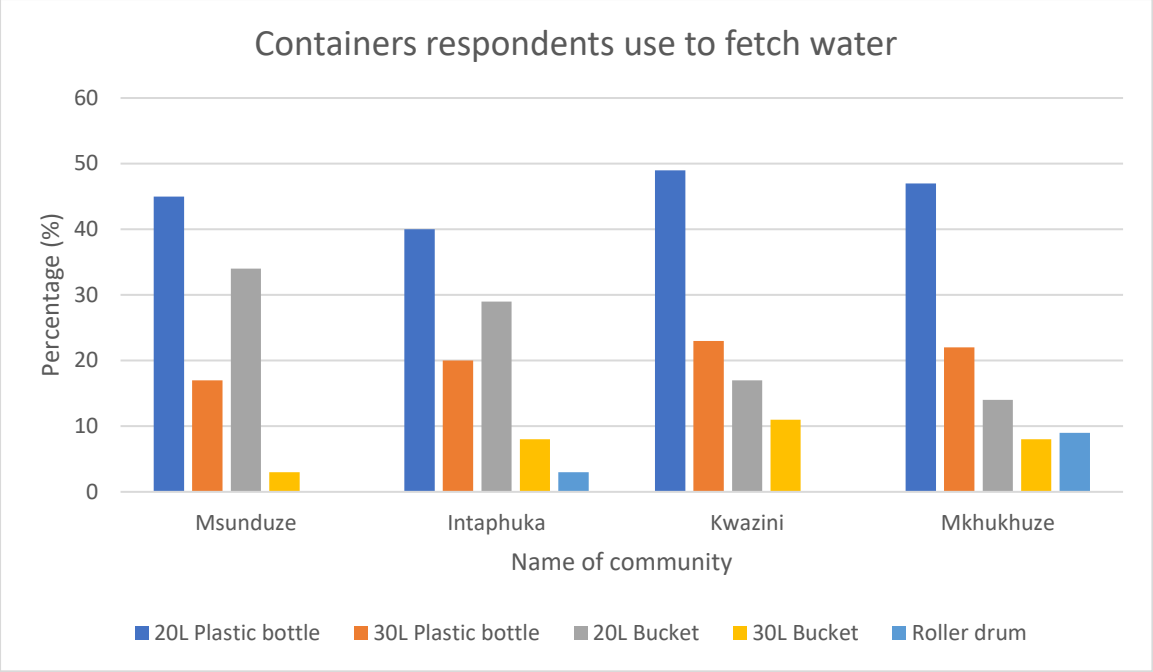


Figure 5.7 Containers the respondents use to fetch water in (in %)

Figure 5.7 depicts the containers respondents use to fetch water. Forty-nine percent of respondents in the Kwazini community fetch water in 20L plastic bottles, 47% in the Mkhukhuze community. At the same time, 45% are in the Msunduze community and 40% in the Intaphuka community respectively. Thirty-four percent of respondents in the Msunduze community fetch water in 20L buckets, 29% in the Intaphuka community. At the same time, 17% and 14% of respondents were in the Kwazini and Mkhukhuze communities, respectively.

A significant number of respondents also fetch water in 30L plastic bottles despite being heavy. There are 23% of respondents in the Kwazini community, 22% in the Mkhukhuze community, while the Intaphuka community has 20% and 17% in the Msunduze community. Regarding using the 30L buckets, 11% of respondents are in the Kwazini community, the Intaphuka and Mkhukhuze communities with 8%, respectively, while the Msunduze community only has 3%. The least respondents use the roller drums as containers to fetch water in the Mkhukhuze community, with 9% of respondents and 3% in the Intaphuka community respectively. Roller drums are barrel shaped containers that hold water and can roll along the ground, with the handle attached to the axis of the drum. These containers are efficient as they can store more water than buckets and also reduce strain of not carrying water on the head.

Table 5.20 Modes of carrying water (in %)

Modes of carrying water	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Wheelbarrow	34	38	41	29	36
Head loading	33	28	37	30	32
Carry by hands	14	22	6	15	14
Car	19	12	16	26	18
Bicycle	-	-	-	-	-

Table 5.20 shows what modes of carrying water respondents use within the four communities. The majority of respondents (41%)in the Kwazini community use wheelbarrows to carry water, 38% in the Intaphuka community, 34% in the Msunduze community, and 29% in the Mkhukhuze community. Thirty-seven percent of respondents in the Kwazini community carry water by head loading, 33% in the Msunduze community, 30% in the Mkhukhuze community, and 28% in the Intaphuka community. Head loading is carrying load on the head. This is the common traditional mode of transporting food, water, and firewood in many rural South African communities (Motaung *et al.,* 2022). This activity is also a responsibility allocated to female children and women particularly in rural Africa (Porter, 2014). It has also been contended that the heavy head-loading task has negative impacts on women's health in the form of neck pain and spinal injury (Kayser *et al.,* 2019). Head loading is also considered an essential contributor to ache and disability associated with spinal musculoskeletal disorders and cervical compression syndromes (Geere and Cortobius, 2017).

In terms of carrying water by car, the majority of respondents (26%) are in the Mkhukhuze community, 19% in the Msunduze community, 16% in the Kwazini community, with the least respondents (12%) in the Intaphuka. Those households that use cars live reside long distances away from the water source and have accessible cars to collect their water. Although this might imply that these rural dwellers have the purchasing power and earn high incomes as they own cars, these are usually dilapidated vehicles which are also exacerbated by poor road infrastructures. However, it was also found that even those without vehicles tend to hire vehicles to fetch water, especially during the dry season when they have to fetch water from sources further away from their homes. Twenty-two percent of respondents in the Intaphuka community carry water by hand, 16% in the Mkhukhuze community, 14% in the Msunduze community, and 6% in the Kwazini community.

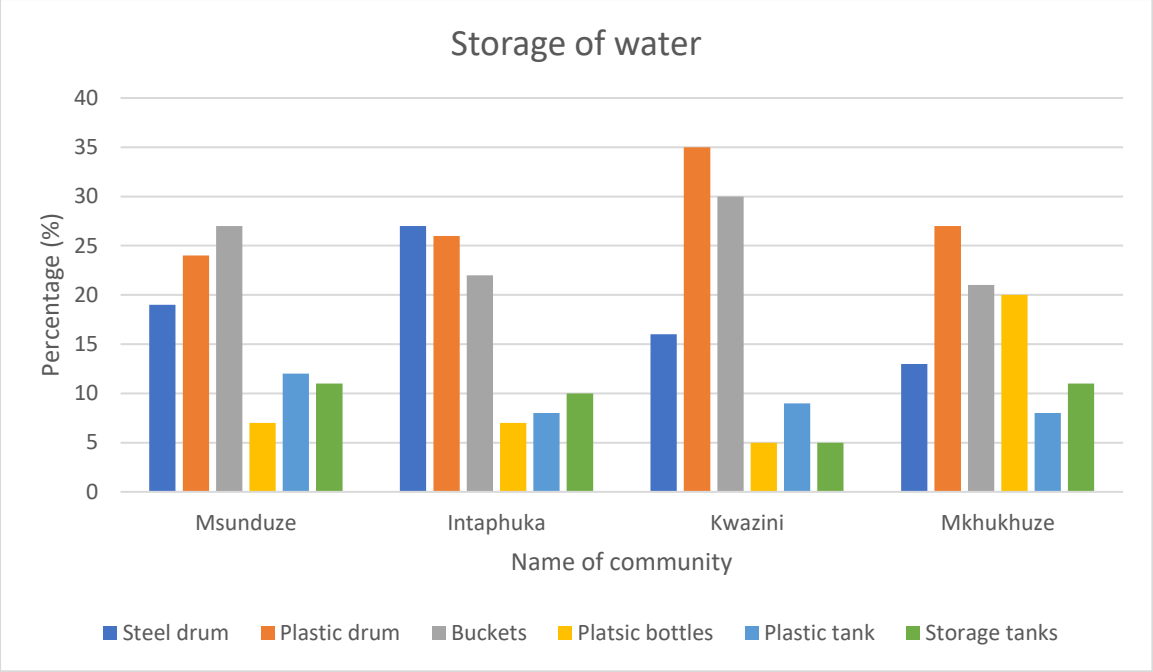


Figure 5.8 Items used to store water in homes (in %)

Figure 5.8 illustrates the items respondents use to store water in their homes. Thirty-five percent respondents in the Kwazini community store water in plastic drums, with 27% in the Mkhukhuze community. The Intaphuka and Msunduze communities also have 26% and 24%, respectively. Some significant respondents store water in buckets as there are 30% of respondents in the Kwazini community, 27% in the Msunduze community, 22% in the Intaphuka community, and 21% in the Mkhukhuze community. Steel drums are also used for the storage of water. Twenty-seven percent of respondents in the Intaphuka community, 19% in the Msunduze community, 16% in the Kwazini, and 13% in the Mkhukhuze community store water in steel drums.

Twenty percent of respondents in the Mkhukhuze community store water in plastic bottles, 7% in both the Msunduze and Intaphuka communities, while the Kwazini community has 5%. Plastic and storage tanks namely Jojo tanks have the same total respondents from the four communities. Twelve percent of respondents in the Msunduze community store water in plastic tanks, 9% in the Kwazini, while the Intaphuka and Mkhukhuze both have 8% of respondents. The Msunduze and Mkhukhuze communities have 11% of respondents who use storage tanks as their water storage, 10% in the Intaphuka community. In comparison, there are 5% of respondents in the Kwazini community. Bottles and plastic bottles are standard containers respondents use to fetch and collect water, while the plastic and steel drums are big and usually used for storage. However, while fetching water from water tankers, some use these drums for

efficiency. At least two people are needed to carry these drums. Storage tanks are usually used for harvesting and storing rainfall water, however, the ones in smaller sizes can also be used as storage.

Plate 5.8 Household's containers used to store water within the Kwazini community

Table 5.21 Purchase of water, where respondents buy water, and the amount spent (in %)

Forced to buy water due to its unavailability	**Msunduze (n=100)**	**Intaphuka (n=100)**	**Kwazini (n=100)**	**Mkhukhuze (n=100)**	**Total (n=400)**
Yes	25	38	2	14	20
No	75	62	98	86	80
Where do respondents purchase water					
Vendors within your area	-	-	-	29	7
Vendors nearest to your area	68	53	100	71	73
Water tanker drivers	32	47	-	-	20
Amount spent for water					
<R200	48	18	-	14	20
R200-R400	48	66	100	86	75
>R400	4	16	-	-	5

Table 5.21 shows that majority of the respondents have not been forced to purchase water due to unavailability. Water unavailability occurs when water is not available and accessible at the

source. The Kwazini community accounts for 98% of respondents, 86% in the Mkhukhuze community, 75% in the Msunduze community, and 62% in the Intaphuka community. However, some community members across the four communities have been forced to purchase water.

Only the Mkhukhuze community has respondents (29%) who purchase water from vendors within their areas. There are local spaza shops in the vicinity. Most of the respondents who have purchased water use vendors within their vicinity. These are shops in that are located in the nearest town. All respondents who have bought water in the Kwazini community purchase water from vendors nearest to their area, 71% in the Mkhukhuze community, 68% in the Msunduze community, and 53% in the Intaphuka community. Surprisingly, many respondents mentioned that they purchased from the drivers of the water tankers, which is illegal. These respondents reside in households with storage tanks such as Jojo tanks where the water tankers fill the water and pay a certain amount according to the size of their tanks. This act proves the level of corruption between the water tankers and NLM as the together in distributing water to the rural communities. This has also led to conflicts among communities as those that lack the earning potential cannot purchase water and are further marginalised.

Water tankers selling water illegally to community members has become an issue. For instance, residents in Hammanskraal, which has been the centre of the recent outbreaks of cholera, complained about the municipality deliberately sabotaging water infrastructure so they could hire water tankers (Goba, 2023a). This comes after the deadly cholera outbreak in the province of Gauteng, where the waterborne disease has claimed 24 lives (Ngcobo, 2023:1). These individuals who drive the tankers have been selling water to the community members illegally.

The South African Government News Agency (2023) has cautioned residents of Hammanskraal not to purchase or consume water from tankers as it had not been tested for cholera. This came about as a result of community members alleging that water tankers were roaming the area selling water to residents. Even though the water from water tankers was later declared safe for drinking, the media has ignored the issue of water tankers selling water illegally. It seems the municipality is benefiting from the city's water infrastructure challenges (Mokgobu, 2023). The business related to water tankers is bound to lose much money if the water supply from infrastructure is fixed, reiterating that there is a vested interest between the municipality and the water tanker business (Goba, 2023b). Such problems with tankers are widespread. In 2019 in Umlazi, eThekwini, residents also protested because of tank drivers

demanding R200 to fill their house tanks after four weeks without water (Binda, 2019). There too, protest leaders alleged that the supply cuts were deliberate so that residents would get water delivered by tankers.

The respondents highlighted that during the peak of the COVID-19 pandemic, they had to buy clean water for hygiene purposes as they were told good hygiene is vital in curbing the transmission of the virus. The KwaZulu-Natal 2021 floods also disturbed the water networks in the communities, which did not have running water for several months. During this time, even local spaza shops started selling 5L water bottles at higher prices due to water scarcity. Majola (2021) also highlights that older people who were frail were forced to pay some community members to fetch water for them as they could not reach the streams.

The majority of respondents have spent R200 to R400 for water, with the Kwazini community leading with all of its respondents claiming they have spent that amount, 86% in the Mkhukhuze community, 66% in the Intaphuka community, and 48% in the Msunduze community. Forty-eight per cent of respondents in the Msunduze community, 18% in the Intaphuka community, and 14% in the Mkhukhuze community have spent less than R200 on water. Sixteen per cent and 4% of respondents in the Intaphuka and Msunduze communities, respectively, have spent more than R400 on water.

5.5.1 Community initiatives

With projected increases for the demand for water, educating the public about sustainable personal water use and water quality threats becomes a necessity (Seelen *et al.,* 2019). One way to achieve this is through engaging with citizens in water issues (Haklay *et al.,* 2021). As a result, community members have initiated plans and projects to counteract the issues of water shortages within the four communities such as Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively. These initiatives include raising awareness, delivering water to the poor, forming community-based projects, rainwater harvesting and cleaning rivers.

Table 5.22 Community initiatives within the four communities (in %)

Community initiatives	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Raising awareness	40	26	10	45	30
Delivering water to the poor	12	-	-	5	4
Community-based projects	57	33	49	43	46
Rainwater harvesting	33	20	12	10	19
Cleaning rivers	12	10	20	3	11

Table 5.22 depicts the community initiatives taken by community members within the four communities. Fifty-seven percent of respondents within the Msunduze community stated they created community-based projects, 49% of respondents in the Kwazini community, 43% in the Mkhukhuze community, and 33% in the Intaphuka community. The respondents in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities highlighted that they have held several community meetings with ward councillors to propose a community-based approach to tackle the water supply issue as the municipality has failed them. Traditional and community-elected leaders as well as the community members from the four communities have led these meetings. However, there has yet to be an implementation thus far. Community-based management (CBM) has proven to be a strategy for operating mainstream participatory development particularly within the rural water supply sector (Whaley and Cleaver, 2017). A participant in the Intaphuka community stated:

> *"We have had countless community meetings with the izinduna and councillors, but they all have not been fruitful as we still do not have running water."* (March 2023, Respondent 53).

Drawing from a case study in India, Hutchings *et al.* (2017) mentions that community members who were seen taking the initiative when they came together from four villages to form an unofficial committee that took responsibility for the piped network, which lasted for 20 years without any external support. Whilst the unsupported community-managed piped water supply cases are rare, this proves it is possible. Kativhu *et al.* (2018) also draw from examples where a sense of ownership from community-led projects has improved the sustainability of water supply projects in Zimbabwe, Pakistan, and Ghana. Although CBM has its weaknesses, it has

also shown that in some cases there has been better performance and benefits to improved water supply systems.

Communities must have a considerable role in these initiatives as they are the ones who understand their needs best. Etongo *et al.* (2018) note that communities should be at the forefront of developing rural water supply, own the facilities, and be responsible for its maintenance. Even when there is any development in the areas, community members are usually not consulted, which creates conflict. It was highlighted that there needs to be better participation from the community members during projects held in their communities. The respondents felt that the municipality should engage more with community members and probe them about their needs concerning service delivery to ensure better outcomes.

The respondents in all four communities (Msunduze, Intaphuka, Kwazini, and Mkhukhuze) stated that they were not assisted by any NGOs and Non-Profit Organisations (NPOs) in terms of additional water supply. However, they did mention that one of the objectives of their proposed community-led projects was to get sponsorship from NGOs. The respondents complained that the fact that they were not being assisted by NGOs or NPOs could have been politically driven as the municipality does not want to sabotage its relationship with owners of the water tankers. They perceive there is a transparent partnership between both parties, and both benefit from the communities' misery.

NGOs have the potential to thrive in community-based projects, especially when it comes to rural water supply initiatives. Rivett *et al.* (2018) emphasises that the aim of NGOs is to facilitate implementation, provide training and fund rural water supply projects. For instance, in the case of community-managed water supply systems in rural Uganda, NGOs provided training activities on the operation and maintenance of water points and repairs (Etongo *et al.*, 2018). However, the long-term sustainability of projects mainly comes from grassroots NGOs rather than those receiving funding and sponsorship externally (Ssozi-Mugarura *et al.*, 2017). This is because projects are developed on time frames, and NGOs leave communities once these projects are concluded. Communities should work with NGOs within their communities to ensure optimal implementation.

Drawing from a case in Zimbabwe, Kativhu *et al.* (2018) further note that since external NGOs funded many rural water projects, they failed to follow the CBM guidelines, which impacted the level of participation and engagement of user communities and negatively impacted

sustainability. In most cases, NGOs only fund the installation of facilities, not the training, which leads to minimal results. NGOs and NPOs may be significant and needed in community initiatives regarding rural water supply systems. However, community members must ensure their goals are aligned to reach the optimum success of these systems.

In terms of raising awareness, the Mkhukhuze community had 45% of respondents who stated they have raised awareness to educate community members on the effects of water shortages, 40% in the Msunduze community, 26% in the Intaphuka community, and 10% in the Kwazini community. In hopes of getting the attention of the mayor and the media's attention, the communities have organised "peaceful" protests to show how much this issue of poor water supply affects them. In most cases, citizens view participation through protests as their way of reiterating their needs instead of formal meetings at policymaking tables (Herrera, 2019). However, in addition, community members perceive that they are rarely addressed or involved in any projects, which leaves them with no choice but to protest. In 2019, the Ndwedwe community made headlines for violent protests regarding water shortages and service delivery (Malinga, 2019). Community members complained about not receiving water from water tankers as they only deliver water once a month or to specific places whilst leaving others. Since then, the respondents stated there also have been protests in the communities regarding the issue, which are not broadcasted in the media.

Regarding encouraging and engaging rainwater harvesting as a community initiative, there were 33% of respondents in the Msunduze community, 20% in the Intaphuka community, 12% in the Kwazini community, and 10% in the Mkhukhuze community. The call for conservation of water has been a paramount strategy due to water shortages (Pala *et al.,* 2021). Rainwater harvesting significantly contributes to the sustainability of rural areas through supplying water in a decentralised manner, while increasing local water security (de Sá Silva *et al.,* 2022). Another benefit of rainwater harvesting includes better stormwater management which is the common activity within the four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively.

Cleaning rivers in NLM is a strategy implemented under the Thuma Mina campaign within NLM (Ndwedwe IDP, 2022). Even though it does not address the root cause of the water crisis within the municipality, this was also one of the community initiatives implemented within the four communities. There were 20% of respondents in the Kwazini community who engaged in this initiative, 12% in the Msunduze community, 10% in the Intaphuka community, and 3% in

the Mkhukhuze community. Additionally, regarding delivering water to the poor was also a community initiative to address water shortages within the four communities. Only the respondents in the Msunduze and Mkhukhuze communities engaged in this initiative with 12% and 5% respectively.

5.6 Ndwedwe Local Municipality interventions

As previously highlighted, all municipalities are tasked with the responsibility of developing and supplying water services to their respective communities (Toxopeüs, 2019; Emily and Muyengwa, 2021). This means that if the current water infrastructure fails, it is the municipality's responsibility to counteract water issues by supplying with alternative sources. This section explores the water infrastructure installed by the municipality as well as the respondents' ratings of the current water infrastructure using the Likert scale.

Table 5.23 Water infrastructure installed by the municipality in each community (in %)

Water infrastructure installed by the municipality in each community	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Reservoir	-	-	-	-	-
Borehole pumps	-	-	-	100	25
Standpipes	33	20	-	57	28
Tanks	-	-	90	-	23
Electrical water pump engine	-	-	-	-	-

Table 5.23 above illustrates the different kinds of water infrastructure installed by the municipality in each community. All respondents in the Mkhukhuze community stated the local municipality installed a borehole pump. Ninety percent of respondents in the Kwazini community stated a tank was installed and provided. Fifty-seven percent of respondents in Mkhukhuze, 33% in Msunduze and 20% in Intaphuka also mentioned standpipes were supplied by the municipality.

In terms of maintaining the water infrastructures in the communities, all respondents stated that infrastructures are poorly maintained as they have been vandalised due to their dysfunctionality over the years. For example, the standpipes within the Msunduze, Intaphuka and Mkhukhuze communities have been dysfunctional and damaged for years. The reasons for the malfunctioning of water infrastructures include the municipality needing to care more about

the communities they serve as they do not maintain these infrastructures. Also, the respondents were fearless in mentioning that community members are not playing a role in ensuring the infrastructures are maintained as they also take part in malfunctioning. There have been cases of community members vandalising and stealing pipes as well as taps for their gain, resulting in the damage and failure of water infrastructure. However, this only occurs when the infrastructure was neglected for many years which gave criminals an opportunity to vandalise. Thus, lack of effective municipal intervention is the root cause of the damage and malfunction of the water infrastructure. The damage to the standpipes in the Mkhukhuze is explained well by a participant who stated:

> *"As you can see these damaged standpipes, I cannot even recall how many times we reported to the ward committee that there was a leakage four years ago. This is why they are in this damaged state."* (April 2023, Respondent 49).

Plate 5.9 A dysfunctional standpipe within the Mkhukhuze community

Plate 5.10 A household's dysfunctional tap with no running water within the Intaphuka community

Table 5.24 Rating the service of the current water supply (in %)

Service rate of the current water supply	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Very good	-	-	-	-	-
Good	-	-	-	-	-
Very bad	56	70	86	72	71
Bad	44	30	14	28	29

Table 5.24 illustrates the respondents' rating of the current water supply services using the Likert scale. The options range from very good, good, very bad, and bad. All respondents in the four communities namely Msunduze, Intaphuka, Kwazini and Mkhukhuze, respectively, rated the water supply service as being very bad and bad. Majority of respondents (86%) in the Kwazini community rated the water supply service very bad, 72% in Mkhukhuze, 70% in Intaphuka, and 56% in the Msunduze community. Regarding the bad rating, there were 44% of respondents in the Msunduze community, 30% in the Intaphuka community, 28% in the Mkhukhuze community, and 14% in the Intaphuka community.

All of the respondents complained about being not notified about water unavailability. This is particularly true for those who still rely on piped water within their households. Sometimes, weeks leading to months pass by without any drop of water from their taps, and the community members would not be notified about any technical issues related to the unavailability. The communities that also need additional water tankers are also not notified when water tankers do not distribute water to the communities. This relates to the municipality needing to tackle water unavailability in communities adequately. Due to the water issue, the respondents have engaged in protests to gain attention from the municipality. However, NLM is still yet to redress the water crisis situation. The municipality's fundamental role to cater for its citizens' needs has been ignored. The municipality needs to improve at prioritising the issue of water unavailability.

5.7 Suggestions

The aim of this study was to assess the community perceptions regarding the challenges associated with water and sanitation. Therefore, it was imperative to explore the suggestions of the community members across the four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively. The suggestions range from stakeholder partnerships, community involvement, ownership of water infrastructure, and an election of a committee to help tackle the issue of the water crisis.

Table 5.25 Respondents suggestions (in %)

Suggestions	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
Stakeholder partnership	94	98	80	86	90
Community involvement	95	90	100	94	95
Ownership of water infrastructure	87	81	77	89	84
Committee election	80	75	70	71	74

Table 5.25 illustrates the suggestions provided by the respondents across the four selected rural communities. All of the respondents in the Kwazini community motivated for community involvement in water related projects, 95% in the Msunduze community, 94% in the Mkhukhuze community, and 90% in the Intaphuka community. Service delivery is to cater to the communities, which only makes sense for them to be involved in its provision when there are constraints. The respondents in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities respectively perceive that they are the essential stakeholders who should be involved in water and sanitation issues in their respective communities. In addition, the respondents perceive that their involvement can be more effective as their ideas and solutions will be aligned with their communities' structures and issues such as poor governance structures or ineffective stakeholder collaboration. These four rural communities might be similar and share common issues, but they differ. Studies have highlighted that there is no universal definition of rural and the term "rural" is ambiguous (Abdulwakeel, 2017; Bennet *et al.,* 2019; Gallent and Gkartzios, 2019). Rural areas are extremely complex and diverse, and therefore cannot be boxed into a single definition (Woods, 2017; Halfacree, 2017; Long *et al.,* 2021). Therefore, rural areas are not homogenous which implies that the four selected rural communities are also different from one another. Thus, strategies should be place-based.

Furthermore, if each community has their community members involved in water provision, there would be effective results as they understand their issues and reside under these conditions. Therefore, their involvement is bound to be more effective. This is also emphasised by Hererra (2019), who mentions that community laws and practices have good chances of producing better outcomes because they have been agreed upon rather than being influenced by external actors.

Regarding respondents suggesting stakeholder partnerships, there were 98% of respondents in the Intaphuka community, and 94% in the Msunduze community. The respondents across the four communities in Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively provided a list of stakeholders they perceive can improve the water issue in their communities. These stakeholders include community members, municipalities, NGOs, and traditional leaders. The respondents perceive each of these stakeholders has a role in effectively addressing water and sanitation issues. If these relevant stakeholders work together for the improvement of rural communities, they can effectively address underlying issues faced in each community. The respondents noted that the current issue with these stakeholders is that they work in isolation, each trying to get their agenda heard and working for their own benefit, forgetting that their role is to uplift their communities. This often causes conflicts between partners and amongst communities. This is reiterated by Mathonsi and Sithole (2017) as they mention traditional leaders' roles and functions in South Africa are blurred within municipalities' activities, which often results in disputations of powers, jurisdiction, and the allocation of responsibilities in local government. According to Chigbu (2013) rural governance is one of the five elements of rurality which relates to the relationships between the actors and institutions involved in attaining rural development. It is therefore important for these institutions that form part of rural governance to collaborate to ensure development of rural areas.

Eighty-nine percent of respondents in the Mkhukhuze community suggested ownership of water infrastructure by community members, and 87% in the Msunduze community. As discussed, the respondents proposed for community members across the four selected rural communities to be involved and be at the forefront of decisions regarding water and sanitation issues and the maintenance of water infrastructures. They would like to acquire funding for their community-led projects to address these issues. They suggested to own and manage their water infrastructures as they no longer have confidence in the local government. For example, to execute this effectively, they also proposed monthly meetings with communities to provide progress and challenges associated with the water supply systems.

Eighty percent of respondents in the Msunduze community suggested for a committee election, and 75% in the Intaphuka community. The respondents also expanded on the various ways that the communities can be involved with the maintenance of water infrastructure. They proposed an election of a committee to handle maintenance issues and provide feedback on its progress. If they are involved in planning, constructing, decision-making, and managing their water

systems, they can fully maintain water infrastructure as they would be equipped. The respondents also know that the communities' involvement ensures long-term sustainability, which is their goal.

Table 5.26 Additional comments from respondents (in %)

Additional comments from respondents	Msunduze (n=100)	Intaphuka (n=100)	Kwazini (n=100)	Mkhukhuze (n=100)	Total (n=400)
The municipality should provide adequate water and sanitation to communities	93	90	100	88	93
The issue of lack of water should be taken seriously by the municipality	100	100	100	92	98
Effective community participation should be at the core of any water related projects	91	87	100	97	94
The maintenance of water infrastructure should rely on community members	92	89	100	91	93

Table 5.26 depicts that all respondents within the Msunduze, Intaphuka, Kwazini communities respectively added that the issue of lack of water should be taken seriously by the municipality. All respondents within the Kwazini community, with 97% in the Mkhukhuze community added that effective community participation should be at the core of any water related projects. The respondents also added that the municipality should provide adequate water and sanitation services to communities as per their mandate. All respondents in the Kwazini community added this comment, and 93% were in the Msunduze community. All respondents in the Kwazini community also added that the maintenance of water infrastructure should rely on community

members, with 92% of respondents in the Msunduze community, 91% of respondents in the Mkhukhuze community, and 89% of respondents in the Intaphuka community.

5.8 Participatory exercise findings

This study performed participatory rural exercises within focus groups within the four selected rural communities within NLM. A purposive sampling technique was employed to sample the respondents for these exercises. These rural exercises consisted of PRA methods such as problem ranking matrix, Venn diagrams, mental maps, and transect walks. The use of PRA methods is an appropriate technique for this study because of allowing rural dwellers to be primary agents of change in their development (Chambers, 1992; Mustanir *et al.,* 2017). PRA enables rural people to share, enhance, and analyse their knowledge of their living conditions. As this study used a triangulation approach, it utilised both quantitative and qualitative methods. For qualitative research, PRA methods were conducted within the four rural communities namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively. The aim of utilising the PRA methods was to engage with the rural dwellers and gain their perceptions regarding water and sanitation challenges within the four selected rural communities. The exercises consisted of ten females within each community from a range of ages. The Msunduze community consisted of females from 40 to 60 years of age, while in the Intaphuka community the respondents were from 30 to 60 years of age. The female respondents in the Kwazini community were from 30 to 65 years, while the Mkhukhuze community's respondents were females older than 40 years of age.

5.8.1 The Msunduze community findings

5.8.1.1 Problem ranking matrix of the Msunduze community

Table 5.27 Msunduze community's problem ranking matrix

	LW	**LSH**	**U**	**C**	**IC**	**IR**	**LE**	**LH**	**DA**	**TP**
LW	•	LW	LW	LW	LW	LW	LW	LW	LW	LW
LSH	•	•	LSH	LSH	IC	LSH	LSH	LSH	LSH	LSH
U	•	•	•	U	U	U	U	LH	U	U
C	•	•	•	•	IC	IR	LE	LH	C	C
IC	•	•	•	•	•	IR	LE	LH	IC	IC
IR	•	•	•	•	•	•	IR	IR	IR	IR
LE	•	•	•	•	•	•	•	LE	LE	LE
LH	•	•	•	•	•	•	•	•	LH	LH
DA	•	•	•	•	•	•	•	•	•	TP
TP	•	•	•	•	•	•	•	•	•	•

Problem	Scoring	Ranking
1. Lack of water (LW)	9	1
2. Lack of sanitation and hygiene (LSH)	7	2
3. Unemployment (U)	6	3
4. Crime (C)	2	8
5. Inefficient clinic (IC)	4	7
6. Informal roads (IR)	6	3
7. Lack of electricity (LE)	5	5
8. Lack of housing (LH)	5	5
9. Drug and alcohol abuse (DA)	0	10
10. Teenage pregnancy (TP)	1	9

The respondents of the Msunduze focus group exercise consisted of only females and ranging from 40 to 60 years old. Younger women from the Msunduze community were unavailable as it was a weekday and were probably at work. Although this study was not focused on female-headed households only, it is essential to note that the burden of collecting water is mainly placed on women. Therefore, only females were asked to participate in this exercise. Notably, Sweetman and Medland (2017) agree by emphasising that women are burdened with more responsibility for the needs of others. The division of labour between genders in rural societies and globally puts women and girls in charge of ensuring the well-being of their families, health, and hygiene. The weight placed on women and girls for fetching water is incredible (Pommells *et al.,* 2018; Dickin *et al.,* 2021). Similarly, Asoba *et al.* (2020) highlights that women worldwide face most water and sanitation challenges as they are involved in domestic and water-based chores.

The most significant challenge that the community faces is the lack of water (1), a lack of sanitation and hygiene (2), unemployment and informal roads (3), lack of electricity (5), lack of housing (5), inefficient clinic (7), crime (8), teenage pregnancy (9), as well as drug and alcohol abuse (10). The respondents perceive the lack of water as one of their most critical problems due to the lack of water supply to households, proper supply and maintenance of infrastructure, and lack of municipal action in providing efficient alternatives. They mostly have to depend on the river as months have passed without access to piped water in their households. This exacerbates the lack of sanitation and hygiene within households, as this is the second problem faced in the Msunduze community.

The residents of the Msunduze community also indicated that unemployment is a problem faced in the community. This means it is a challenge for residents of Msunduze to find employment and get employed within their community. Frequently, this leads to residents, especially the youth, moving to urban areas to find jobs. Improved employment opportunities, high income in the cities, and improved living conditions attract rural youth to the urban areas (Alarima, 2018). This is also the case in the South African context as rural-urban migration mainly occurs due to better employment opportunities, educational and health services and wage increases in urban areas (Mlambo, 2018).

Another problem that ties in with unemployment is having informal roads which are gravel roads. Thiede *et al.* (2020) note that informal unpaved roads in developing countries such as South Africa arise through various human movements which government authorities are not aware of. This makes it hard to identify and develop these informal roads. This is a problem as it results in high transport costs. There is only one mode of public transport in the area, which are taxis. The taxi fare always increases due to petrol increases in the country. The taxi owners also complain about the informal roads, which puts a strain on the servicing of the taxis. Venter *et al.* (2014) also agree by presenting evidence that the condition of rural roads affects the quantity and quality of transport services as well as fares charged to passengers. The poor the quality of roads the more fares charged to passengers. As unemployment is considered a problem in the areas, high taxi fares indicate that those who need assistance to afford the taxi fares find it difficult to reach the nearby town's amenities such as supermarkets and banks.

Lack of electricity and housing are also issues that are faced in Msunduze. Many houses are still without legal access to electricity and often connect to the electricity illegally. This is a safety risk and poses a threat to their lives. Blimpo *et al.* (2020) argue that SSA has one of the lowest provisions of electricity than other regions. Electricity is not only essential at household level but also critical for the provision of other services such as healthcare, education, and other services, which can promote socioeconomic growth among communities (Moner-Girona *et al.*, 2021). Thus, this implies that the Msunduze community is far from development as it lacks this basic service provision amongst other services. In addition, many households still require proper housing as their houses are built with mud. Lack of housing is a severe issue of SSA. Although access to proper housing is a human right and one of the core objectives of the SDGs, the housing need is more acute in Africa (Tusting *et al.*, 2019). The lack of housing in South Africa can be attributed to the legacy of apartheid as the vast black majority was denied this

basic service and allocated to overcrowded settlements particularly in urban areas (Marutlulle, 2021).

In addition, the clinic is incompetent as it is always low on supplies and experienced shortage of staff. The existing staff is not efficiently trained and are often rude to patients. Teenage pregnancy also poses a threat to the community. It seems the clinic is not encouraging young girls to take precautions such as contraceptives, and many girls fear going to the clinic as they are scared of being judged by the nurses. The respondents also indicated a lack of educational programs such as HIV/AIDS programmes to teach girls about the dangers of early sexual engagement. Unemployment also plays a considerable role as some young girls would rather have children and use the grant money provided by the South African government as income.

The respondents of the Msunduze community listed crime as well as drug and alcohol abuse as problems in the community, exacerbated by high unemployment rates. In a study investigating the relationship between unemployment and crime, Boden *et al.* (2017) argue that unemployment plays a fundamental role in substance abuse. In Zambia, Mukosa *et al.* (2020) reveal that unemployed youth have been forced to engage in crime and political violence to make a living. Instead of being in well-paying and productive jobs, many are involved in crime, drug abuse, prostitution, and alcohol abuse. However, it was not seen as a major problem in comparison to other problems. When the youth cannot find employment, they turn to crime and substance abuse during their voluntary time.

5.8.1.2 Venn diagram of the Msunduze community

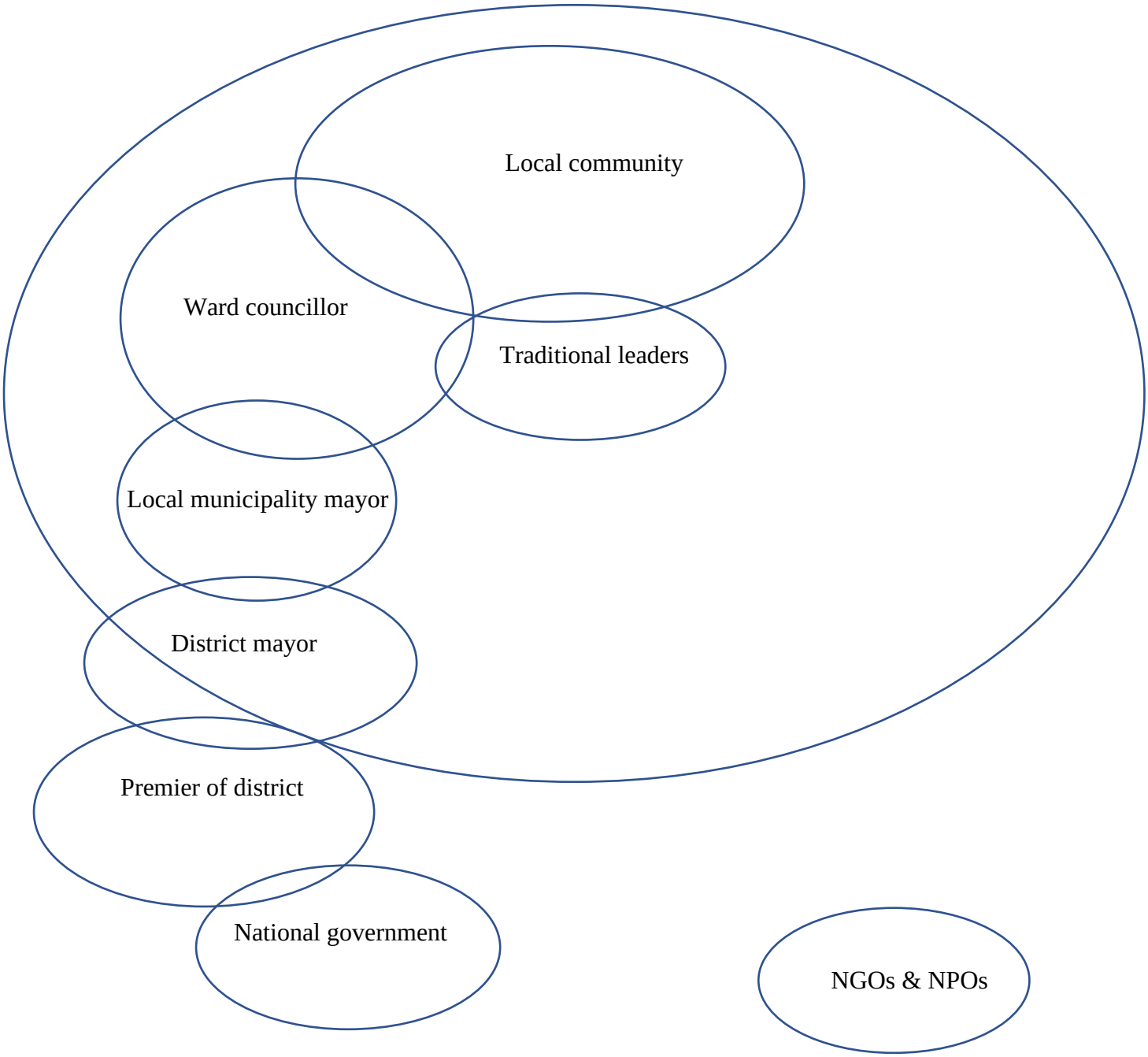


Figure 5.9 Venn diagram drawn by the Msunduze community

Figure 5.9 is a Venn diagram drawn by the respondents in the focus group held in the Msunduze community. Circles that overlap or touch indicate that these community members have a relationship with each other. The respondents indicated that the local community is a very close-knit community. The local community of Msunduze have a direct connection between the ward councillor and the traditional leaders, which comprise *amakhosi* and *izinduna*. In many rural areas, chiefs collaborate with councillors to allocate land, resolve conflicts within communities, as well as govern communities (Logan and Katenda, 2021). However, the Msunduze community has a more significant influence from the ward councillor than traditional leaders. This is because the ward councillor is responsible for service delivery, while the conventional leaders mediate between the local community and the councillor.

It can be noted from Figure 5.9 that the respondents perceive traditional leaders only to have a direct relationship with the local community and ward councillor. It is evident from Figure 5.9 that the higher the hierarchy of stakeholders becomes, the more distant they are with the local community. For instance, the hierarchy from the local municipality mayor to the national government becomes less influential to the needs of the local community. Regarding NGOs and NPOs, the Msunduze community does not see any influence from them, especially concerning the provision of WASH services.

5.8.1.3 Mental map of the Msunduze community

Key:

Existing amenities:

 Forest plantations

 Formal roads

 Church

 Crop fields

 Borehole

 Community Health Clinic

 Formal house

 Rondavel

 Community spaza shops

 School

 Standpipe

 Taxi stops

 Informal roads

 River

 Farm or reserve

 Hotel

 Lodge

 Spring water

 Stream

 Communal tank

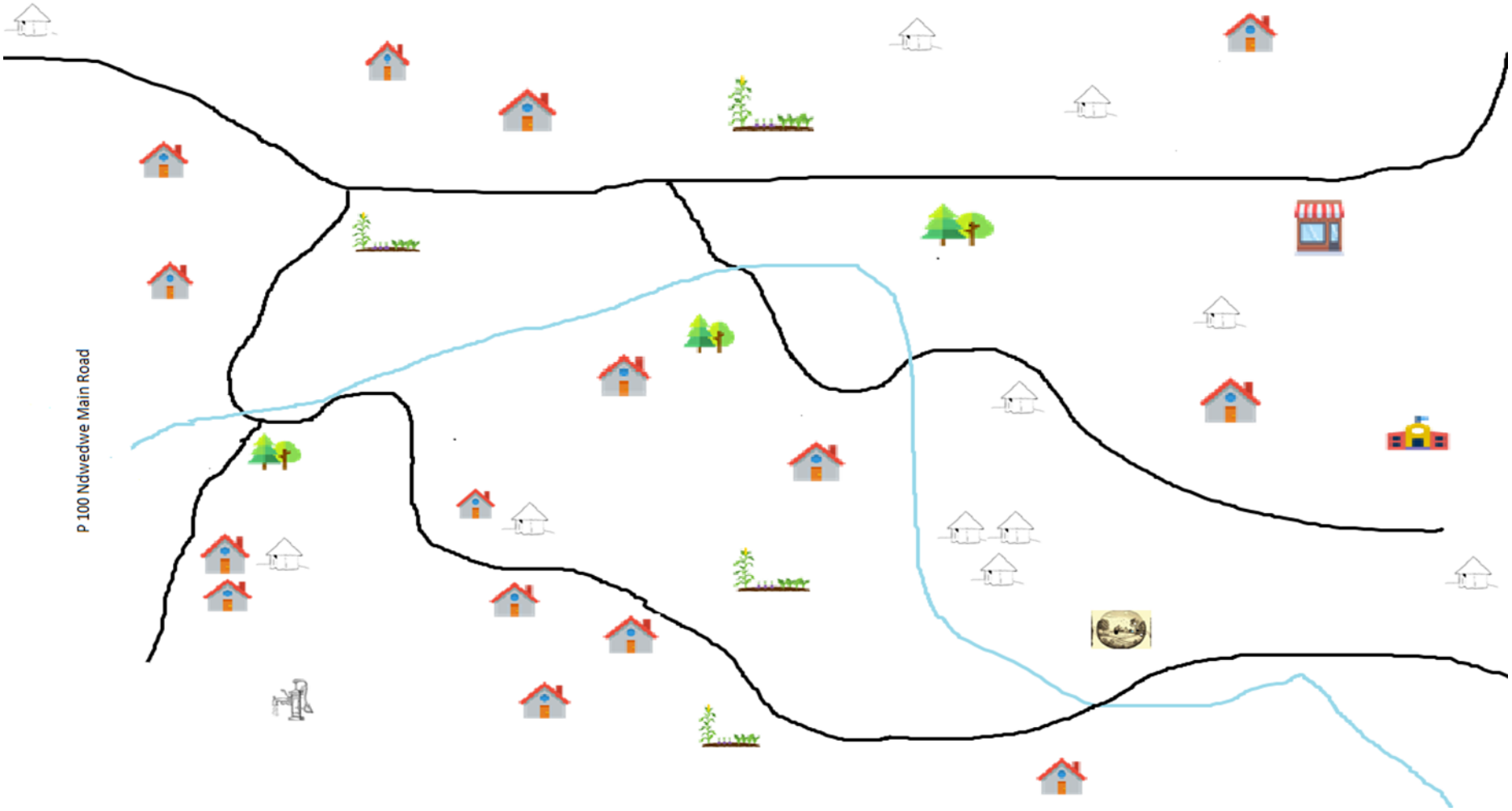


Figure 5.10 A mental map of the current facilities within the Msunduze community

Figure 5.10 was drawn by respondents of the focus group held within the Msunduze community. The Figure 5.10 above depicts a school, a community spaza shop, formal houses, rondavel houses, and a community church. The mental map also indicates where the forests and cultivation farms are situated. The forest plantations act as a source of wood for the community members as they use the wood to ignite the fire to cook during power cuts in this community. The river that supplies the community with water is also illustrated in this map. The location of the dysfunctional standpipes is also shown in Figure 5.10. A small farm owned by one family where they graze and sell livestock is also illustrated in this map. The various informal roads (gravel) are also indicated within this map.

5.8.1.4 Transect walks of the Msunduze community

Table 5.28 Transect walks observations in the Msunduze community

Date	Time	Observation
28/04/2023 Friday	07:00-09:30	On this morning, it is extremely cold in Msunduze. There are a few people walking to work and some to town. I have spotted a few female children walking to a nearby river to fetch water with their buckets and water bottles. Those who woke up early are coming from the river already walking home with their water. Some are carrying their buckets and bottles by hands, some head loading, while others on wheelbarrows.
	15:00-17:30	Taxis are busy again as it is now rush hour with majority coming from work during this time. There are only two women at the river collecting water and doing their laundry. The children are also back from school and helping their mothers collect water from the river. I walk past the standpipes that were installed by the municipality. I am told they have not been functioning for the past three years. Therefore, the nearby river is their main water source.
29/04/2023 Saturday	07:00-09:30	It is a peaceful Saturday morning and with mild weather conditions. As it is a Saturday, little girls and boys are accompanied with their mothers to the river to collect water. The little ones are carrying their 5L bottles and buckets while the mothers have their 20L buckets. The children also seem to have mastered carrying buckets on their heads just like their mothers.
	15:00-17:30	The sun is now shining, and I stumble upon a few boys having fun and swimming in the river. I proceed closer to the river and notice disposable diapers by the riverbank. Apparently, this is where some people dispose their waste and diapers in hopes it gets washed away by the river. At around 17:00 I notice a water tanker truck delivering water to the community. The water tanker is crowded with residents trying to collect as much as they can. Others are running with plastic basins filled with laundry to carry and wash back home. Some young boys are climbing up at the back of the truck and being naughty, which seems dangerous.
30/04/2023 Sunday	07:00-09:30	During the walk I noticed almost all the houses have water meters installed which means they should have running water in their homes, this is shocking as many of them collect water

		from the river. It is revealed that they last had received water three years ago and only have access after protests or during election periods. The meters are no longer working, and the taps have been dry for a long time.
	15:00-17:30	Some are fetching water from the river for the second time of the day and stocking to prepare for the week ahead. I overhear their conversation complaining about how tired they are and how much stocking of water they need to do since the week is starting the next day.
05/05/2023 Friday	07:00-09:30	There is a woman who is carrying a 20L bucket on her head and seems to be fatigued by the sun and heavy load. She takes a break and sits by the side of the road. She seems to have been walking a long distance from the river.
	15:00-17:30	A water tanker truck is filling up a *Jojo* rainwater tanker in one household that has a ceremony the next day. The researcher is told the iz*induna* of a community have the responsibility of making sure a household has enough water if they have any certain scheduled ceremonies such as weddings and funerals.
06/05/2023 Saturday	07:00-09:30	There is a pattern of a common type of sanitation within some households which is the pit latrines with ventilation. These are pit latrines built outside that were installed by the municipality. They are not connected to the sewage system. When the pit latrines are full the household members are responsible for "cleaning" with certain chemicals.
	15:00-17:30	The rain starts to pour during the walk, and we quickly must rush back. The road is about to become muddy as the road is gravel. On our way back I notice several households preparing to harvest rainwater from their roofs with their buckets and plastic basins.
07/05/2023 Sunday	07:00-09:30	It is a mild Sunday, and the researcher walks by a group of women doing their laundry at the river. They collect water in their basins and wash along the river. They then rinse their clothes in the flowing river. This does not seem sanitary as other community members consume the same water.

15:00-17:30	It is now around 17:00 and heading back home and I notice two men washing their taxis by the river. This seems convenient as the source of water is closer. There are also a few women carrying buckets on their heads coming from river.

5.8.2 The Intaphuka community findings

5.8.2.1 Problem ranking matrix of the Intaphuka community

Table 5.29 Intaphuka community's problem ranking matrix

	LW	LSH	U	C	IC	IR	LE	LH	DA	TP
LW	•	LW	U	LW	LW	IR	LW	LW	LW	LW
LSH	•	•	U	LSH	LSH	IR	LE	LH	LSH	LSH
U	•	•	•	U	U	U	LE	LH	U	U
C	•	•	•	•	C	IR	LE	LH	C	C
IC	•	•	•	•	•	IR	LE	LH	IC	IC
IR	•	•	•	•	•	•	IR	IR	IR	IR
LE	•	•	•	•	•	•	•	LH	LE	LE
LH	•	•	•	•	•	•	•	•	LH	LH
DA	•	•	•	•	•	•	•	•	•	TP
TP	•	•	•	•	•	•	•	•	•	•

Problem	**Scoring**	**Ranking**
1. Lack of water (LW)	7	2
2. Lack of sanitation and hygiene (LSH)	4	5
3. Unemployment (U)	7	2
4. Crime (C)	3	6
5. Inefficient clinic (IC)	2	7
6. Informal roads (IR)	8	1
7. Lack of electricity (LE)	6	4
8. Lack of housing (LH)	7	2
9. Drug and alcohol abuse (DA)	0	9
10. Teenage pregnancy (TP)	1	8

The respondents in the Intaphuka focus group exercise were all female. Their ages ranged from 30 to 60 years. The most critical problem for these respondents was informal roads (1). This was followed by lack of water (2), unemployment (2), lack of housing (2), lack of electricity (4), lack of sanitation and hygiene (5), crime (6), inefficient clinic (7), and teenage pregnancy (8).

The respondents perceived informal roads as the main problem in the Intaphuka community is burdened with. The lack of road infrastructure strains rural communities' development as it is challenging to reach nearby towns. Therefore, it is crucial for developing countries to prioritise and improve rural roads as they benefit economic opportunities (Nkomo *et al.,* 2016). The lack of water, unemployment, and lack of housing were all ranked second after informal roads in

the Intaphuka community. Unemployment threatens the development of this community as many depend on social grants which implies they earn little to support the businesses part of that community. Unemployment also results in migration of the youth to seek job opportunities to send money back home. The respondents noted that the lack of water, housing, electricity, sanitation, and hygiene are interlinked. For instance, if a house is built with mud, the municipality cannot connect the house to the main power or piped water as well as proper hygiene and sanitation services. However, with electricity, many choose to connect illegally to the power cables. Those with big houses usually have running water and proper hygiene facilities inside their homes as they are connected to the central sewage system and legal electricity.

The respondents of the Intaphuka community stated that crime has been a growing problem over the years, which can be linked to high unemployment rates in the community. Public services such as the clinic and schools are inefficient and can be linked to teenage pregnancy. The respondents perceive females are not educated sufficiently in schools and in the clinic about the dangers of pregnancy and sexually transmitted diseases. According to Campbell *et al.* (2007) HIV/AIDS continues to affect many parts of SSA while being a major cause of mortality. Gona *et al.* (2020) further note that South Africa is regarded as the second leading country, after Botswana, in Southern African countries with high mortality rates associated with HIV/AIDS. This amplifies the burden of HIV/AIDS in this country and the importance of educating females on the danger of this disease. Drug and alcohol abuse were not perceived as a problem in Intaphuka among the focus group.

5.8.2.2 Venn diagram of the Intaphuka community

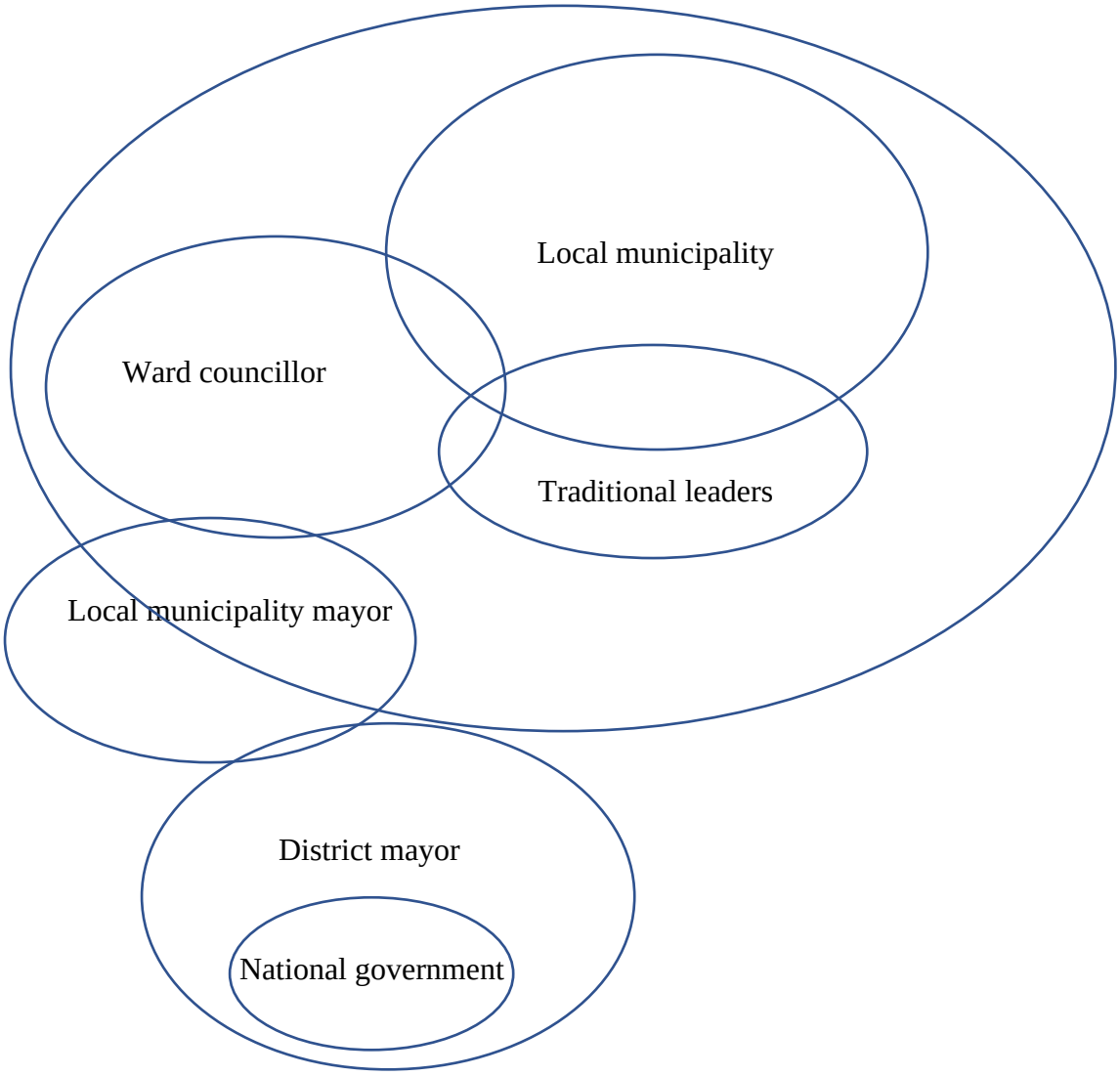


Figure 5.11 Venn diagram drawn by Intaphuka community

The Venn diagram above, Figure 5.11, was drawn by the focus group respondents in Intaphuka. Like the Msunduze community, the local community holds an integral role and is directly influenced by the ward councillor and traditional leaders. The ward councillor is slightly more influential than the traditional leaders due to its role in service delivery. However, over the years, the respondents mention that the ward councillor needs to provide essential services as the community has been living for years without reticulated water in their households. When it comes to customs and traditional advice or activities, traditional leaders play an intrinsic part.

The respondents of Intaphuka indicated they perceive being isolated from the local municipality mayor. The mayor has never come and addressed them when they recently had a protest demanding the provision of water, therefore, they do not see any influence from the mayor. The local municipality mayor is linked with the ward councillor as it is where the ward councillor conveys the community's issues (Ndwedwe IDP, 2022). The district mayor and national government also do not interact with the local community.

5.8.2.3 Mental map of the Intaphuka community

Figure 5.12 A mental map of the current facilities within the Intaphuka community

Figure 5.12 indicates the features drawn by the focus group held within the Intaphuka community. In the Intaphuka focus group exercise, respondents consisted of only females who ranged from 30 to 60 years of age. Figure 5.12 illustrates that there are schools, a church, a spaza shop, formal and rondavel houses, and the community health clinic further from the community. The map also shows where the forests and cultivation farms are. The Intaphuka community also has a community sports ground used by the locals and nearby schools for soccer competitions. The respondents also drew the Princess Lodge that is within the community. This lodge also provides employment within the community as some community members are employed in this lodge. This helps in increasing household food security and sustaining of livelihoods. The map also shows the standpipes of the community. There are also informal roads and the river within the Intaphuka community.

5.8.2.4 Transect walks of the Intaphuka community

Table 5.30 Transect walks observations in the Intaphuka community

Date	Time	Observation
12/05/2023 Friday	07:00-09:30	It is a school day, and the children are in school. Women have gathered at the nearby river to collect water. Some are carrying laundry baskets to do their washing at the same river. Those doing their washing collect water in their dishes and wash by the rocks close to the river and rinse their clothes in the running river.
	15:00-17:30	It is the afternoon, and the children are already back from school, some are accompanying their mothers to the river to collect water while others are playing in the fields. Teenage girls are also carrying their buckets and water bottles to fetch water.
13/05/2023 Saturday	07:00-09:30	The researcher stumbles upon some teenage girls coming from the river singing some IsiZulu traditional songs. The researcher is told that one girl has an *umemulo* (coming of puberty) ceremony that day and one of the traditions is that these girls go in the early hours of the ceremony to bath in the river to remove bad luck. Around 09:00 there are people still walking towards the river with their buckets and wheelbarrows.
	15:00-17:30	The sun is shining and there are small boys playing and swimming in the river. Around 17:00 the sun sets and there are mostly girls lining in the river with their containers to collect water.
14/05/2023 Sunday	07:00-09:30	It is a cold morning and there not many people in the river to collect water. Later in the morning a truck carrying water comes to deliver water to the community. I am told the water tanker last delivered water a month ago. The tanker is crowded instantly as people come with their buckets and steel drums to collect water. Within an hour the tanker is emptied, and some are left with empty containers as they could not collect.
	15:00-17:30	It is their 'lucky day' as the water tanker returns the second time on the same day, which is not a frequent occurrence. However, it stops further way from its initial point. Many come out to collect but not as much as in the morning.

19/06/2023 Friday	07:00-09:30	What is noticeable in the area is that there seems to be less development as compared to Msunduze with regards to road infrastructure. The road is gravel with potholes. The area also seems to be impoverished by analysing the houses, with some built with mud.
	15:00-17:30	Similar to Msunduze, the main water source is a nearby river as this area has not had tap water for over five years. Some households have their own rainwater tankers to harvest rainwater. However, I see many women and children collecting water in the river.
20/06/2023 Saturday	07:00-09:30	It is a rainy morning and those with rainwater tanks are fortunate to harvest water while those that do not have are obliged to harvest with their basins and buckets from their roof corners. As expected, the river is quite empty during this time.
	15:00-17:30	The weather has calmed down. I walk past a young boy running with a newspaper further away from his home, towards the trees. It seems he is about to relieve himself as I do not see any pit latrine outside the household. There are quite a number of households without pit latrines so it could mean they have flush toilets inside their houses or do not have any toilet facilities.
21/06/2023 Sunday	07:00-09:30	It is a sunny Sunday and I walk past some community members walking to the church and some to work. Some girls are walking towards the river to collect water with their buckets and bottles. There is one teenage boy accompanying his mother with a wheelbarrow filled with 20L bottles. This makes it easy to carry more than two bottles at a time as it can fit three to four 20litre bottles.
	15:00-17:30	After two months, the water tanker comes to deliver water to the community. Then residents come out in huge numbers with their buckets, bottles, and plastic drums to collect as much as possible. The tanker carrying stops for 15 minutes and then proceeds to the next stop. The residents scream and shout at the driver for leaving. Some run after the truck to the next stop. It becomes very chaotic in the streets when the truck delivers water.

5.8.3 The Kwazini community findings

5.8.3.1 Problem ranking matrix of the Msunduze community

Table 5.31 Kwazini community's problem ranking matrix

	LW	LSH	U	C	IC	IR	LE	LH	DA	TP
LW	•	LW	U	LW	LW	IR	LW	LW	LW	LW
LSH	•	•	U	LSH	LSH	IR	LE	LH	LSH	LSH
U	•	•	•	U	U	IR	LE	LH	U	U
C	•	•	•	•	IC	IR	LE	LH	C	C
IC	•	•	•	•	•	IR	LE	LH	IC	TP
IR	•	•	•	•	•	•	LE	LH	IR	IR
LE	•	•	•	•	•	•	•	LE	LE	LE
LH	•	•	•	•	•	•	•	•	LH	LH
DA	•	•	•	•	•	•	•	•	•	TP
TP	•	•	•	•	•	•	•	•	•	•

Problem	Scoring	Ranking
1. Lack of water (LW)	7	2
2. Lack of sanitation and hygiene (LSH)	4	5
3. Unemployment (U)	6	4
4. Crime (C)	2	6
5. Inefficient clinic (IC)	2	6
6. Informal roads (IR)	7	2
7. Lack of electricity (LE)	8	1
8. Lack of housing (LH)	7	2
9. Drug and alcohol abuse (DA)	0	8
10. Teenage pregnancy (TP)	2	6

The respondents of the Kwazini focus group were also female and comprised of an age range from 30 to more than 65. The most critical problem for these respondents was the lack of electricity (1). In addition, lack of water (2), informal roads (2), lack of housing (2), unemployment (4), lack of sanitation and hygiene (5), crime (6), inefficient clinic (6), and teenage pregnancy (6).

Compared to other communities, the main problem in the Kwazini community is the lack of electricity. According to the Ndwedwe IDP (2022) the municipality is challenged with providing electricity to some communities. However, there have been electrification projects implemented in some communities within NLM. The provision of electricity is often minimal in rural areas compared to cities in the global South. Even though access to electricity is a human right for all citizens in SA, including rural dwellers, many remote rural areas still lack

this vital amenity due to the expensive prospect of connecting them to the central national grid (Motjoadi *et al.*, 2020). Lack of water, informal roads and housing share the second ranking in terms of challenges in the Kwazini community, after lack of electricity. Unemployment is also a problem as the youth continue to seek employment within and outside the community which leads to migration of the youth. Lack of sanitation and hygiene is linked with lack of water, which indicates that sanitation and hygiene become poor when water is inaccessible. Crime is also perceived as a problem which can be attributed to high unemployment rates.

Inefficient clinic and teenage pregnancy are interlinked, as the respondents perceive that the rise of teenage pregnancy in the Kwazini community is due the clinic not reaching out to young girls and teaching them about their bodies and the precautions to take. Programmes by the Department of Health are also obsolete. Also, the lack of sex education in schools encourages teenage pregnancy. The negative impacts of teenage pregnancy are that it promotes poor academic performance after the pregnancy, teenagers suspending or completely leave out their schooling due to pregnancy-related issues (Maemeko *et al.*, 2018). Likewise, Mohr *et al.* (2019) highlight that in low-income countries, results show that higher levels of teenage pregnancy deter girl children reaching higher education. Therefore, it is important for departments such as the Department of Social Welfare to target schools and learning institutions to discourage teenage pregnancy. The respondents perceived that drug and alcohol abuse were not a problem within the Kwazini community.

5.8.3.2 Venn diagram of the Kwazini community

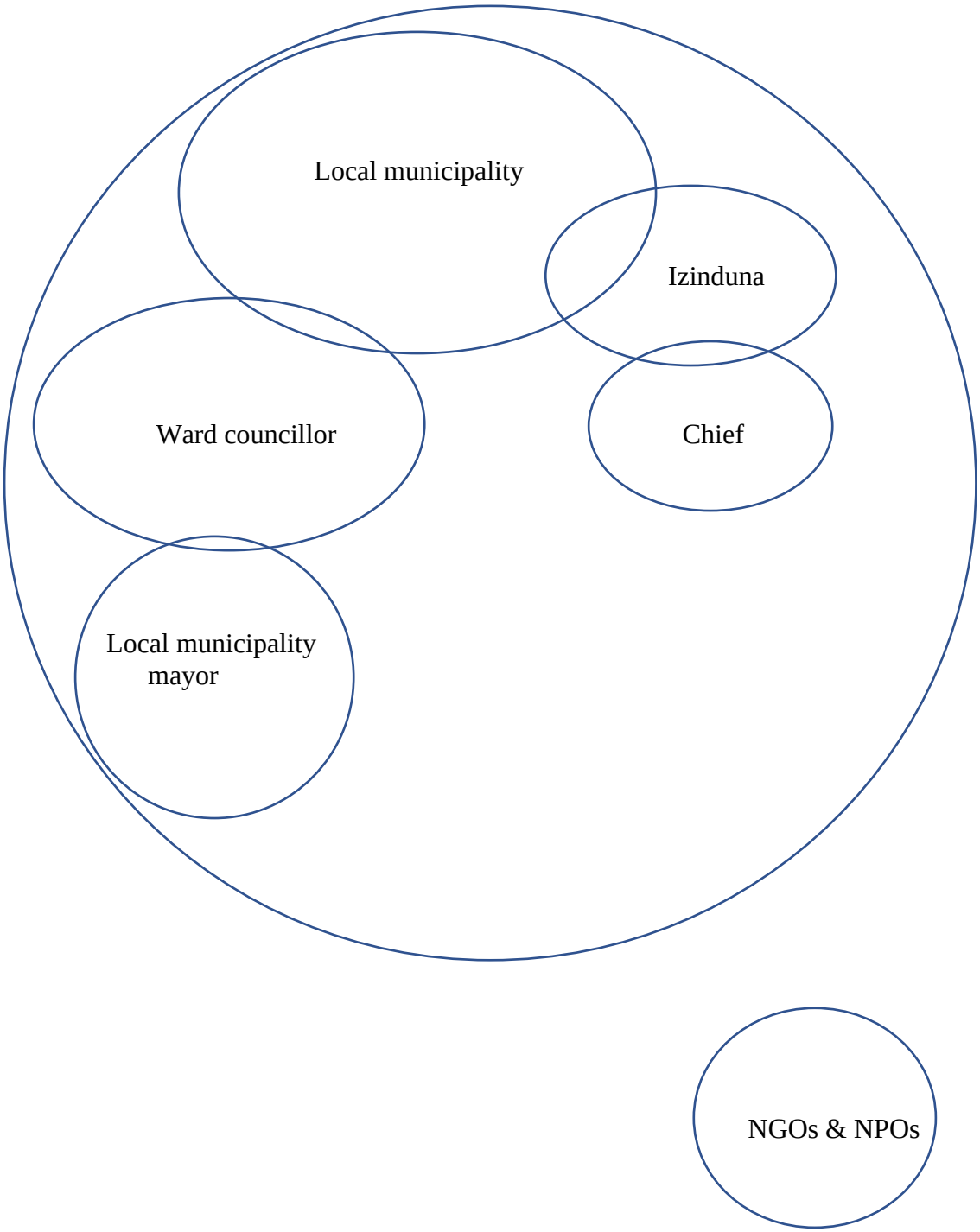


Figure 5.13 Venn diagram drawn by Kwazini community

Figure 5.13 above is a Venn diagram drawn by the focus group respondents in Kwazini. This focus group indicated that the local community play a huge role in decision-making regarding issues faced in the community. The circles indicate that the local community of Kwazini interact mainly with the *izinduna* of the community and the ward councillor. Kwazini seems more traditional than Msunduze and Intaphuka, as the *izinduna* are more influential than the ward councillor. The community addresses their issues with the *izinduna* and liaises them with the community chief. Chiefs have consistently scored higher citizen ratings in terms of trust and better performance than elected leaders and government officials, as they are seen as markedly less corrupt (Logan and Katenda, 2021).

The respondents stated that they have lost their trust in their ward councillor as the councillor fails to deliver essential services. For example, some parts of Kwazini still need electricity, while this issue has been reported to the councillor, there yet to be any action to address this demand. The chief is always notified by the ward councillor when there is a proposed development in the community. He directs this to the *izinduna* to pass the message to the community. The respondents felt that they were isolated from the local municipality mayor. They also revealed that they have not received assistance from NGOs and NPOs.

5.8.3.3 Mental map of the Kwazini community

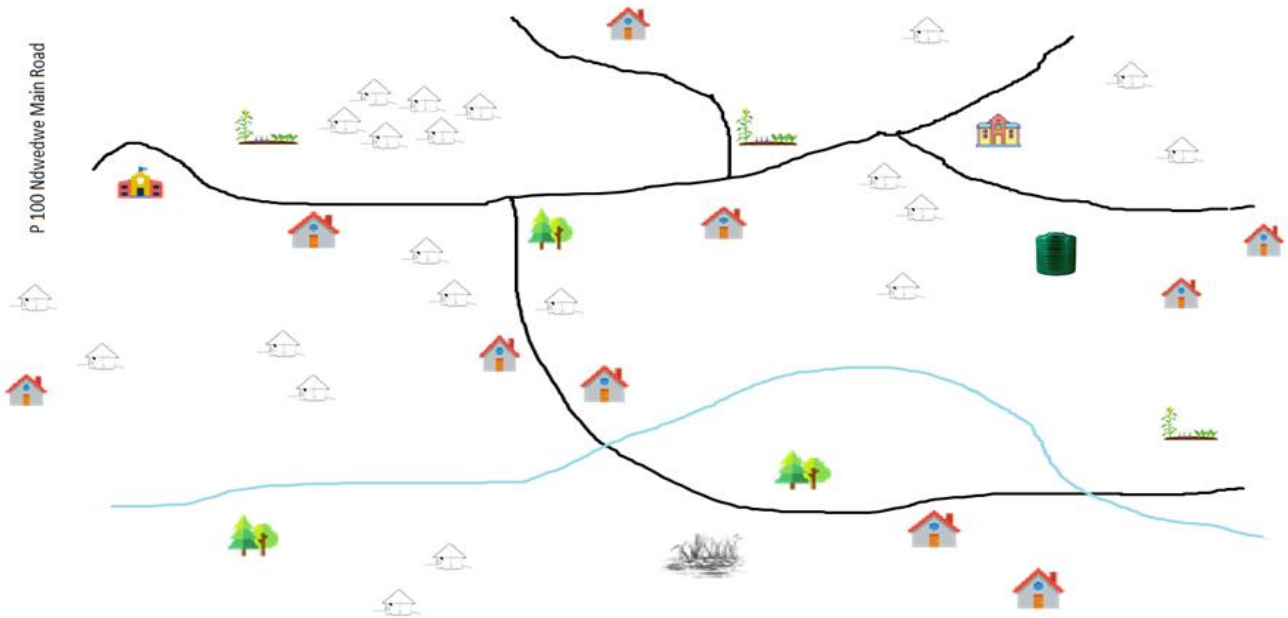


Figure 5.14 A mental map of the current facilities within the Kwazini community

Figure 5.14 was drawn by respondents of the focus group held in the Kwazini community. Figure 5.14 shows a school, church, formal houses, and many rondavel houses. The mental map depicts where the forests and cultivated lands are situated. This community seems more traditional than the Msunduze, Intaphuka, and Mkhukhuze communities as the respondents mainly practice agricultural activities such as grazing and cultivating the land. The forest plantations are mainly used for wood collection as the community lacks electricity supply. Some households are connected to the electricity illegally. There is a river and a running stream within this community that are shared with livestock. This implies the community members of Kwazini may be vulnerable to waterborne diseases due to consuming unsafe water. The communal tank installed by the local municipality is also illustrated in this map. This tank is shared among the community members. The The tanker carrying water fills this tank once a week. This source of water is not reliable as some community members do not collect water due to long queues. This tank also fails to provide for the community at large. The Kwazini community also has informal roads.

5.8.3.4 Transect walks of the Kwazini community

Table 5.32 Transect walks observations in the Kwazini community

Date	Time	Observation
16/06/2023 Friday	07:00-09:30	During the morning walk I noticed women coming from fetching firewood for the week ahead. I am told they mainly use firewood for cooking and heating as many households do not have electricity. There is also a group of women with their buckets headed to the river.
	15:00-17:30	I gather that almost all households have taps installed but wonder why so many women rely on the river and stream. It is revealed to me that most of these taps had running water three years ago.
17/06/2023 Saturday	07:00-09:30	Due to lack of piped water in the area some households have their own rainwater tankers (*Jojo*) to harvest rainwater as an alternative and to some as their main water source. I walk past a little boy collecting water from the communal rainwater tanker with a 5L bucket after a rainy night. The water is used for drinking and other activities.
	15:00-17:30	It is midday and I notice a few boys swimming and playing in the nearby river. They seem to be having fun and I wonder how dangerous it must be as I am told that two people drowned in a river after a heavy rainfall in the nearby community.
18/06/2023 Sunday	07:00-09:30	It is a sunny morning and there is a boy herding cattle in the road. He carefully instructs the cows to the river to drink water. This reinforces how contaminated the river is as people use that water for drinking and cooking. Just an hour later some girls with their buckets head to the same river to collect water.
	15:00-17:30	During the day I walk past an old lady sitting outside her house, under a shade, making mats to sell at the local town. I notice this community is somewhat more “rural” than the other communities as the houses are more dispersed with many households owning cattle.

23/06/2023 Friday	07:00-09:30	I am amazed by this woman with her young child on her back carrying a 20L bucket on her head heading home from the stream.
	15:00-17:30	So far, I have not come across any communal water supply infrastructure that was installed by the municipality as compared to other communities. Although almost all houses have taps in their yards, they are still not functional. Therefore, this leaves community members to collect mainly from the river.
24/06/2023 Saturday	07:00-09:30	For some the river is far from their households and therefore must use their own or hire a car. I walk past a father in the driving seat of a van with children collecting water from the river and loading the buckets and 20litre bottles at the back. This is a normal task for those that have to use cars to collect water.
	15:00-17:30	It is starting to get dark at 17:30 and I notice a few houses do not have electricity as their lights are not on like other households. They could be using candles for lighting. Some are preparing a fire for cooking and heating as it is cold.
25/06/2023 Sunday	07:00-09:30	Many households have their containers by the roads waiting for the water tankers to deliver water. There are also some people waiting by the communal tank waiting for the water tanker to pour water, so they also collect.
	15:00-17:30	While others are back from work and church, for some it is a regular day to collect water and store for the week ahead.

5.8.4 The Mkhukhuze community findings

5.8.4.1 Problem ranking matrix of the Mkhukhuze community

Table 5.33 Mkhukhuze community's problem ranking matrix

	LW	LSH	U	C	IC	IR	LE	LH	DA	TP
LW	•	LW	U	LW	LW	LW	LW	LW	LW	LW
LSH	•	•	U	LSH	LSH	LSH	LSH	LH	LSH	LSH
U	•	•	•	U	U	IR	LE	U	U	U
C	•	•	•	•	C	IR	LE	LH	C	TP
IC	•	•	•	•	•	IR	LE	LH	LH	IC
IR	•	•	•	•	•	•	IR	IR	IR	IR
LE	•	•	•	•	•	•	•	LE	LE	LE
LH	•	•	•	•	•	•	•	•	DA	TP
DA	•	•	•	•	•	•	•	•	•	TP
TP	•	•	•	•	•	•	•	•	•	•

Problem	Scoring	Ranking
1. Lack of water (LW)	8	1
2. Lack of sanitation and hygiene (LSH)	6	4
3. Unemployment (U)	7	2
4. Crime (C)	2	8
5. Inefficient clinic (IC)	1	9
6. Informal roads (IR)	7	2
7. Lack of electricity (LE)	6	4
8. Lack of housing (LH)	4	6
9. Drug and alcohol abuse (DA)	1	9
10. Teenage pregnancy (TP)	3	7

The Mkhukhuze focus group exercise respondents were all females older than 40. The most critical problem in Mkhukhuze is the lack of water (1), unemployment (1), informal roads (2), lack of sanitation (4), electricity (4), lack of housing (6), teenage pregnancy (7), crime (8), and drug and alcohol abuse (9), as well as inefficient clinic (9).

Lack of access to water in Mkhukhuze has been a challenge in the community for the past few years. Even though there is a borehole pump that caters for most of the community, it is only functional occasionally (refer to Table 5.8). Thus, those who live far away are forced to use contaminated water from rivers and fountains. Similarly, Nhamo *et al.* (2019) note that rural areas in SA still rely on surface water, which is usually contaminated. The municipality rarely sends a water tanker to deliver water to the Mkhukhuze municipality. Even when it does come,

it only reaches some of the community members. Thus, the respondents perceive the lack of water as a critical problem in Mkhukhuze.

Informal roads and unemployment indicate lack of development in Mkhukhuze. The respondents indicated that informal roads (gravel) lead to taxi owners increasing fares twice a year, as they also complain about the dangers of using their taxis on the informal roads. Unemployment rates are also escalating, so only some can afford to visit town regularly. According to Ndwedwe IDP (2022) the current youth unemployment rate is 58%. This is the reason as to why they go to town to do groceries once a month to avoid additional costs. Spaza shops in the community are also expensive, as shop owners complain about the delivery charges. In most cases, these 'spaza shops' store only some of the products needed in the community and lack services such as automated teller machines (ATMS) so community members can withdraw and transfer money. Spaza shops are shops found within communities of South Africa which cater for local community members in township and rural areas. This forces the community dwellers of Mkhukhuze to pay high travel fares to town in order to access such facilities.

The respondents also perceive Mkhukhuze as lacking sanitation, hygiene, electricity, and housing. Sanitation and hygiene are closely linked with water; thus, inadequate access to water results in a lack of sanitation and hygiene. In South Africa, most communities still rely on the bucket system as a latrine to relieve themselves (Melariri *et al.*, 2019). Respondents also stated that only a few households have built government-subsidised houses, commonly known as Reconstructed Development Programme (RDP) houses. Furthermore, many impoverished households still need to be added to the waiting list.

Teenage pregnancy is also an issue faced in Mkhukhuze. Many young girls are forced to drop out of school when they fall pregnant to care for their babies. This leads to an escalating generation of uneducated youth, further exacerbating unemployment. It also leads to a growing number of incidents such as crime in the community, which poses a threat to the sustainability of livelihoods. The respondents also highlighted that no rehabilitation programmes offered in the clinic or the community to counteract the growing issue of drug and alcohol abuse in Mkhukhuze, which is a threat to the youth, especially to young boys.

5.8.4.2 Venn diagram of the Mkhukhuze community

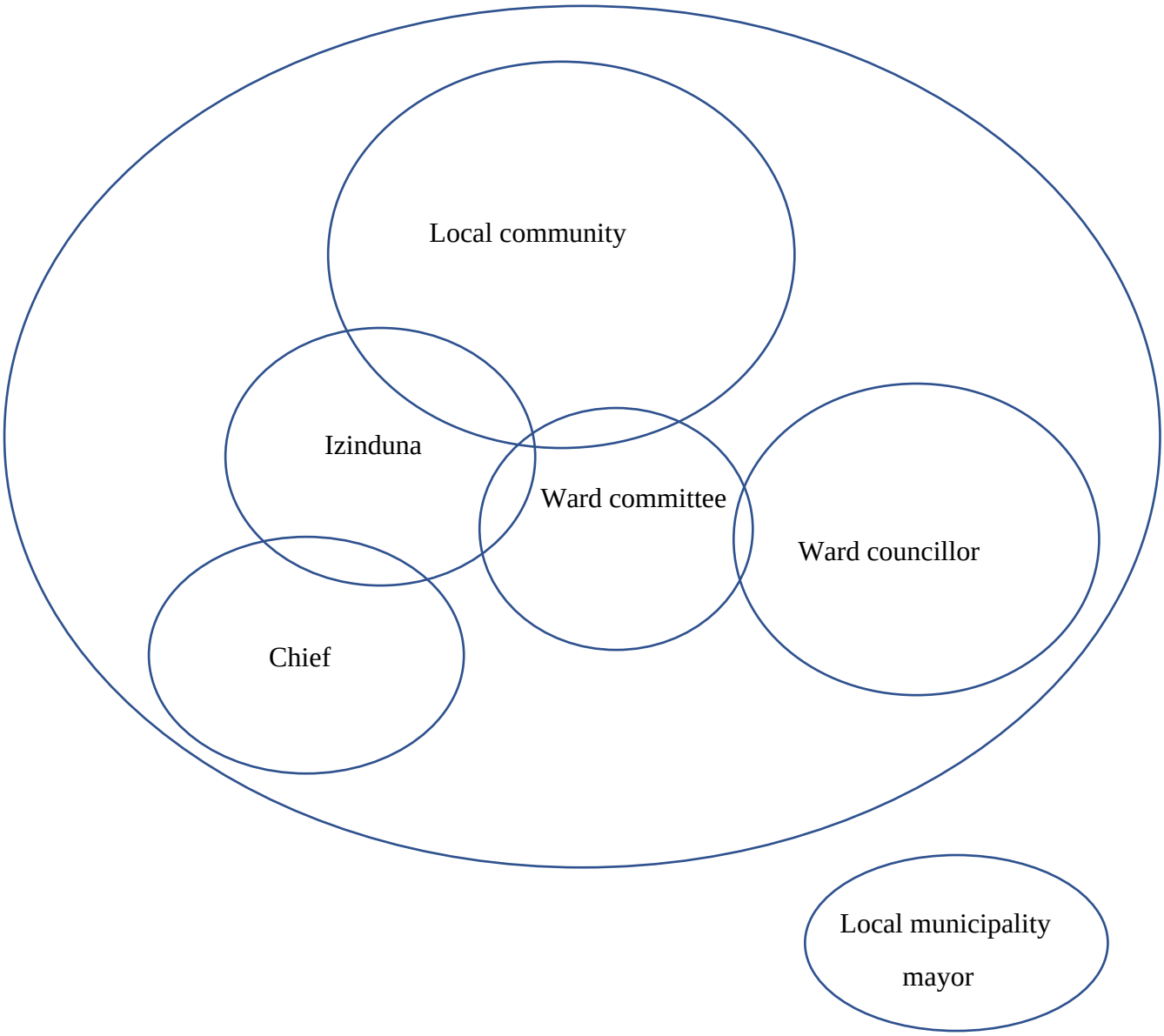


Figure 5.15 Venn diagram drawn by Mkhukhuze community

Figure 5.15 above showcases a Venn diagram drawn by the focus group held in the Mkhukhuze community. The respondents mainly interact with *izinduna* and the ward committee. The *izinduna* have more influence with the community than the ward committee. The local community of Mkhukhuze direct their concerns and issues with *izinduna*, who liaises these issues to their chief. The respondents perceived that traditional leaders listen to and act on their problems more than the ward committee and councillor. The ward committee's role is to direct issues the community faces to the ward councillor. However, the respondents perceive that the ward councillor is not doing enough to addressing the problems of the community.

For instance, when the local standpipe started leaking, they informed the ward committee, which needed to act efficiently to attend to it by fixing it. Only one community meeting was held to address this issue, and they promised to fix it. It has been years since this happened, and the standpipe is no longer functional. The respondents felt that the *izinduna* and chief are more approachable and act fast on their issues. The local municipality mayor works well with the ward councillor and does not interact with the community.

5.8.4.3 Mental map of the Mkhukhuze community

Figure 5.16 A mental map of the current facilities within the Mkhukhuze community

Figure 5.16 depicts the features drawn by the focus group within the Mkhukhuze community. The respondents of the Mkhukhuze community focus group consisted of only females older than 40 years of age. Figure 5.16 demonstrates a school, spaza shops, taxi stops, formal and rondavel houses, and the Emakhosini Sun Hotel, which provides the local with employment. This map also shows where the uMdloti River runs within the community and the spring water where people collect water for alternative uses. This river is contaminated with water which implies it is sustainable for the community. The Mkhukhuze community also has a sports ground, borehole, and standpipes. The standpipes have been dysfunctional for years which infringes on the community's livelihoods as this limits the water supply to the community. As a result, the community members rely on the borehole pump.

5.8.4.4 Transect walks of the Mkhukhuze community

Table 5.34 Transect walks observations in the Mkhukhuze community

Date	Time	Observation
02/06/2023 Friday	07:00-09:30	The line is getting longer at the borehole pump that is the main water source in this community. Some are coming back for the second time. The pump was installed by the municipality and is still functioning, as compared to other water supply infrastructures in Msunduze and Intaphuka. However, after a few people have used it, the pumps get strenuous and dysfunctional and cannot be used for about 20 minutes. This is the reason there is a long line.
	15:00-17:30	The school is out, and the learners are walking home after a hot day. They stop by the pump to drink water. They complain that the water has a metallic taste. Around 17:00 the line is long again some have returned from work and have to collect water for the next day.
03/06/2023 Saturday	07:00-09:30	I notice a young woman walking with an empty bucket towards a bush. I proceed to ask her where she is going, and she tells me she is going to fetch water from a natural spring of water down at the bush. I follow and upon reaching there I realise how contaminated the water is. She tells me that livestock also drink water in this spring of water, and so she only uses this water for laundry and not drinking. On my return, I notice animal tracks which confirms that livestock also drink water from this fountain.
	15:00-17:30	It seems as though some households have access to piped water in their households as I notice a boy collecting water from a tap within the household. I am told they are connected to the pipe that was installed when they installed taps in most households, however, many households' taps have not received water for several years. It is quite surprising that some households still have taps in their households.
04/06/2023 Sunday	07:00-09:30	During the walk I walk past a group of women with firewood on their heads. They have just returned from fetching firewood from a bush that is a km away. They look

		exhausted. They prefer conducting this activity in the morning to avoid the afternoon heat and snakes.
	15:00-17:30	The residents have been informed by the councillor that the water tanker will be coming later in the day to deliver water. Almost everyone has their buckets and bottles ready by the road. The last time they had water delivered was in March after their protest regarding inadequate access to water. The water tanker comes and makes its first stop, people run towards it. After 40 minutes the tanker is empty and promises to come back for the second round to the next stop. The water tanker did not return.
09/06/2023 Friday	07:00-09:30	There are two cars by the borehole pump. These people have to drive from their households to the pump to collect water. Fortunately for them they are able to collect as much as they can in their buckets and bottles depending on the storage space of the car. However, it is unfortunate that they have to actually drive to fetch drinking water since their taps have been dry for a long time.
	15:00-17:30	There is also a damaged and dysfunctional standpipe about a kilometre from the borehole. This standpipe used to provide water to more than 20 households when it was functional. There had been several meetings with the ward committees and councillor about the leakage of the standpipe, however, it has now been damaged and vandalised.
10/06/2023 Saturday	07:00-09:30	In the uMdloti River that passes the community there are women collecting water in their buckets. They prefer using this water for cleaning and washing and not drinking since it is contaminated. People discard their waste and perform their rituals in this river and therefore cannot be used for drinking.
	15:00-17:30	It is a cold afternoon and I walk past a boy setting a fire outside. There is garbage next to the fire which proves that he is about to burn the waste. This is a common practice in this area as the refuse disposal is not collected by local authority or any private companies.

11/06/2023 Sunday	07:00-09:30	It is around 07:00 and I walk past a woman and her children doing laundry at their household. The little children are washing blankets by stamping with their feet to remove excess dirt. The teenage girl's role is to fetch water from the river. Others are in the river doing their laundry and rinsing in the running water.
	15:00-17:30	It is the afternoon and there are only a few people in the river and the borehole. They are collecting water to store for the upcoming week, especially for their children who go to school.

5.9 Chapter summary

The data obtained from this study's data collection process was presented, analysed, and discussed in this chapter. The results indicate that the four communities, respectively require access to piped water, basic sanitation, and proper hygiene. Communities receive limited water infrastructure from the municipality. Often, communities have resorted to violent protests to gain the municipality's attention. Communities have no choice but to access water from rivers and streams, which are usually contaminated, further exacerbating the risk of contracting waterborne diseases. Pit latrines with and without ventilation are the typical sanitation facilities in the four communities, and most respondents do not practice safe hygiene despite living under the COVID-19 pandemic. Most households are female headed, with the onus of fetching water being placed on women and female children.

These findings aligned with the literature, arguing that rural areas still lack WASH compared to urban areas. The lack of these services in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities, respectively, proves that service delivery in rural areas needs to be stronger, with the blame on the local government. This is also emphasised in the results from the problem ranking exercise, where communities ranked the issues faced in their respective communities. Lack of water was one of the most ranked problems faced in the four selected rural communities. Venn diagrams showcased the hierarchy of institutions within the four communities while mental maps drawn by the respondents were also presented. This chapter also included observations from the transect walks conducted in the respective four rural communities such as Msunduze, Intaphuka, Kwazini, and Mkhukhuze, respectively, which helped the researcher to understand the issue of WASH provision within the four rural communities.

CHAPTER SIX
SUMMARY, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

The previous chapter presented and analysed the data collected from community members from the four selected rural communities of NLM namely Msunduze, Intaphuka, Kwazini, and Mkhukhuze, KwaZulu-Natal. This research aimed to assess the community perceptions regarding challenges associated with water and sanitation in the four communities as listed above. The data was collected through the administration of four hundred questionnaires (one hundred in each respective community) and through participatory rural exercises within focus groups of ten female respondents in each respective community. The questionnaire data was analysed through SPSS version 28 while the PRA data was analysed thematically using four methods (problem ranking matrix, Venn diagram, mental maps, and transect walks) and elaborated upon in the previous chapter. This chapter provides a summary of the key findings through reviewing literature and linking to the objectives of this study. Furthermore, the conceptual reflections are also explored in this chapter. In addition, this chapter provides the recommendations and conclusion of the entire research.

6.2 Summary of key findings

A summary of the key findings of this study will be presented and discussed in the context of the objectives of this study:

6.2.1 Objective One: To review the barriers to WASH in SSA.

This objective aimed to review and capture barriers to WASH in SSA. Reviewing literature identifies significant themes associated with a topic while identifying limitations and gaps of prior research (Lim *et al.,* 2022). Existing literature was reviewed extensively in chapter two in the form of a review paper. Chapter two focused on the barriers and effects of WASH in SSA. A barrier is known as anything that hinders access and or use of WASH facilities and causes the use of these facilities in a way that is unacceptable (White *et al.,* 2016). The barriers can be categorised into institutional, economic, political and geographical. Institutional barriers are challenges embedded in weak policy coordination between government agencies and other institutions, poor implementation of laws and regulations, lack of planning, and inadequate participation of communities (Sinharoy *et al.* 2019; Amokwandoh *et al.* 2020; Kulanyi *et al.* 2021). The economic barrier is linked to the underfunding of the WASH sector in SSA (WHO,

2022). Political barriers explore the political factors that present barriers to the implementation of WASH policies such as corruption and adoption of neoliberal policies (Ohwo, 2019; Breen and Gillanders, 2021). Geographical barriers relate to the location of a settlement being a factor the affects the accessibility, availability, development, and implementation of WASH. Settlements located on the outskirts of the city, usually informal settlements and rural areas receive less provision of WASH when compared to its counterparts (Roche *et al.,* 2017; Armah *et al.,* 2018; Sinharoy *et al.,* 2019; Zerbo *et al.,* 2021)

Subsequently, the chapter also examined the coverage of WASH services in SSA during the MDG and current SDG period to demonstrate its progress in meeting the targets. The findings of the review were that the region needs to make faster progress in meeting the SDG targets, and there are also ongoing disparities between urban and rural populations, with rural areas receiving less WASH services than urban areas. In addition, this means that urban areas are prioritised more so over rural areas regarding the expansion of proper WASH provision. The consequences of poor WASH services, and the relationship between poor WASH and associated waterborne diseases are also discussed in the review. Recommendations are also provided in the review which include promoting community involvement, building stakeholder partnerships, and increasing investment in WASH infrastructure.

6.2.2 Objective Two: To assess the impacts of poor WASH on relevant diseases in rural SSA.

This objective assessed the impacts of poor WASH on relevant diseases in rural SSA. Studies have shown that poor WASH access is a great contributor to waterborne diseases such as diarrhoea, cholera, and typhoid fever in SSA (Nienie *et al*., 2017; WHO, 2017b; Karjanja, 2021). As a result, diarrhoea accounts for the leading deaths in children under five years globally, particularly in rural SSA (Peter and Umar, 2018; Wolf *et al.,* 2019). South Africa is no exception to this as numerous outbreaks of diarrhoea and cholera cases have occurred over the years due to consumption of poor WASH (Mackintosh and Colvin, 2003; Hemson and Dube, 2004; Edokpayi *et al.,* 2017; Edokpayi *et al.,* 2018).

Furthermore, the questionnaire results revealed that most respondents in the Msunduze, Intaphuka, and Kwazini communities stated that their water is not safe to consume from the source without any treatment. The main questions pertaining to this objective involved determining the type of household sanitation, contracting diseases due to poor sanitation,

identifying the most vulnerable groups, and practising hygiene during the COVID-19 pandemic.

Most households in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities use pit latrines without ventilation as their toilet facilities. Some households practise open defecation as they do not have any toilet facilities. These figures are also emphasised by the iLembe IDP (2021) as it highlights that rural communities in the district still depend on pit latrines or in most cases no sanitation system, which poses a massive risk on the environment and health. Although the minority of respondents stated they have contracted diseases due to poor sanitation, this has been an issue in many impoverished communities in SSA and cannot be overlooked. As is, Martinez-Santos (2017b) asserts that many hospital wards worldwide are occupied by people suffering from diseases associated with poor water and sanitation, with increasing fatalities due to consuming contaminated water.

Some respondents and their family members in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities stated they had contracted diseases due to poor sanitation. Poor WASH services significantly contribute to water-borne diseases, allowing for easy transmission of various diseases and respiratory infections (Roche *et al.,* 2017; Wolf *et al.,* 2019). The majority of respondents have suffered from diarrhoea and COVID-19. Diarrhoea is one of the most common diseases caused by poor sanitation due to consuming contaminated water, caused mainly by open defecation (Peter and Umar, 2018). Children and women are vulnerable to contracting diarrhoea as they are mostly burdened with water-related chores. Worldwide, diarrhoea is known to be the primary cause of mortality in children under five worldwide and kills more children than any other disease (Null *et al.,* 2018; Wolf *et al.,* 2019).

Although basic hygiene, such as hand washing with water and soap, is the most practical way to curb the transmission of COVID-19 (WHO, 2019), an overwhelming majority of respondents across the four communities do not practice safe hygiene during the pandemic. However, the SSA population is expected to be more vulnerable to the virus due to insufficient access to improved WASH services. This is also reinforced by Kayode *et al.* (2020), who highlight that most rural areas in SSA lack access to basic handwashing facilities and sanitation systems, which places them at greater risk of contracting the disease.

6.2.3 Objective Three: To analyse the local community perceptions on the state of WASH provision in the four selected rural communities in NLM, KwaZulu-Natal.

The aim of this study was to assess the community perceptions regarding the challenges associated with water and sanitation. Therefore, it was imperative to explore the perceptions on the state of WASH provision within the four selected communities. Quantitative and qualitative research methods were utilised to acquire the perceptions of the locals on the state of WASH provision. Overall, the respondents perceive lack of WASH provision within the rural communities. Regarding water provision, the respondents from the four rural communities believe the local municipality is not doing enough to tackle the issue of water shortages in the communities. Despite the municipality installing meters and taps in households, community members have not received reticulated water for over six years (Majola, 2021). The findings from the questionnaire survey and problem ranking matrix demonstrated that lack of essential water and sanitation is a major problem in these communities. During the problem ranking exercise, the communities across the four communities mainly ranked lack of: water, sanitation and hygiene as the most prominent issues they faced, respectively.

There is lack of piped water within the communities with many households relying on alternative sources for water. These alternative sources, mainly rivers and streams, are not sustainable and safe as they are shared with livestock which means they are highly contaminated. This poses a threat to their health as they are vulnerable to diarrhoea and cholera diseases. Only the Mkhukhuze community has a functional water supply, which is a borehole. However, this borehole fails to cater to all as some households are located further from this water source. In addition to water provision, access to proper sanitation and hygiene facilities also lack within these communities. Communities are still subjected to unimproved sanitation facilities such as pit latrines without ventilation, with some households still practicing open defecation. Due to lack of running water within the households, the locals cannot practice proper hygiene (handwashing with soap and water) which makes them vulnerable to outbreaks such as COVID-19.

The respondents perceived the lack of municipal action and infrastructure as the major obstacles in communities needing access to water. Toxopeüs (2019) asserts that local municipalities in South Africa are obligated to provide essential water and sanitation services as well as take the responsibility to ensure the realisation of this right. However, local

municipalities have been falling behind as they often face problems with water infrastructure maintenance and sanitation services (Emily and Muyengwa, 2021). The respondents mentioned that the local municipality does not prioritise the issue of water in the rural communities despite several calls and protests from the locals.

The results from the questionnaire also reinforced that gender plays a crucial role in determining access to governance of WASH services. Across all four communities, the female children and mothers are responsible for water collection. Sweetman and Medland (2017) argue that women shoulder more responsibility in the WASH sector when compared to men. While this might not necessarily relate to the cause of inadequate water and sanitation in the four communities, it is vital to highlight the gendered patterns and the role females play in ensuring adequate water in rural households. Women and female children are most responsible for collecting water within the four communities. They walk long distances to the water sources, which impacts on the children's academic performance and other activities at home. They often undertake one or two trips per day due to the long distances. Furthermore, these trips are approximately more than 30 minutes each. The risks of travelling such long distances to the water sources cannot be ignored as women are more vulnerable to social and sexual violence while seeking water sources from unknown areas (Baker *et al.*, 2017).

6.2.4 Objective Four: To assess the effectiveness of the adaptive capacities used to counteract poor WASH in the four selected rural communities in NLM, KwaZulu-Natal.

This objective aimed at assessing the effectiveness of the adaptive capacities to counteract poor WASH. The findings from the questionnaire revealed that the four communities use various alternative water sources which are usually further from the main sources. These alternative water sources include rivers, rainwater tanks, water tankers, spring water (contaminated from livestock), and communal tanks. These alternative sources are not reliable as water gets depleted faster due to limited availability of water. A means to increase household accessibility, whereby households store water in storage tanks, steel drums, plastic drums and buckets.

Furthermore, the community members have also embarked on a mission to form strategies to counteract the issue of inadequate access to water. The critical questions about this objective included identifying and elaborating on community initiatives and identifying any external assistance received by the four communities. These communities do not receive any external assistance to counteract the issue of poor WASH provision. As a result, communities have

motivated different strategies to address WASH issues faced in the four communities. The main initiative proposed was to form a community-based approach to water provision. The community members have proposed that the locals should lead water projects, and they should have complete control over them. Etongo *et al.* (2018) highlights that rural dwellers having control over the operation, installation, and maintenance of water infrastructure creates long-term sustainability. Therefore, participation is key to the success of community-based water projects. In addition, the results also revealed there is no external support, such as NGOs and NPOs that support the communities. However, they highlighted that they need funding for their projects to prosper, preferably from an organisation that is part of the communities. Communities working with NGOs within their respective communities can ensure guaranteed implementation of projects as both these groups want what is best for the communities.

With projected increases for the demand for water, it is important to educate the public about sustainable personal water use and water quality threats (Seelen *et al.,* 2019). One way to achieve this is through engaging with citizens relating to water issues (Haklay *et al.,* 2021). As a result, community members have initiated plans and projects to counteract the issues of water shortages within the four communities such as Msunduze, Intaphuka, Kwazini, and Mkhukhuze respectively. These initiatives include raising awareness, delivering water to the poor, forming community-based projects, rainwater harvesting and cleaning rivers.

6.3 Conceptual reflections

This research adopted four conceptual frameworks namely SLA, political economy, political ecology and urban bias theory to understand the complexity of WASH within the four selected rural communities in NLM, KwaZulu-Natal. The key findings from this research will be evaluated in regard to the conceptual framework below:

6.3.1 The sustainable livelihoods approach

The SLA has become one of the common approaches used in rural research as it aims to understand the lives of the poor (Serrat, 2017). This approach is rooted in rural community engagement and participation in all stages of projects such as initiation, development, and maintenance. SLA helps identify the assets local communities depend on, the risks they are vulnerable to, and the strategies they undertake in their lives to alleviate poverty. This approach is strength-based and not needs-based (Mazibuko, 2013). Moreover, this approach focuses people at the core of development as it argues that things should happen based on people's

assets and what they possess to enhance their livelihoods . Therefore, community members should be recognised as relevant stakeholders regarding access to water and sanitation in NLM, KwaZulu-Natal. This study utilised the SLA by exploring the community perceptions regarding challenges associated with water and sanitation as well as coping strategies used in response to the issues of insufficient access to water and sanitation. In doing so, this study investigated how the community members utilise their assets and capabilities to sustain their livelihoods.

As one of the main principles of SLA is that it is people-centred, this study utilised the PRA methods within the four communities to engage with the community members and gain their insights. This aimed to put the rural community members at the core of the study. The use of different methods such as problem ranking matrix, Venn diagram, mental maps, and transect walks was useful as new insights was gained for this research. These methods ensured the concerns of community dwellers were heard and taken into consideration.

In addition, this approach is embedded in five assets namely financial, human, social, and natural. Financial capital relates to the means of purchase of water which is secured through access to credit for provision of connections to the service. According to the findings of this research, the Intaphuka community had the majority of respondents (38%) who stated that they have been forced to purchase water due to its unavailability. As such, all the respondents have purchased water in vendors nearest to their area. These findings imply that these communities can sustain their livelihoods as they have access to financial capital. However, with widespread unemployment in NLM and across the communities (Ndwedwe IDP, 2022), many households might lack economic development which infringes on sustaining their livelihoods.

Human capital includes the knowledge and access to education which enhances decisions for gaining access to water. Regarding education levels, majority of the respondents across the four communities did not complete secondary school, with the Kwazini community leading in this category forming 66% of respondents. Although, these respondents may have some education, this might not be enough in ensuring community decision making for gaining access to water. Usually in development projects, requirements range from holding a matric certificate or a tertiary qualification. Therefore, if the majority of the community members lack this requirement then they are unlikely to be incorporated into these projects. In addition, changes in human capital are likely to affect other factors that account for assets. For instance, having skills, knowledge, or a good education can positively impact the ability of people to earn a

living, which affects their financial capability to sustain a livelihood. Therefore, if one lacks proper education then he or she lacks proper employment. This implies that he or she will not afford buying water in times of need. In addition, human capital also relates to good health. Most of the respondents were not living with a disability. However, a significant percentage of respondents had health issues such as influenza, diabetes and sinus infection. Having sickly family members adds the burden towards the family as improved WASH is required to treat the vulnerable people. These further strain the availability of water within a household.

Social capital includes creating opportunities to raise awareness and safety-net structures within the four rural communities to ensure the poor have access to water. Regarding the community initiatives taken by the community members of the four rural communities, a substantial percentage of responds mentioned that one of the initiatives was raising awareness within their respective communities. The Mkhukhuze community had 45% of respondents who stated they have raised awareness to educate community members on the effects of water shortages, and 40% in the Msunduze community. Additionally, both these communities also initiated to deliver water to the poor within their respective communities. This implies that these communities have means of sustaining their livelihoods as they have access to this asset.

Natural capital determines water availability in water sources such as rivers and streams within the four selected rural communities, while physical capital unpacks the water and sanitation infrastructure available within the four communities. These two assets are interlinked in this study as the results depicted that many households rely on rivers and streams as water sources due to lack of functional water infrastructures. The Intaphuka community had the majority of respondents (61%) whose households depend on rivers. This was also the main category for the Msunduze and Kwazini community, except for the Mkhukhuze community who had a significant percentage (41%) of respondents who rely on borehole water. This is the only community with a reliable water infrastructure as the Msunduze and Intaphuka communities have dysfunctional standpipes which have not been functional for years. Thus, the community members within these communities are forced to collect water from rivers and streams. It is evident from these findings that these communities lack access to these assets. This infringes on their livelihoods which result to poverty within communities.

The SLA therefore emphasises the importance of water for sustainable rural livelihoods. The various benefits of water show the importance of enhancing rural economies which is applicable to the four selected rural communities of NLM. However, these communities lack

access to sufficient provision of water and sanitation. this implies that underdevelopment within rural areas is still an issue. As a result, this creates poverty within rural areas. The SLA was thus appropriate for this study as it is based on ensuring rural livelihoods are enhanced through gaining access to water.

6.3.2 Political economy

The political economy approach rests on politics, power relations, governance dynamics and institutional configuration (Amable *et al.,* 2019). Political economy aims to connect political and economic procedures within a society. These procedures may cover different cases, such as water distribution, water reforms or implantation of laws (Cohn and Hira, 2020). The interaction between politics and economics thus centres the question of power, resources, and how these aspects are distributed in different areas or circumstances. It is widely recognised that rural communities' struggles are mainly due to the pursuit of power and influence by a variety of private and public actors (Cohn and Hira, 2020). Therefore, political economy understands that the quest for power and control over resources results in the subjection of rural communities of developing countries to poverty.

Adopting a political economy approach was to understand the role of politics, power relations, and governance dynamics in the water crisis within the four selected rural communities. The interaction between politics and economics centres the question of power and resources and how these aspects are distributed in different areas or circumstances (Cohn and Hira, 2020). Monetary is power, and nowadays, access to resources requires money. As the findings reveal that some households have been forced to purchase water due to its unavailability, this has placed a strain on these households as they either depend on wages or social grants as their main source of income. This money is not sufficient to cater for their families as well as purchase water. Clearly, impoverished communities, usually in rural areas, such as in the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities, lack access to adequate water simply because they do not have the means to pay for it. This is also highlighted by a study by Wrisdale *et al.* (2017), which mentions that rural dwellers in South Africa are vulnerable to water insecurity because they lack the power to pay for water services. Privatising water expands the gap between those living in poverty and the wealthier which often leads to water conflicts. Moreover, the pursuit for power has also facilitated corruption within the WASH sector. Respondents also highlighted that water tankers have been selling water to households

illegally. This has further led to conflicts within communities as vulnerable households lack the earning potential and cannot afford the basic service.

6.3.3 Political ecology

Similar to political economy, the political ecology approach was adopted to demonstrate how lack of water is not defined by the unavailability of water due to environmental hazards such as climate change but as a result of challenges associated with power dynamics and relations based on race, class, ethnicity, or geographic location (LaVanchy *et al.,* 2017). This uneven power perpetuates injustices as the majority suffer while benefitting the minority who can pay for water services. The majority, who are based in underdeveloped rural areas, require more water access due to their lack of power.

In the context of this study, political ecology demonstrates that the physical amount of water does not define lack of access to water. Notably, NLM has faced environmental hazards such as droughts and floods in recent years (iLembe IDP, 2021; Daily News, 2022). As a result, from the 2022 floods, water systems were destroyed which placed vulnerable groups within NLM without proper water supply. The recent droughts are also attributed to the decrease of water amongst communities within iLembe District and NLM (iLembe IDP, 2021). Some respondents also blamed lack of rain as the main cause of insufficient water within the four communities. However, results also show that despite these environmental hazards, some communities and households still have access to piped water and functional infrastructure such as the borehole within the Mkhukhuze community. These findings highlight how politics play a role in the distribution of water within these four communities. The results show that water is available but only for a privileged few leaving the masses without this basic service.

6.3.4 Urban bias theory

The literature review of this study discusses the bias in access to WASH between urban and rural areas at great lengths. Even though SSA lags behind in meeting the universal water coverage, it accounts for the highest inequality between urban and rural areas regarding WASH provision (Roche *et al.,* 2017, Armah *et al.,* 2018; Ohwo, 2019). Studies show that WASH services are provided better in cities in comparison to rural areas in developing countries (Mulenga et al., 2017; Adams and Smiley, 2018; Ohwo, 2019). Cities have access to drinking water through piped systems, while most rural dwellers still rely on surface water (Adams and Smiley, 2018; Ohwo, 2019). Rural areas still rely on contaminated water, while urban areas

have access to proper water (piped systems) in their households (iLembe IDP, 2021). However, informal settlements and slums are no exception to poor provision of WASH as they also experience water shortages and subjected to poor in-situ communal sanitation facilities in South Africa and SSA (Pieterse, 2014; Pan *et al.*, 2018; Twani and Soyapi, 2022).

Nevertheless, the disparity between urban and rural areas is quite evident in the developing world. The findings of this study reveal that there is a distortion in resource allocation and service delivery between rural and urban areas, as it is evident how rural areas such as Msunduze, Intaphuka, Kwazini, and Mkhukhuze, respectively need more water provision when compared to urban areas. The uneven distribution of water is also closely linked to the urban bias theory adopted in this study. This theory argues that the needs of rural areas are overlooked and underserviced compared to their counterparts (Arias, 2020). This is also emphasised by the iLembe IDP (2021) by noting that services such as waste management practices in rural areas are poor as refuse removal is only limited to cities of KwaDukuza Local Municipality. This proves that rural underdevelopment is not solely through economic and political aspects but through skewed infrastructural development and poor service provision

6.4 Recommendations

Suggestions to address the challenges associated with water and sanitation have been integrated into the discussion throughout the previous chapters. Additionally, the following recommendations of this study are forwarded below:

6.4.1 WASH policy implementation and reform

The key findings in this study highlight that the rural communities of Msunduze, Intaphuka, Kwazini, and Mkhukhuze lack access to safe water and sanitation. This is reiterated by literature from Roche *et al.* (2017), who mention that rural areas are far from reaching the water goal as they still need to gain safely managed water coverage. Apart from water supply, rural areas need to catch up regarding any service delivery across SSA compared to urban areas. Therefore, it is essential to implement strategies to address these inequalities and ensure adequate provision of water in rural areas.

Omisore (2018) argues that the SSA region is where it is today due to the legacy of past policies, particularly implemented during colonialism and apartheid. It is thus vital to formulate and implement appropriate policies to address the water issue. Certain countries in the region have formulated policies to improve WASH services, such as the Water Supply and Sanitation

Act of 2009 in Tanzania and the Ministry of Sanitation and Water Resources in Ghana (Bishoge, 2021). In the post-apartheid South African context, the recognition of the right to sufficient water has seen further developments in the national legislation such as the establishment of the National Water Act (Act 26 of 1998) and Water Services Act (Act 108 of 1997) (Toxopeüs, 2019; Meissner *et al.*, 2018; Pahl-Wostl, 2019). These legislative frameworks were to amend apartheid discrimination, promote equal access to resources and give a voice to the public through cooperative governance (Hove *et al.*, 2019). The national government's constitutional mandate is the administration and custodianship of the country's water resources (Meissner *et al.*, 2018). This makes it the responsibility of the DWS for the bulk management of the country's water resources (Clifford-Holmes *et al.*, 2017; Mofokeng, 2017; Meissner *et al.*, 2018; Rawlins, 2019; Makaya *et al.*, 2020). Regarding hygiene and sanitation, the National Sanitation Policy of 2016 ensures that all institutions (public and private) are responsible to provide proper sanitation which includes handwashing facilities (Coetzee and Kotzé, 2018).

It is important to note that even though these policies have been implemented, they have yet to trickle down and reach communities, predominantly rural areas such as Msunduze, Intaphuka, Kwazini, and Mkhukhuze. These community members have been living without reticulated water for years despite living in a country that affords everyone the right to access sufficient water (Majola, 2021). Many communities have to rely on contaminated rivers and streams, which further exacerbate poverty. In the future, policies should be developed to specifically target rural communities. The legacy of past injustices such as apartheid and colonial regimes should be taken into consideration when developing these policies so that the background conditions of these communities are also attended to. These policies should address the barriers to WASH in rural communities and consider ways to improve access to WASH services. In addition, rural communities should also be included in the formation of such programmes as they are the key stakeholders in WASH management.

6.4.2 Empowering and educating rural communities

In the whole process of providing safe water for local communities, it is imperative to acknowledge the involvement of the locals. This is because they are the ones who have the capacity to initially identify potential sources and at the same time manage these sources to become efficient and sustainable (Etongo *et al.*, 2018). The inclusion of communities in water projects has had positive outcomes regarding the distribution of water (Whaley and Cleaver,

2017; Ambuehl *et al.*, 2022). Literature emphasises that community water projects implemented outside the community are most likely to fail due to the absence of understanding the needs of communities (Etongo *et al.,* 2018; Herrera, 2019). Projects need to consider local and indigenous laws and customs as they can produce better services than foreign laws imposed by external factors. Herrera (2019) argue that SDG 6B also encourages local participation in water projects to ensure adequate access to water. Thus, local participation increases acceptance and use of the project as well as improved management of community-based safe water infrastructure.

For rural communities to receive safe water, infrastructure regarding distribution water such as boreholes, wells, and hand pumps must be operated and maintained. These systems need regular cleaning, repairs, and replacements of parts to work properly and effectively. Rural dwellers within NLM can be trained in monitoring and maintaining such systems. Educating the communities and providing them sufficient knowledge and skills in the management and maintenance of these resources is essential as they are the end users and have the biggest responsibility in maintaining these sources while identifying key stakeholders to help them in the process. Community ownership and accountability promote sustainability (Etongo *et al.,* 2018). Therefore, community involvement and training are crucial in increasing water provision within rural communities.

6.4.3 Reducing corruption in rural water distribution

Fighting water corruption while focusing on the needs of the poor presents a tremendous challenge. It means changing a system that favours powerful vested interests and making it more accountable to the needs of society's weakest citizens (economically, politically and socially) (Sohail and Cavill, 2008). In the case of NLM, truck drivers transporting water have been selling water to residents within the four communities which is an act of corruption. This has led to conflicts among rural dwellers as those that lack the earning potential are further marginalised. Reducing corruption within water distribution should involve building mechanisms for citizen participation and monitoring. Citizens can provide essential input to water policies and check the performance of both private and public water utilities (Sohail and Cavill, 2008). Civil society should be encouraged to be vigilant in their areas, and supported when they identify issues that need to be addressed (Muller, 2020).

Strong regulatory oversight and performance-based monitoring must be implemented for both the public and private sector. Both the local municipality and owners of tankers carrying water

must abide by clear pro-poor objectives, and be subject to independent oversight by auditors and regulators with investigative authority and enforcement power. A culture must be established in which it is expected that misconduct will have consequences. At a formal level, this is the responsibility of the Auditor-General and the broad family of law enforcement authorities, including agencies such as the Special Investigating Unit (Muller and Erasmus, 2020). The Auditor-General and law enforcement institutions should support the processes of tackling corruption in the sector and government's communication agencies must reflect this.

Rights are the ultimate guarantor of equality. When enforced, a legal right to water can be an important mechanism for poorer communities. At the country level, states should create their own legal commitments by incorporating the right to water into specific sectoral policies and government laws. Once passed, the court system can be used as the channel for enforcement. In Argentina, for example, community members, with the help of a human rights NGO, took the municipality and state of Cordoba to court over failing to stop daily spillage from a sewage treatment plant that contaminated their drinking water (Gorsboth and Wolf, 2005). In 2004, a court ruled in the citizens' favour and both the state and municipality were forced to take action. Similarly, residents with the four rural communities must realise their right to water and seek assistance from external NGOs to ensure that the municipality fulfils its responsibility of equally distributing water to all communities.

6.4.4 Promoting water treatment methods within rural communities

For communities in developing countries, the majority of drinking water-related issues are due to pathogens from poor sanitation, resulting in infection and diarrhoea (Abubakar, 2018; Peter and Umar, 2018; Wolf *et al.,* 2019; Nguyen *et al.,* 2021). One cause of this is that these communities often do not have access to centralised water treatment facilities (Hemson, 2016; Edokpayi *et al.,* 2018). This is also an issue in South Africa as studies have shown that water treatment plants in rural systems do not meet the requirements of the South African National Standards for the quality of drinking water (Mackintosh and Colvin. 2003; Momba *et al*., 2006; Odiyo and Makungo, 2012; Mpenyana-Monyatsi *et al.,* 2012; Hemson, 2016).

Treating drinking water in rural regions so that it is safe for human use is a complex task that calls for the integration of technology, community involvement, and environmental awareness. Utilising local water sources and putting in place good filtration and purification systems is the initial stage. The second step in designing a safe drinking water system is to select and design the appropriate treatment methods to ensure that the water meets the required standards and

guidelines for human consumption. Although there are various advanced water treatment technologies available, rural areas should promote low-cost point of use treatment systems such as flocculation and coagulation, filtration, and disinfection (Pooi and Ng, 2018). The treatment methods depend on the quality and characteristics of the water source, as well as the level of service and affordability of the rural community. Flocculation and coagulation remove the turbidity in the water, which eradicates the supporting structure of microorganisms (Ramavandi, 2014). Filtration removes microorganisms by size exclusion, whereby microorganisms larger than the pore size of the filter will be retained within the system and discarded (Thomas *et al.,* 2022; Malik *et al.,* 2024; Dulta *et al.,* 2024). Disinfection is usually the last step in the drinking water treatment process as it kills or inactivates pathogens that cause human sickness (Collivignarelli *et al.,* 2017; Gelete *et al.,* 2020). These treatments are suitable for rural communities as they are: user-friendly, low-cost and maintenance, as well as effectively treat and reduce the presence of pathogens in water supplies (Pooi and Ng, 2018).

Involvement from the community in water treatments is necessary as protecting water supplies and teaching people how to use water wisely is crucial (Gleitsmann, 2005; Hove *et al.,* 2019). The ultimate objective is to guarantee that clean water is always accessible in rural areas, while also reducing waste, encouraging individual initiative, and protecting scarce water supplies for future generations. Maintaining sanitary water supplies also requires community effort and education. Water recycling, decreasing leaks, and investing in cutting-edge treatment technology are also some examples of sustainable measures. Furthermore, a future where everyone has access to safe drinking water while protecting water resources is made possible by policies that promote equitable distribution, conservation, and infrastructure investments.

This study recommends that future research must:

- Collect data from a larger sample size in rural communities in order to obtain results that cover a larger population area. This will promote a cross-sectional study of different rural areas within provinces in South Africa. This will also enable more comparative studies which can help identify WASH challenges in various rural communities.
- Also perform stakeholder analysis by incorporating relevant stakeholders within WASH studies to gather their perceptions regarding the challenges they face in providing WASH services within rural communities.

- Include diverse themes in order to holistically assess the challenges of accessing WASH in rural communities.

6.5 Contribution of this study to the field

This thesis deliberated the gaps in the insufficient provision of WASH services within the Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities, respectively. This thesis highlighted that lack of access to adequate water and sanitation is endemic to South Africa and other countries in the SSA region. Rural areas still rely on contaminated rivers and running streams while using poor sanitation. There needs to be better hygiene awareness in rural areas, as many do not practice handwashing with soap and water.

Municipalities are failing to supply sufficient water to rural areas. Thus, an integration of relevant stakeholders is necessary to ensure improved water provision. Therefore, a means a call to include communities as a stakeholder is necessary. Communities should be involved during the development and planning of water supply projects. The involvement of rural dwellers is essential to better recognise the challenges experienced within communities and ensure appropriate strategies. This thesis has thus highlighted the role of community members in the rural water supply sector, as the participation of locals leads to the long-term sustainability of water infrastructure.

Triangulation was used as a methodological approach. This approach requires collecting both quantitative and qualitative data to grasp people's knowledge and insights into the communities of Msunduze, Intaphuka, Kwazini, and Mkhukhuze. The respondents initially showed hesitance to disclose information when answering the questionnaire survey but were reassured that their identity would not be disclosed. However, during the participatory exercises, the respondents were approachable as they were allowed to verbalise about their issues at greater length. Thus, the results of this research highlight the importance of community inclusion and their role in decision-making. Even though a partnership of stakeholders is needed to address water and sanitation issues, communities should be the main stakeholders consulted during rural water development to ensure sustainability.

6.6 Conclusion

Although there has been slight progress with meeting the SDG 6 water and sanitation targets, many rural areas are still lagging when providing these services. This research's findings show that rural areas such as Msunduze, Intaphuka, Kwazini and Mkhukhuze, respectively still lack

proper water coverage, improved sanitation and good hygiene services. While many implementations in the form of policies have been formed to counteract these issues, it has come into focus that these policies have not been effective enough to address the water crises in rural areas. Rural dwellers in the Msunduze, Intaphuka, Kwazini, Mkhukhuze, and other rural areas in the developing context are still subjected to open defecation, which leads to the contamination water bodies and did not have proper hygiene services in their homes.

The lack of participation from community members in the four selected rural communities is evident as these areas lack adequate access to WASH. The community members perceived being involved in decision-making regarding WASH as a significant contributor to the lack of service provision. However, it must be acknowledged that even though the NLM has installed infrastructure to help communities access water, those infrastructure have been damaged and no longer of use. This highlights how the municipality is lacking in providing services to the communities.

These findings highlight how the South African government should intervene in current policies that deal with water and sanitation, specifically in rural areas. An umbrella of policies is not ideal, as rural communities are heterogenous and diverse in their rights. Therefore, it is important for policies to be specific to each community to ensure that each community is provided with adequate water and sanitation services. While drafting these policies, communities should be prominent stakeholders in this process. Communities should also be empowered and educated in managing and maintenance of water infrastructure to ensure the sustainability of the infrastructure. In addition, the involvement of communities in reducing corruption in rural water distribution and water treatments is also essential to ensure adequate provision of water to rural communities.

REFERENCES

Abdinor, S.A., Ahmed, M.S., Mohamed, M.I., Abdirahman, A.A., Ahmed, U.A., Saman, A.M.N., Shegow, A.H.H., Hajir, A.Y., Aweys, M. and Abukar, M., 2021. Perceptions of Medical Professionals on the Recurrence of Cholera in Baidoa District, Bay Region, South-West State of Somalia (SWSS). *Journal of Medical and Dental Science Research*, *8*(7), pp.52-61.

Abrams, A.L., Carden, K., Teta, C. and Wågsæther, K., 2021. Water, sanitation, and hygiene vulnerability among rural areas and small towns in south Africa: Exploring the role of climate change, marginalization, and inequality. *Water*, *13*(20), p.2810.

Abu-Bader, S.H., 2021. *Using statistical methods in social science research: With a complete SPSS guide*. Oxford University Press, USA.

Abubakar, I.R., 2018. Exploring the determinants of open defecation in Nigeria using demographic and health survey data. *Science of the total environment*, *637*, pp.1455-1465.

Adams, E.A. and Smiley, S.L., 2018, November. Urban-rural water access inequalities in Malawi: implications for monitoring the Sustainable Development Goals. In *Natural Resources Forum* (Vol. 42, No. 4, pp. 217-226). Oxford, UK: Blackwell Publishing Ltd.

Adams, E.A., Sambu, D. and Smiley, S.L., 2019. Urban water supply in Sub-Saharan Africa: historical and emerging policies and institutional arrangements. *International Journal of Water Resources Development*, *35*(2), pp.240-263.

Adedoyin, O.B., 2020. Qualitative research methods. *Principles of Social Psychiatry:*, pp.77-87.

Adesegun, O.A., Adeyemi, O.O., Ehioghae, O., Rabor, D.F., Binuyo, T.O., Alafin, B.A., Nnagha, O.B., Idowu, A.O. and Osonuga, A., 2020. Current trends in the epidemiology and management of enteric fever in Africa: a literature review. *Asian Pacific Journal of Tropical Medicine*, *13*(5), p.204.

Adom, R.K. and Simatele, M.D., 2021. Analysis of public policies and programmes towards water security in post-apartheid South Africa. *Water Policy*, *23*(3), pp.503-520.

Ajay, V.O., 2023. A Review on Primary Sources of Data and Secondary Sources of Data. *European Journal of Education and Pedagogy. DOI: http://dx.doi.org/19810.21091/ejedu.2023.VOL.2ISSUE.3*.

Akinola, A.O., 2018. Women, culture and Africa's land reform agenda. *Frontiers in psychology*, *9*, p.2234.

Akoteyon, I.S., 2019. Inequalities in access to water and sanitation in rural settlements in parts of southwest Nigeria. *Ghana Journal of Geography*, *11*(2), pp.158-184.

Alarima, C.I., 2018. Factors influencing rural-urban migration of youths in Osun State, Nigeria. *Agro-Science*, *17*(3), pp.34-39.

Algorani, E.B. and Gupta, V., 2023. Coping mechanisms. In *StatPearls [Internet]*. StatPearls Publishing.

Al-Saidi, M., 2017. Conflicts and security in integrated water resources management. *Environmental Science & Policy*, *73*, pp.38-44.

Amable, B., Regan, A., Avdagic, S., Baccaro, L., Pontusson, J., Van der Zwan, N., Amable, B., Regan, A., Avdagic, S., Baccaro, L. and Pontusson, J., 2019. New approaches to political economy. *Socio-economic Review*, *17*(2), pp.433-459.

Ambuehl, B., Kunwar, B.M., Schertenleib, A., Marks, S.J. and Inauen, J., 2022. Can participation promote psychological ownership of a shared resource? An intervention study of community-based safe water infrastructure. *Journal of Environmental Psychology*, *81*, p.101818.

Amokwandoh, M., Kunyegbe, T.A., and Ayi-Bonte, V., 2020. Identifying barriers to inclusion in WASH. Available at https://www.ircwash.org/sites/default/files/084-202013ghana_socialinclusiondefweb.pdf. Accessed on 20 November 2023.

Andrade, C., 2021. The inconvenient truth about convenience and purposive samples. *Indian Journal of Psychological Medicine*, *43*(1), pp.86-88.

Apine, E., Turner, L.M., Rodwell, L.D. and Bhatta, R., 2019. The application of the sustainable livelihood approach to small scale-fisheries: The case of mud crab Scylla serrata in South west India. *Ocean & Coastal Management*, *170*, pp.17-28.

Apuke, O.D., 2017. Quantitative research methods: A synopsis approach. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *33*(5471), pp.1-8.

Armah, F.A., Ekumah, B., Yawson, D.O., Odoi, J.O., Afitiri, A.R. and Nyieku, F.E., 2018. Access to improved water and sanitation in sub-Saharan Africa in a quarter century. *Heliyon*, *4*(11), p.e00931.

Arshed, N. and Danson, M., 2015. The literature review. *Research methods for business and management: a guide to writing your dissertation*, pp.31-49.

Asoba, S.N., Fiko, M., Makiwane, B. and Mefi, N.P., 2020. Water and sanitation challenges: The case of a rural South African municipality. *Academy of Entrepreneurship Journal*, *26*, pp.1-9.

Atun, R., Davies, J.I., Gale, E.A., Bärnighausen, T., Beran, D., Kengne, A.P., Levitt, N.S., Mangugu, F.W., Nyirenda, M.J., Ogle, G.D. and Ramaiya, K., 2017. Diabetes in sub-Saharan Africa: from clinical care to health policy. *The Lancet Diabetes & Endocrinology*, *5*(8), pp.622-667.

Awumbila, M., 2017. Drivers of migration and urbanization in Africa: Key trends and issues. *International Migration*, *7*(8), pp.1-9.

Ayuk, T.B., Carine, N.E., Ashu, N.J., Christine, N.A., Josette, E.V. and Roger, B.M., 2018. Prevalence of diarrhoea and associated risk factors among children under-five years of age in Efoulan health district-Cameroon, sub-Saharan Africa. *MOJ Public Health*, *7*(6), pp.259-264.

Baijius, W. and Patrick, R.J., 2019. “We don’t drink the water here”: the reproduction of undrinkable water for First Nations in Canada. *Water*, *11*(5), p.1079.

Baker, K.K., Padhi, B., Torondel, B., Das, P., Dutta, A., Sahoo, K.C., Das, B., Dreibelbis, R., Caruso, B., Freeman, M.C. and Sager, L., 2017. From menarche to menopause: A population-based assessment of water, sanitation, and hygiene risk factors for reproductive tract infection symptoms over life stages in rural girls and women in India. *PloS one*, *12*(12), p.e0188234.

Baldwin, J.R., Pingault, J.B., Schoeler, T., Sallis, H.M. and Munafò, M.R., 2022. Protecting against researcher bias in secondary data analysis: challenges and potential solutions. *European Journal of Epidemiology*, *37*(1), pp.1-10.

Banks, L.M., White, S., Biran, A., Wilbur, J., Neupane, S., Neupane, S., Sharma, A. and Kuper, H., 2019. Are current approaches for measuring access to clean water and sanitation inclusive of people with disabilities? Comparison of individual-and household-level access between people with and without disabilities in the Tanahun district of Nepal. *PloS one*, *14*(10), p.e0223557.

Bans-Akutey, A. and Tiimub, B.M., 2021. Triangulation in research. *Academia Letters*, *2*, pp.1-6.

Barnes, B.R., 2018. Politics and activism in the water and sanitation wars in South Africa. *Journal of Social and Political Psychology*, *6*(2), pp.543-555.

Barry, M.A., Arinal, F., Talla, C., Hedible, B.G., Sarr, F.D., Ba, I.O., Diop, B., Dia, N. and Vray, M., 2021. Performance of case definitions and clinical predictors for influenza surveillance among patients followed in a rural cohort in Senegal. *BMC infectious diseases*, *21*(1), pp.1-11.

Basco-Carrera, L., Warren, A., van Beek, E., Jonoski, A. and Giardino, A., 2017. Collaborative modelling or participatory modelling? A framework for water resources management. *Environmental Modelling & Software*, *91*, pp.95-110.

Behailu, B.M., Hukka, J.J. and Katko, T.S., 2017. Service failures of rural water supply systems in Ethiopia and their policy implications. *Public Works Management & Policy*, *22*(2), pp.179-196.

Belay, D.G., Asratie, M.H., Aragaw, F.M., Tsega, N.T., Endalew, M. and Gashaw, M., 2022. Open defecation practice and its determinants among households in sub-Saharan Africa: pooled prevalence and multilevel analysis of 33 sub-Saharan Africa countries demographic and health survey. *Tropical Medicine and Health*, *50*(1), p.28.

Bennett, S.D., Lowther, S.A., Chingoli, F., Chilima, B., Kabuluzi, S., Ayers, T.L., Warne, T.A. and Mintz, E., 2018. Assessment of water, sanitation, and hygiene interventions in response to an outbreak of typhoid fever in Neno District, Malawi. *PloS one*, *13*(2), p.e0193348.

Berndt, A.E., 2020. Sampling methods. *Journal of Human Lactation*, *36*(2), pp.224-226.

Binda, M., 2019. Protesters blame corruption for lack of water in Umlazi. Available at https://www.groundup.org.za/article/protesters-blame-corruption-lack-water-umlazi/. Accessed on 20 January 2024.

Birkhold, M., Coulibaly, Y., Coulibaly, O., Dembélé, P., Kim, D.S., Sow, S. and Neuzil, K.M., 2020. Morbidity and mortality of typhoid intestinal perforation among children in sub-Saharan Africa 1995–2019: a scoping review. *World journal of surgery*, *44*(9), pp.2892-2902.

Bischoff-Mattson, Z., Maree, G., Vogel, C., Lynch, A., Olivier, D. and Terblanche, D., 2020. Shape of a water crisis: Practitioner perspectives on urban water scarcity and 'Day Zero'in South Africa. *Water Policy*, *22*(2), pp.193-210.

Bishoge, O.K., 2021. Challenges facing sustainable water supply, sanitation and hygiene achievement in urban areas in sub-Saharan Africa. *Local Environment*, *26*(7), pp.893-907.

Blimpo, M.P., Postepska, A. and Xu, Y., 2020. Why is household electricity uptake low in Sub-Saharan Africa?. *World Development*, *133*, p.105002.

Bob, U., 2008. Rural women's relations to land resources in KwaZulu-Natal: issues of access and control. *Alternation*, *15*(1), pp.110-134.

Boden, J.M., Lee, J.O., Horwood, L.J., Grest, C.V. and McLeod, G.F., 2017. Modelling possible causality in the associations between unemployment, cannabis use, and alcohol misuse. *Social science & medicine*, *175*, pp.127-134.

Bosworth, G. and Bat Finke, H., 2020. Commercial Counterurbanisation: A driving force in rural economic development. *Environment and Planning A: Economy and Space*, *52*(3), pp.654-674.

Bouchard, J.P., Pretorius, T.B., Kramers-Olen, A.L., Padmanabhanunni, A. and Stiegler, N., 2022, August. Global Warming and Psychotraumatology of Natural Disasters: The Case of the Deadly Rains and Floods of April 2022 in South Africa. In *Annales Médico-psychologiques, Revue Psychiatrique*. Elsevier Masson.

Bourblanc, M. and Blanchon, D., 2019. Political ecologies of water in South Africa: A literature review. *Wiley Interdisciplinary Reviews: Water*, *6*(5), p.e1371.

Breen, M. and Gillanders, R., 2021. Money down the drain: Corruption and access to water in sub-Saharan Africa. *Available at SSRN 3866657*.

Burger, R. and Christian, C., 2020. Access to health care in post-apartheid South Africa: availability, affordability, acceptability. *Health Economics, Policy and Law*, *15*(1), pp.43-55.

Bwire, G., Munier, A., Ouedraogo, I., Heyerdahl, L., Komakech, H., Kagirita, A., Wood, R., Mhlanga, R., Njanpop-Lafourcade, B., Malimbo, M. and Makumbi, I., 2017. Epidemiology of cholera outbreaks and socio-economic characteristics of the communities in the fishing villages of Uganda: 2011-2015. *PLoS Neglected Tropical Diseases*, *11*(3), p.e0005407.

Calow, R.C., MacDonald, A.M., Nicol, A.L. and Robins, N.S., 2010. Ground water security and drought in Africa: linking availability, access, and demand. *Groundwater*, *48*(2), pp.246-256.

Campbell, C., Nair, Y. and Maimane, S., 2007. Building contexts that support effective community responses to HIV/AIDS: a South African case study. *American Journal of Community Psychology*, *39*, pp.347-363.

Campbell, C.J., 2018. Space, place and scale: Human geography and spatial history in past and present. *Past and Present*, *239*(1), pp.e23-e45.

Campbell, J., 2002. A critical appraisal of participatory methods in development research. *International Journal of Social Research Methodology*, *5*(1), pp.19-29.

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D. and Walker, K., 2020. Purposive sampling: complex or simple? Research case examples. *Journal of research in Nursing*, *25*(8), pp.652-661.

Castellar, S.M.V. and Juliasz, P.C.S., 2018, May. Mental map and spatial thinking. In *Proceedings of the ICA* (Vol. 1, pp. 1-6). Copernicus GmbH.

Castleberry, A. and Nolen, A., 2018. Thematic analysis of qualitative research data: Is it as easy as it sounds?. *Currents in pharmacy teaching and learning*, *10*(6), pp.807-815.

Cavestro, L., 2003. PRA-participatory rural appraisal concepts methodologies and techniques. *Padova University. Padova PD. Italia*.

Chambers, R., Conway, G. and Brighton Institute of Development Studies., 1992. *Sustainable rural livelihoods: practical concepts for the 21st century* (Vol. 296). Brighton: Institute of development studies.

Chambers, R., 1992. *Rural apprasial: rapid, relaxed and participatory*. Institute of Development Studies (UK).

Chandra, G., 2010. Participatory rural appraisal. *Katiha, PK, Vaas, KK, Sharma, AP, Bhaumik, U. & Chandra Ganesh (Eds). Issues and tools for social science research in inland fisheries. Central Inland Fisheries Research Institute, Barrackpore, Kolkata, India. Bulletin*, *163*, pp.286-302.

Chaudhuri, S. and Roy, M., 2017. Rural-urban spatial inequality in water and sanitation facilities in India: A cross-sectional study from household to national level. *Applied Geography*, *85*, pp.27-38.

Chigbu, U.E., 2013. Rurality as a choice: Towards ruralising rural areas in sub-Saharan African countries. *Development Southern Africa*, *30*(6), pp.812-825.

Choithani, C., 2020. Gendered livelihoods: Migrating men, left-behind women and household food security in India. *Gender, Place & Culture*, *27*(10), pp.1373-1394.

Clifford-Holmes, J.K., Slinger, J.H., de Wet, C. and Palmer, C.G., 2017. Modelling in the 'muddled middle': a case study of water service delivery in post-Apartheid South Africa. *Social Systems Engineering: The Design of Complexity*, p.215.

Coetzee, L. and Kotzé, P., 2018. The Internet of Things: Opportunities for Water, Sanitation and Hygiene (WASH) Management. Available at: https://www.wrc.org.za/wp-content/uploads/mdocs/TT%20757%20web.pdf. Accessed on 28 November 2023.

Cohen, C., Kleynhans, J., Moyes, J., McMorrow, M.L., Treurnicht, F.K., Hellferscee, O., Mathunjwa, A., von Gottberg, A., Wolter, N., Martinson, N.A. and Kahn, K., 2021. Asymptomatic transmission and high community burden of seasonal influenza in an urban and a rural community in South Africa, 2017–18 (PHIRST): a population cohort study. *The Lancet Global Health*, *9*(6), pp.e863-e874.

Cohn, T.H. and Hira, A., 2020. *Global political economy: Theory and practice*. Routledge.

Cole, M.J., Bailey, R.M., Cullis, J.D. and New, M.G., 2018. Spatial inequality in water access and water use in South Africa. *Water Policy*, *20*(1), pp.37-52.

Collivignarelli, M.C., Abbà, A., Benigna, I., Sorlini, S. and Torretta, V., 2017. Overview of the main disinfection processes for wastewater and drinking water treatment plants. *Sustainability*, *10*(1), p.86.

Contini, S., 2017. Typhoid intestinal perforation in developing countries: Still unavoidable deaths?. *World journal of gastroenterology*, *23*(11), p.1925.

Comins, L., 2023. Report finds KZN water rights marred by corruption, inequality and neglect. Available at Report finds KZN water rights marred by corruption, inequality and neglect – The Mail & Guardian (mg.co.za). Accessed on 22 March 2024.

Crankshaw, O. and Borel-Saladin, J., 2019. Causes of urbanisation and counter-urbanisation in Zambia: Natural population increase or migration?. *Urban Studies*, *56*(10), pp.2005-2020.

Crocker, J., Saywell, D. and Bartram, J., 2017. Sustainability of community-led total sanitation outcomes: Evidence from Ethiopia and Ghana. *International journal of hygiene and environmental health*, *220*(3), pp.551-557.

Cropley, A., 2023. Qualitative Research Methods: A Practice-Oriented Introduction. Available at: https://www.researchgate.net/publication/285471178_Qualitative_Research_Methods_A_Practice-Oriented_Introduction. Accessed on 3 January 2024.

Daily News., 2022. All Ndwedwe Local Municipality Flood Victims Have Been Located Saya Municipality. Available at All Ndwedwe Local Municipality flood victims have been located says municipality (iol.co.za). Accessed on 30 September 2022.

Dalati, S. and Marx Gómez, J., 2018. Surveys and questionnaires. *Modernizing the Academic Teaching and Research Environment: Methodologies and Cases in Business Research*, pp.175-186.

Dalstein, F. and Naqvi, A., 2022. 21st Century water withdrawal decoupling: A pathway to a more water-wise world?. *Water Resources and Economics*, *38*, p.100197.

Dasgupta, S., Emmerling, J. and Shayegh, S., 2023. Inequality and growth impacts of climate change—insights from South Africa. *Environmental Research Letters*, *18*(12), p.124005.

Dassah, E., Aldersey, H., McColl, M.A. and Davison, C., 2018. Factors affecting access to primary health care services for persons with disabilities in rural areas: a “best-fit” framework synthesis. *Global Health Research and Policy*, *3*(1), pp.1-13.

de Sá Silva, A.C.R., Bimbato, A.M., Balestieri, J.A.P. and Vilanova, M.R.N., 2022. Exploring environmental, economic and social aspects of rainwater harvesting systems: A review. *Sustainable Cities and Society*, *76*, p.103475.

Deen, J., Mengel, M.A. and Clemens, J.D., 2020. Epidemiology of cholera. *Vaccine*, *38*, pp. A31-A40.

Delaire, C., Kisiangani, J., Stuart, K., Antwi-Agyei, P., Khush, R. and Peletz, R., 2022. Can open-defecation free (ODF) communities be sustained? A cross-sectional study in rural Ghana. *PLoS One*, *17*(1), p.e0261674.

Denny, E. and Weckesser, A., 2022. How to do qualitative research?: qualitative research methods. *Bjog*, *129*(7), p.1166.

Department of Forestry, Fisheries and the Environment. 2023. Working for Water programme. Available at https://www.dffe.gov.za/working-water-wfw-programme. Accessed on 20 November 2023.

Dery, F., Achore, M. and Bisung, E., 2021. “Today men's orientation has changed”: Gender and household water and sanitation responsibilities in Ghana. In *Geography, Health and Sustainability*, pp. 145-160.Dev, P.S. and Eljo, J.J.G., 2023. Inclusive Wash for Elderly with Disabilities. *Journal for ReAttach Therapy and Developmental Diversities*, *6*(5s), pp.285-291.

Dos Santos, S., Adams, E.A., Neville, G., Wada, Y., De Sherbinin, A., Bernhardt, E.M. and Adamo, S.B., 2017. Urban growth and water access in sub-Saharan Africa: Progress, challenges, and emerging research directions. *Science of the Total Environment*, *607*, pp.497.

Drammeh, W., Hamid, N.A. and Rohana, A.J., 2019. Determinants of household food insecurity and its association with child malnutrition in Sub-Saharan Africa: A review of the literature. *Current Research in Nutrition and Food Science Journal*, *7*(3), pp.610-623.

Du Plessis, P. and Mestry, R., 2019. Teachers for rural schools–a challenge for South Africa. *South African Journal of Education*, *39*, pp.1-9.

Dulta, K., Iwuchukwu, F.U., Kumari, S., Narayanasamy, S. and Selvasembian, R., 2024. Traditional techniques of water purification in rural areas. *Water Resources Management for Rural Development*, pp. 65-76.

Dwipayanti, N.M., Nastiti, A., Powell, B., Loehr, J., Hadwen, W., Vada, S. and Johnson, H., 2021. Healthy Community, Safe Destinations, and Happy Tourists. Guideline For Gender Equality, Disability, and Social Inclusion in Water, Sanitation, and Hygiene in the Community in Tourism Destinations, Indonesia, pp.1-30.

Edokpayi, J.N., Odiyo, J.O. and Durowoju, O.S., 2017. Impact of wastewater on surface water quality in developing countries: a case study of South Africa. *Water quality*, *10*(66561), pp.10-5772.

Edokpayi, J.N., Rogawski, E.T., Kahler, D.M., Hill, C.L., Reynolds, C., Nyathi, E., Smith, J.A., Odiyo, J.O., Samie, A., Bessong, P. and Dillingham, R., 2018. Challenges to sustainable safe drinking water: a case study of water quality and use across seasons in rural communities in Limpopo province, South Africa. *Water*, *10*(2), p.159.

Emenike, C.P., Tenebe, I.T., Omole, D.O., Ngene, B.U., Oniemayin, B.I., Maxwell, O. and Onoka, B.I., 2017. Accessing safe drinking water in sub-Saharan Africa: Issues and challenges in South–West Nigeria. *Sustainable cities and society*, *30*, pp.263-272.

Emily, M.M. and Muyengwa, G., 2021. Maintenance of municipality infrastructure: a case study on service delivery in Limpopo Province at South Africa. *American Journal of Operations Research*, *11*(6), pp.309-323.

Enfield, S., 2018. Mainstreaming disability and making WASH programmes inclusive.

Etongo, D., Fagan, G.H., Kabonesa, C. and Asaba B, R., 2018. Community-managed water supply systems in rural Uganda: The role of participation and capacity development. *Water*, *10*(9), p.1271.

Fan, S. and Rue, C., 2020. The role of smallholder farms in a changing world. *The role of smallholder farms in food and nutrition security*, pp.13-28.

Ferreira, D.C., Graziele, I., Marques, R.C. and Gonçalves, J., 2021. Investment in drinking water and sanitation infrastructure and its impact on waterborne diseases dissemination: The Brazilian case. *Science of the Total Environment*, *779*, p.146279.

Ferrero, G., Setty, K., Rickert, B., George, S., Rinehold, A., DeFrance, J. and Bartram, J., 2019. Capacity building and training approaches for water safety plans: A comprehensive literature review. *International journal of hygiene and environmental health*, *222*(4), pp.615-627.

Förster, J.J., Downsborough, L. and Chomba, M.J., 2017. When policy hits practice: Structure, agency, and power in South African water governance. *Society & Natural Resources*, *30*(4), pp.521-536.

Fotio, H.K. and Nguea, S.M., 2022. Access to water and sanitation in Africa: Does globalization matter?. *International Economics*, *170*, pp.79-91.

Francis, D. and Webster, E., 2019. Poverty and inequality in South Africa: critical reflections. *Development Southern Africa*, *36*(6), pp.788-802.

Freeman, M.C., Garn, J.V., Sclar, G.D., Boisson, S., Medlicott, K., Alexander, K.T., Penakalapati, G., Anderson, D., Mahtani, A.G., Grimes, J.E. and Rehfuess, E.A., 2017. The impact of sanitation on infectious disease and nutritional status: A systematic review and meta-analysis. *International Journal of Hygiene and Environmental Health*, *220*(6), pp.928-949.

Fusheini, A. and Gyawu, S.K., 2020. Prevalence of typhoid and paratyphoid fever in the hohoe municipality of the Volta region, Ghana: a five-year retrospective trend analysis. *Annals of global health*, *86*(1), pp.1-10.

Gafoor, A. and Beater, J., 2018. Umshwathi Bulk Water Supply Scheme 4, Ndwedwe Local Municipality, KwaZulu-Natal. Available at: https://sahris.sahra.org.za/sites/default/files/heritagereports/uMshwathi%20Bulk%20Water%20Supply%20Scheme_Phase%201%20Heritage%20Impact%20Assessment_v4.pdf. Accessed on 20 January 2024.

Gallo, M.A., 2020. Bantu Education, and Its Living Educational and Socioeconomic Legacy in Apartheid and Post-Apartheid South Africa"(2020). *Senior Theses*. *43*, pp.1-45. Geere, J.A. and Cortobius, M., 2017. Who carries the weight of water? Fetching water in rural and urban areas and the implications for water security. *Water Alternatives*, *10*(2), pp.513-540.

Gelete, G., Gokcekus, H., Ozsahin, D.U., Uzun, B. and Gichamo, T., 2020. Evaluating disinfection techniques of water treatment. *Desalin. Water Treat*, *177*, pp.408-415.

Getahun, W. and Adane, M., 2021. Prevalence of acute diarrhea and water, sanitation, and hygiene (WASH) associated factors among children under five in Woldia Town, Amhara Region, northeastern Ethiopia. *BMC Pediatrics*, *21*(1), pp.1-15.

Gizaw, Z., Demissie, N.G., Gebrehiwot, M., Destaw, B. and Nigusie, A., 2023. Hand hygiene practice and associated factors among rural communities in northwest Ethiopia. *Scientific Reports*, *13*(1), p.4287.

Gleitsmann, B., 2005. *The importance of community involvement in the planning and design phases of rural water supply development projects in the Koro region of Mali, West Africa* (Doctoral dissertation, Cornell University).

Goba, T., 2023a. Brink: Tshwane probing claims that water tank mafia operating in Hammanskraal. Available at: https://ewn.co.za/0001/01/01/brink-tshwane-probing-claims-that-water-tank-mafia-operating-in-hammanskraal. Accessed on 11 August 2023.

Goba, T., 2023b. Tshwane records decline of cholera cases in Hammanskraal. Available at : https://ewn.co.za/2023/06/24/tshwane-records-decline-of-cholera-cases-in-hammanskraal#:~:text=Hammanskraal%20has%20been%20at%20the,the%20countrywide%20total%20of%2032. Accessed on 11 August 2023.

Gona, P.N., Gona, C.M., Ballout, S., Rao, S.R., Kimokoti, R., Mapoma, C.C. and Mokdad, A.H., 2020. Burden and changes in HIV/AIDS morbidity and mortality in Southern Africa Development Community Countries, 1990–2017. *BMC Public Health*, *20*, pp.1-14.

Gorsboth, M. and Wolf, E., 2005. Identifying and addressing violations of the human right to water. *FIAN International, Bread for the World*.

Götz, N. and Holmén, J., 2018. Introduction to the theme issue:"Mental maps: geographical and historical perspectives". *Journal of Cultural Geography*, *35*(2), pp.157-161.

Grab, S.W. and Nash, D.J., 2023. A new flood chronology for KwaZulu-Natal (1836–2022): The April 2022 Durban floods in historical context. *South African Geographical Journal*, pp.1-22.

Grigg, N., Ahmad, S.M.U.D., Podger, G., Kirby, M. and Colloff, M., 2018. Water quality in the Ravi and Sutlej Rivers, Pakistan: a system view. *South Asia Sustainable Development Investment Portfolio CSIRO, Australia*.

Guo, A., Bowling, J.M., Bartram, J. and Kayser, G., 2017. Water, sanitation, and hygiene in rural health-care facilities: a cross-sectional study in Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia. *The American Journal of Tropical Medicine and Hygiene*, *97*(4), p.1033.

Gwimbi, P., George, M. and Ramphalile, M., 2019. Bacterial contamination of drinking water sources in rural villages of Mohale Basin, Lesotho: exposures through neighbourhood sanitation and hygiene practices. *Environmental Health and Preventive Medicine*, *24*, pp.1-7.

Haklay, M.M., Dörler, D., Heigl, F., Manzoni, M., Hecker, S. and Vohland, K., 2021. What is citizen science? The challenges of definition. *The science of citizen science*, *13*, pp.1-529.

Harlin, J. and Kjellén, M., 2015. Water and development: from MDGs towards SDGs. *Water for development—charting a water wise path, SIWI report*, *35*, pp.8-14.

Harvey, D., 2007. *A brief history of neoliberalism*. Oxford University Press, USA.

Haywood, L.K., Funke, N., Audouin, M., Musvoto, C. and Nahman, A., 2019. The Sustainable Development Goals in South Africa: Investigating the need for multi-stakeholder partnerships. *Development Southern Africa*, *36*(5), pp.555-569.

He, Z., Bishwajit, G., Zou, D., Yaya, S., Cheng, Z. and Zhou, Y., 2018. Burden of common childhood diseases in relation to improved water, sanitation, and hygiene (WASH) among Nigerian children. *International Journal of Environmental Research and Public Health*, *15*(6), p.1241.

Heap, V. and Waters, J., 2019. Data collection methods. In *Mixed Methods in Criminology* (pp. 141-176). Routledge.

Heesen, R., Bright, L.K. and Zucker, A., 2019. Vindicating methodological triangulation. *Synthese*, *196*(8), pp.3067-3081.

Hellberg, S., 2017. Water for survival, water for pleasure-A biopolitical perspective on the social sustainability of the basic water agenda. *Water Alternatives*, *10*(1), p.65.

Hemson, D. and Dube, B., 2004. Water services and public health: the 2000-01 cholera outbreak in KwaZulu-Natal, South Africa. Available at https://repository.hsrc.ac.za/handle/20.500.11910/7937. Accessed on 10 January 2024.

Hemson, D., 2016. Water, sanitation and health: South Africa's remaining and existing issues. *South African Health Review*, *2016*(1), pp.25-34.

Herbig, F.J., 2019. Talking dirty-effluent and sewage irreverence in South Africa: A conservation crime perspective. *Cogent Social Sciences*, *5*(1), p.1701359.

Herrera, V., 2019. Reconciling global aspirations and local realities: Challenges facing the Sustainable Development Goals for water and sanitation. *World Development*, *118*, pp.106-117.

Hofstetter, M., Bolding, A. and van Koppen, B., 2020. Addressing failed water infrastructure delivery through increased accountability and end-user agency: The case of the Sekhukhune District, South Africa. *Water Alternatives*, *13*(3), pp.843-863.

Holmes, A.G.D., 2020. Researcher Positionality--A Consideration of Its Influence and Place in Qualitative Research--A New Researcher Guide. *Shanlax International Journal of Education*, *8*(4), pp.1-10.

Hornberger, B. and Rangu, S., 2020. Designing inclusion and exclusion criteria. *University of Pennsylvania ScholarlyCommons*, pp.3-13.

Hove, J., D'Ambruoso, L., Mabetha, D., Van Der Merwe, M., Byass, P., Kahn, K., Khosa, S., Witter, S. and Twine, R., 2019. 'Water is life': developing community participation for clean water in rural South Africa. *BMJ Global Health*, *4*(3), p.e001377.

Howard, G., 2021. The future of water and sanitation: global challenges and the need for greater ambition. *AQUA—Water Infrastructure, Ecosystems and Society*, *70*(4), pp.438-448.

Howard, G., Bartram, J., Brocklehurst, C., Colford Jr, J.M., Costa, F., Cunliffe, D., Dreibelbis, R., Eisenberg, J.N.S., Evans, B., Girones, R. and Hrudey, S., 2020. COVID-19: urgent actions, critical reflections and future relevance of 'WASH': lessons for the current and future pandemics. *Journal of water and health*, *18*(5), pp.613-630.

Hsiao, A., Desai, S.N., Mogasale, V., Excler, J.L. and Digilio, L., 2017. Lessons learnt from twelve oral cholera vaccine campaigns in resource-poor settings. *Bulletin of the World Health Organization*, *95*(4), p.303.

Hutchings, P., Franceys, R., Mekala, S., Smits, S. and James, A.J., 2017. Revisiting the history, concepts and typologies of community management for rural drinking water supply in India. *International Journal of Water Resources Development*, *33*(1), pp.152-169.

Hutete, C. and Sibanda, M.M., 2022. Water service provision and social equity in a South African rural district municipality. *Africa's Public Service Delivery & Performance Review*, *10*(1), p.12.

Hutete, C. and Sibanda, M.M., 2022. Water service provision and social equity in a South African rural district municipality. *Africa's Public Service Delivery & Performance Review*, *10*(1), p.12.

Huttinger, A., Dreibelbis, R., Kayigamba, F., Ngabo, F., Mfura, L., Merryweather, B., Cardon, A. and Moe, C., 2017. Water, sanitation and hygiene infrastructure and quality in rural healthcare facilities in Rwanda. *BMC Health Services Research*, *17*(1), pp.1-11.

Hutton, G. and Chase, C., 2017. Water supply, sanitation, and hygiene. *Injury Prevention and Environmental Health. 3rd edition*.

Hutton, G. and Chase, C., 2017. Water supply, sanitation, and hygiene. *Injury Prevention and Environmental Health. 3rd edition*.

iLembe District Economic Profile., 2021. Available at iLembe District Economic Profile .pdf (kznedtea.gov.za). Accessed on 7 August 2022.

iLembe District Municipality IDP Draft Review., 2021. Available at Draft-IDP-Review.-2021-2022-31-March-2021.pdf (ilembe.gov.za). Accessed on 7 August 2022.

Immurana, M., Kisseih, K.G., Yusif, H.M. and Yakubu, Z.M., 2022. The effect of financial inclusion on open defecation and sharing of toilet facilities among households in Ghana. *Plos one*, *17*(3), p.e0264187.

International Labour Office., 2019. Water for Improved Rural Livelihoods. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_729058.pdf. Accessed on 28 November 2023.

Jacobs-Mata, I., Sadoff, C., Van Koppen, B., 2019. What Thuma Mina really means for rural communities. Available at https://infrastructurenews.co.za/2019/07/18/what-thuma-mina-really-means-for-rural-communities/. Accessed on 22 November 2023.

Johnston, M.P., 2017. Secondary data analysis: A method of which the time has come. *Qualitative and Quantitative Methods in Libraries*, *3*(3), pp.619-626.

Kamara, J.K., Galukande, M., Maeda, F., Luboga, S. and Renzaho, A.M., 2017. Understanding the challenges of improving sanitation and hygiene outcomes in a community-based intervention: A cross-sectional study in rural Tanzania. *International Journal of Environmental Research and Public Health*, *14*(6), p.602.

Kamau, N. and Njiru, H., 2018. Water, sanitation and hygiene situation in Kenya's urban slums. *Journal of Health Care for the Poor and Underserved*, *29*(1), pp.321-336.

Kanyamuna, V. and Zulu, K., 2022. Participatory research methods: Importance and limitations of participation in development practice. *World Journal of Social Sciences and Humanities*, *8*(1), pp.9-13.

Kanyane, M., 2017. Interfacing interplay of local government, traditional leaders and society. *Journal of Contemporary African Studies*, *35*(2), pp.212-220.

Kanyangarara, M., Allen, S. and Jiwani, S.S., 2021. Access to water, sanitation and hygiene services in health facilities in sub-Saharan Africa 2013–2018: Results of health facility surveys and implications for COVID-19 transmission. *BMC Health Services Research*, *21*(1), pp.1-11.

Kativhu, T., Mazvimavi, D., Tevera, D. and Nhapi, I., 2018. Implementation of Community Based Management (CBM) in Zimbabwe: The dichotomy of theory and practice and its influence on sustainability of rural water supply systems. *Physics and Chemistry of the Earth, Parts A/B/C*, *106*, pp.73-82.

Kativhu, T., Mazvimavi, D., Tevera, D. and Nhapi, I., 2018. Implementation of Community Based Management (CBM) in Zimbabwe: The dichotomy of theory and practice and its influence on sustainability of rural water supply systems. *Physics and Chemistry of the Earth, Parts A/B/C*, *106*, pp.73-82.

Kaur, P., Stoltzfus, J. and Yellapu, V., 2018. Descriptive statistics. *International Journal of Academic Medicine*, *4*(1), pp.60-63.

Kayiwa, D., Mugambe, R.K., Mselle, J.S., Isunju, J.B., Ssempebwa, J.C., Wafula, S.T., Ndejjo, R., Kansiime, W.K., Nalugya, A., Wagaba, B. and Zziwa, J.B., 2020. Assessment of water, sanitation and hygiene service availability in healthcare facilities in the greater Kampala metropolitan area, Uganda. *BMC Public Health*, *20*(1), pp.1-11.

Kayser, G.L., Rao, N., Jose, R. and Raj, A., 2019. Water, sanitation, and hygiene: measuring gender equality and empowerment. *Bulletin of the World Health Organization*, *97*(6), p.438.

Kazembe, D.R.A., 2017. Exploring Barriers to Accessing Water, Sanitation and Hygiene for Disabled People in Chiradzulu. Available at https://www.researchgate.net/profile/Dyson-Kazembe/publication/323447015_Barriers_to_Accessing_WASH_for_Disabled_People_in_Chiradzulu_Malawi/links/61fba658007fb50447318308/Barriers-to-Accessing-WASH-for-Disabled-People-in-Chiradzulu-Malawi.pdf. Accessed on 3 January 2024.

Keeler, B.L., Derickson, K.D., Waters, H. and Walker, R., 2020. Advancing water equity demands new approaches to sustainability science. *One Earth*, *2*(3), pp.211-213.

Keener, S., Luengo, M. and Banerjee, S.G., 2010. Provision of water to the poor in Africa: Experience with water standposts and the informal water sector. *World Bank Policy Research Working Paper*, (5387).

Kim, C.L., Espinoza, L.M.C., Vannice, K.S., Tadesse, B.T., Owusu-Dabo, E., Rakotozandrindrainy, R., Jani, I.V., Teferi, M., Soura, A.B., Lunguya, O. and Steele, A.D., 2022. The Burden of Typhoid Fever in Sub-Saharan Africa: A Perspective. *Research and Reports in Tropical Medicine*, *13*, p.1.

Kivunja, C., 2018. Distinguishing between theory, theoretical framework, and conceptual framework: A systematic review of lessons from the field. *International Journal of Higher Education*, *7*(6), pp.44-53.

Klar, S. and Leeper, T.J., 2019. Identities and intersectionality: a case for Purposive sampling in Survey-Experimental research. *Experimental methods in survey research: Techniques that combine random sampling with random assignment*, pp.419-433.

Komarulzaman, A., Smits, J. and de Jong, E., 2017. Clean water, sanitation, and diarrhoea in Indonesia: Effects of household and community factors. *Global Public Health*, *12*(9), pp.1141-1155.

Koyuncu, A., Simuyandi, M., Bosomprah, S. and Chilengi, R., 2020. Nutritional status, environmental enteric dysfunction, and prevalence of rotavirus diarrhoea among children in Zambia. *PloS one*, *15*(10), p.e0240258.

Kulanyi, R., Jonga, M., Vos, E. and Van Soelen, S., 2021. Barriers to inclusion in the WASH sector: insights from Uganda. *International Journal of Biological and Chemical Sciences*, *15*(7), pp.76-81.

Kuo, C., Black, L., Barber, S., Luzigwi, V., Wanjiru, R. and Kelly, C., 2022. Arthritis in East Africa: an observational study. *Qeios*, pp.1-12.

KwaZulu-Natal Economic Profile., 2021. Available at KZN Economic Profile.pdf (kznedtea.gov.za)Accessed on 6 August 2022.

KwaZulu-Natal Province: Cooperative Governance and Traditional Affairs. 2022. KZN Floods Update. Available at KZN FLOODS UPDATE: – KZNCOGTA. Accessed on 30 September 2022.

KwaZulu-Natal Provincial Profile., 2016. Available at PP KZN (electronic).cdr (statssa.gov.za). Accessed on 7 August 2022.

LaVanchy, G.T., Romano, S.T., and Taylor, M.J., 2017. Challenges to water security along the "Emerald coast": A political ecology of local water governance in Nicaragua. *Water*, *9*(9), p.655.

Lebek, K., Twomey, M. and Krueger, T., 2021. Municipal failure, unequal access and conflicts over water–a hydro-social perspective on water insecurity of rural households in KwaZulu-Natal, South Africa. *Water Alternatives*, *14*(1), pp.271-292.

Leighton, K., Kardong-Edgren, S., Schneidereith, T. and Foisy-Doll, C., 2021. Using social media and snowball sampling as an alternative recruitment strategy for research. *Clinical Simulation in Nursing*, *55*, pp.37-42.

Letsatsi, N. and Kruger, A., 2022. The April 2022 Floods in Comparison with Other Recent Flooding Events in KwaZulu-Natal. *Weathersmart*, p.5.

Li, Y., Westlund, H. and Liu, Y., 2019. Why some rural areas decline while some others not: An overview of rural evolution in the world. *Journal of Rural Studies*, *68*, pp.135-143.

Lim, W.M., Kumar, S. and Ali, F., 2022. Advancing knowledge through literature reviews:'what','why', and 'how to contribute'. *The Service Industries Journal*, *42*(7-8), pp.481-513.

Liu, Y. and Li, Y., 2017. Revitalize the world's countryside. *Nature*, *548*(7667), pp.275-277.

Local Burden of Disease WaSH Collaborators, 2020. Mapping geographical inequalities in access to drinking water and sanitation facilities in low-income and middle-income countries, 2000–17. *The Lancet. Global Health*, *8*(9), p.e1162.

Logan, C. and Katenda, L.M., 2021. African Citizens' Message to Traditional Leaders: Stay in Development, Stay out of Politics.

Lukasiewicz, A. and Baldwin, C., 2017. Voice, power, and history: ensuring social justice for all stakeholders in water decision-making. *Local Environment*, *22*(9), pp.1042-1060.

Mabiso, A. and Benfica, R.S., 2019. IFAD Research Series 61: The Narrative on Rural Youth and Economic Opportunities in Africa: Facts, Myths and Gaps. *Myths and Gaps (December 4, 2019)*.

Macaulay, A.C., 2017. Participatory research: What is the history? Has the purpose changed?. *Family Practice*, *34*(3), pp.256-258.

Mackintosh, G. and Colvin, C., 2003. Failure of rural schemes in South Africa to provide potable water. *Environmental Geology*, *44*(1), pp.101-105.

Maemeko, E.L., Nkengbeza, D. and Chokomosi, T.M., 2018. The impact of teenage pregnancy on academic performance of grade 7 learners at a school in the Zambezi region. *Open Journal of Social Sciences*, *6*(09), p.88.

Mahesh, V., Lekshmi, P.S., Pawar, D.A., Kumar, A. and Prakash, P., 2017. Matrix Ranking-An important PRA tool to assess farmers preferences and priorities. *Agricultural Science Digest-A Research Journal*, *37*(2), pp.100-105.

Majola, N., 2021. Taps Ran Dry in Ndwedwe Six Years Ago. Available at Taps ran dry in Ndwedwe six years ago | GroundUp. Accessed on 01 October 2022.

Makonye, F., 2022. Interrogating the July 2021 Looting, Burning and Violence in South Africa: Case of KwaZulu-Natal (KZN). *African Journal of Peace and Conflict Studies (formerly Ubuntu: Journal of Conflict and Social Transformation)*, *11*(2), pp.55-66.

Malik, S., Khyalia, P. and Laura, J.S., 2024. Conventional methods and materials used for water treatment in rural areas. In *Water Resources Management for Rural Development*, pp. 79-90.

Manetu, W.M. and Karanja, A.M., 2021. Waterborne disease risk factors and intervention practices: A review. *Open Access Library Journal*, *8*(5), pp.1-11.

Mango, N., Makate, C., Tamene, L., Mponela, P. and Ndengu, G., 2018. Adoption of small-scale irrigation farming as a climate-smart agriculture practice and its influence on household income in the Chinyanja Triangle, Southern Africa. *Land*, *7*(2), p.49.

Maphumulo, W.T. and Bhengu, B.R., 2019. Challenges of quality improvement in the healthcare of South Africa post-apartheid: A critical review. *Curationis*, *42*(1), pp.1-9.

Marcus, B., Weigelt, O., Hergert, J., Gurt, J. and Gelléri, P., 2017. The use of snowball sampling for multi-source organizational research: Some cause for concern. *Personnel Psychology*, *70*(3), pp.635-673.

Martínez-Santos, P., 2017. Determinants for water consumption from improved sources in rural villages of southern Mali. *Applied Geography*, *85*, pp.113-125.

Martínez-Santos, P., 2017. Does 91% of the world's population really have "sustainable access to safe drinking water"?. *International Journal of Water Resources Development*, *33*(4), pp.514-533.

Marutlulle, N.K., 2021. A critical analysis of housing inadequacy in South Africa and its ramifications. *Africa's Public Service Delivery & Performance Review*, *9*(1), p.16.

Marx, K., 2019. *The Critique of the Political Economy*. e-artnow.

Mashamba-Thompson, T.P., Jama, N.A., Sartorius, B., Drain, P.K. and Thompson, R.M., 2017. Implementation of point-of-care diagnostics in rural primary healthcare clinics in South Africa: perspectives of key stakeholders. *Diagnostics*, *7*(1), p.3.

Mathonsi, N. and Sithole, S., 2017. The incompatibility of traditional leadership and democratic experimentation in South Africa. *African Journal of Public Affairs*, *9*(5), pp.35-46.

Maulani, G., Rahardja, U., Hardini, M., I'zzaty, R.D., Aini, Q. and Santoso, N.P.L., 2020, November. Educating farmers using participatory rural appraisal construct. In *2020 Fifth International Conference on Informatics and Computing (ICIC)* (pp. 1-8). IEEE.

Mazibuko, S., 2013. Understanding underdevelopment through the sustainable livelihoods approach. *Community Development*, *44*(2), pp.173-187.

Mbiyozo, A.N., 2018. Gender and migration in South Africa: Talking to women migrants. *ISS Southern Africa Report*, *2018*(16), pp.1-36.

McNamara, K.E., Clissold, R., Westoby, R., Piggott-McKellar, A.E., Kumar, R., Clarke, T., Namoumou, F., Areki, F., Joseph, E., Warrick, O. and Nunn, P.D., 2020. An assessment of community-based adaptation initiatives in the Pacific Islands. *Nature Climate Change*, *10*(7), pp.628-639.

Meehan, K., Jurjevich, J.R., Chun, N.M. and Sherrill, J., 2020. Geographies of insecure water access and the housing–water nexus in US cities. *Proceedings of the National Academy of Sciences*, *117*(46), pp.28700-28707.

Meline, T., 2006. Selecting studies for systemic review: Inclusion and exclusion criteria. *Contemporary issues in communication science and disorders*, *33*(Spring), pp.21-27.

Mensah, J., 2019. Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, *5*(1), p.653531.

Mercandalli, S. and Losch, B., 2017. Rural Africa in motion. Dynamics and drivers of migration South of the Sahara. Mercandalli, S. and Losch, B., eds. 2017. Rural Africa in motion. Dynamics and drivers of migration South of the Sahara. Rome, FAO and CIRAD, pp. 60.

Miller, R.L., 2017. *Review for Social Scientists*. Macmillan International Higher Education.

Mlambo, V., 2018. An overview of rural-urban migration in South Africa: its causes and implications. *Archives of Business Research*, *6*(4), pp.63-70.

Mlenga, D.H., 2016. Towards community resilience, focus on a rural water supply, sanitation and hygiene project in Swaziland. *American Journal of Rural Development*, *4*(4), pp.85-92.

Mohr, R., Carbajal, J. and Sharma, B.B., 2019. The influence of educational attainment on teenage pregnancy in low-income countries: A systematic literature review. *Journal of Social Work in the Global Community*, *4*(1), p.2.

Mokgobu, A., 2023. Water tankers not sources of cholera outbreak. Available at: https://www.jacarandafm.com/news/news/hammanskraal-water-tankers-not-source-cholera-outbreak/. Accessed on 11 August 2023.

Momba, M.N.B., Tyafa, Z., Makala, N., Brouckaert, B.M. and Obi, C.L., 2006. Safe drinking water still a dream in rural areas of South Africa. Case Study: The Eastern Cape Province. *Water SA*, *32*(5), pp.715-720.

Moner-Girona, M., Kakoulaki, G., Falchetta, G., Weiss, D.J. and Taylor, N., 2021. Achieving universal electrification of rural healthcare facilities in sub-Saharan Africa with decentralized renewable energy technologies. *Joule*, *5*(10), pp.2687-2714.

Monstadt, J. and Schramm, S., 2017. Toward the networked city? Translating technological ideals and planning models in water and sanitation systems in Dar es Salaam. *International Journal of Urban and Regional Research*, *41*(1), pp.104-125.

Morgan, C., Bowling, M., Bartram, J. and Kayser, G.L., 2017. Water, sanitation, and hygiene in schools: Status and implications of low coverage in Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia. *International Journal of Hygiene and Environmental Health*, *220*(6), pp.950-959.

Moriarty, P., 2002. Sustainable livelihoods approaches: an explanation. *Waterlines*, pp.4-6.

Motaung, T.G., Ellapen, T.J. and Paul, Y., 2022. The consequence of head-loading on the neuro-musculoskeletal health of the ILembe District youth of KwaZulu-Natal. *African Journal of Disability (Online)*, *11*, pp.1-7.

Motjoadi, V., Bokoro, P.N. and Onibonoje, M.O., 2020. A review of microgrid-based approach to rural electrification in South Africa: Architecture and policy framework. *Energies*, *13*(9), p.2193.

Mpenyana-Monyatsi, L., Onyango, M.S. and Momba, M.N.B., 2012. Groundwater quality in a South African rural community: A possible threat to public health. *Pol J Environ Stud*, *21*(5), pp.1349-58.

Mpongwana, Z., Shumba, K. and Bracking, S., 2022. Reflections on Rural Household Water Insecurity: Evidence from Goboti and Khubvi in the Eastern Cape and Limpopo Provinces, South Africa. *African Journal of Inter/Multidisciplinary Studies*, *4*(1), pp.217-233.

Mukosa, F., Katebe, M., Sakyi, K.A., Mweemba, B., Mbewe, S.B. and Sikazwe, W., 2020. The impact of youth unemployment on the Zambian economy. *Journal of Economics and Sustainable Development* *11*(6), pp.81-85.

Mulenga, J.N., Bwalya, B.B. and Kaliba-Chishimba, K., 2017. Determinants and inequalities in access to improved water sources and sanitation among the Zambian households. *International Journal of Development and Sustainability*, *6*(8), pp.746-762.

Muller, M. and Erasmus, J., 2020. Money down the drain: Corruption in South Africa's water sector. *Corruption Watch and the Water Integrity Network*, pp.1-77.

Mumbi, T.L. and Cholo, W., 2017. An Assessment of Open Defecation Among Residents of Thika East Sub-County, Kiambu County, Kenya. *Int J Med Res*, *2*(3), pp.09-20.

Mustanir, A., Lubis, S. and Barisan, B., 2017, November. Participatory Rural Appraisal in Deliberations of Development Planning. In *International Conference On Democracy, Accountability, and Governance (ICODAG 2017)* (Vol. 163, pp. 316-319).

Mvongo, V.D. and Defo, C., 2021. Assessing water service performances in rural sub-Saharan Africa environment: The case studies of two councils of the southern and eastern regions of the Republic of Cameroon (Central Africa). *Journal of Water, Sanitation and Hygiene for Development*, *11*(1), pp.37-50.

Mweshi, G.K. and Sakyi, K., 2020. Application of sampling methods for the research design. *Archives of Business Review–Vol*, *8*(11), pp.183-193.

Nara, B.B., Lengoiboni, M. and Zevenbergen, J., 2020. Implications of customary land rights inequalities for food security: A study of smallholder farmers in Northwest Ghana. *Land*, *9*(6), p.178.

Nassaji, H., 2020. Good qualitative research. *Language Teaching Research*, *24*(4), pp.427-431.

National Development Plan 2030. Our future - make it work. Available at: https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf. Accessed on 27 November 2023.

Natow, R.S., 2020. The use of triangulation in qualitative studies employing elite interviews. *Qualitative Research*, *20*(2), pp.160-173.

Ndwedwe Local Municipality IDP Draft Review., 2022. Available at Integrated Development Plan | Ndwedwe Local Municipality. Accessed on 9 August 2022.

Nga-Ndjobo, P.M. and Abessolo, Y.A., 2023. Access to paved roads, gender, and youth unemployment in rural areas: Evidence from sub-Saharan Africa. *African Development Review*, *35*(2), pp.165-180.

Ngarava, S., Zhou, L. and Monde, N., 2019. Gendered water insecurity: A structural equation approach for female headed households in South Africa. *Water*, *11*(12), p.2491.

Ngcobo, K., 2023. Hammanskraal residents cautioned against buying water from roaming tankers. Available at https://www.timeslive.co.za/news/south-africa/2023-05-26-hammanskraal-residents-cautioned-against-buying-water-from-roaming-tankers/. Accessed on 11 November 2023.

Ngezahayo, E., Burrow, M. and Ghataora, G., 2019. Rural Roads–roles, challenges and solutions for Sub-Saharan Africa's sustainable development. *Int. Journal of Latest Eng. and Manag. Research (ISSN: 2455-4847)*, *4*(10), pp.70-79.

Nguyen, T.Y.C., Fagbayigbo, B.O., Cissé, G., Redi, N., Fuhrimann, S., Okedi, J., Schindler, C., Röösli, M., Armitage, N.P., Carden, K. and Dalvie, M.A., 2021. Diarrhoea among children aged under five years and risk factors in informal settlements: A cross-sectional study in Cape Town, South Africa. *International Journal of Environmental Research and Public Health*, *18*(11), p.6043.

Nicol, A., 2000. Adopting a sustainable livelihoods approach to water projects: implications for policy and practice, pp. 6-17.

Nienie, A.B., Sivalingam, P., Laffite, A., Ngelinkoto, P., Otamonga, J.P., Matand, A., Mulaji, C.K., Biey, E.M., Mpiana, P.T. and Poté, J., 2017. Microbiological quality of water in a city with persistent and recurrent waterborne diseases under tropical sub-rural conditions: the case of Kikwit City, Democratic Republic of the Congo. *International Journal of Hygiene and Environmental Health*, *220*(5), pp.820-828.

Nkomo, L.S.P., Desai, S.A., Seutloali, K.E., Peerbhay, K.Y. and Dube, T., 2019. Assessing the surface material quality of unpaved rural roads to understand susceptibility to surface deterioration. A case study of four rural areas in KwaZulu-Natal, South Africa. *Physics and Chemistry of the Earth, Parts A/B/C*, *112*, pp.3-11.

Nkomo, SL., Desai, S. and Peerbhay, K., 2016. Assessing the conditions of rural road networks in South Africa using visual observations and field-based manual measurements: A case study of four rural communities in Kwa-Zulu Natal. *Review of Social Sciences*, *1*(2), pp.42-55.

Noble, H. and Heale, R., 2019. Triangulation in research, with examples. *Evidence-Based Nursing*, *22*(3), pp. 67-68.

Nortje, M.J., 2017. The effect of poverty on education in South Africa. *Educor Multidisciplinary Journal*, *1*(1), pp.47-62.

Ntaro, M., Owokuhaisa, J., Isunju, J.B., Mulogo, E. and Ssempebwa, J.C., 2022. Contextual and psychological factors influencing open defecation free status: an exploratory qualitative study in rural South Western Uganda. *BMC Public Health*, *22*(1), pp.1-15.

Null, C., Stewart, C.P., Pickering, A.J., Dentz, H.N., Arnold, B.F., Arnold, C.D., Benjamin-Chung, J., Clasen, T., Dewey, K.G., Fernald, L.C. and Hubbard, A.E., 2018. Effects of water quality, sanitation, handwashing, and nutritional interventions on diarrhoea and child growth in rural Kenya: a cluster-randomised controlled trial. *The Lancet Global Health*, *6*(3), pp.e316-e329.

Thobejane, T. and Nyathi, N.A., 2018. Exploring socio-economic challenges faced by female headed households in rural districts: The case of Manama village, Matebeleland South Province in Zimbabwe. *Gender and Behaviour*, *16*(2), pp.11500-11526.

Nyoni, G. and Kollamparambil, U., 2022. Rural-urban migration and the well-being of the migrant-sending households: An impact evaluation study. *South African Journal of Economic and Management Sciences*, *25*(1), p.4120.

Odiyo, J.O. and Makungo, R., 2012. Water quality problems and management in rural areas of Limpopo Province, South Africa. *WIT Transactions on Ecology and the Environment*, *164*, pp.135-146.

Odusola, A., 2017. Agriculture, rural poverty and income inequality in sub-Saharan Africa. *Income Inequality Trends in Sub-Saharan Africa: Divergence, Determinants and Consequences (2017)*, pp.76-100.

Ofori-Sasu, D., Dzeha, G.C., Fiador, V.O. and Abor, J.Y., 2023. Dividend policy framework and bank risk-taking in Africa: do women inclusion in governance system offer new insight?. *Future Business Journal*, *9*(1), p.92.

Ohwo, O. and Agusomu, T.D., 2018. Assessment of water, sanitation and hygiene services in Sub-Saharan Africa. *European Scientific Journal ESJ*, *14*(35), p.308.

Ohwo, O. and Odubo, T.V., 2021. Comparative analysis of wash services between the rich and poor in sub-Saharan Africa. *International Journal of Natural Resource Ecology and Management*, *6*(3), pp.147-155.

Ohwo, O., 2019. Dimensions of inequality in urban and rural water, sanitation and hygiene services in Sub-Saharan Africa. *European Scientific Journal ESJ*, *15*(8), pp.144-162.

Olanrewaju, C.C. and Reddy, M., 2022. Assessment and prediction of flood hazards using standardized precipitation index—A case study of eThekwini metropolitan area. *Journal of Flood Risk Management*, *15*(2), p.e12788.

Omisore, A.G., 2018. Attaining Sustainable Development Goals in sub-Saharan Africa; The need to address environmental challenges. *Environmental Development*, *25*, pp.138-145.

Omona, S., Malinga, G.M., Opoke, R., Openy, G. and Opiro, R., 2020. Prevalence of diarrhoea and associated risk factors among children under five years old in Pader District, northern Uganda. *BMC Infectious Diseases*, *20*, pp.1-9.

Omotayo, A.O., Olagunju, K.O., Omotoso, A.B., Ogunniyi, A.I., Otekunrin, O.A. and Daud, A.S., 2021. Clean water, sanitation and under-five children diarrhea incidence: Empirical evidence from the South Africa's General Household Survey. *Environmental Science and Pollution Research*, *28*, pp.63150-63162.

Orner, K.D., Naughton, C. and Stenstrom, T.A., 2018. Pit toilets (latrines). *Water and Sanitation for the 21st Century: Health and Microbiological Aspects of Excreta and Wastewater Management (Global Water Pathogen Project)*, pp.3-20.

Pala, G.K., Pathivada, A.P., Velugoti, S.J.H., Yerramsetti, C. and Veeranki, S., 2021. Rainwater harvesting-A review on conservation, creation & cost-effectiveness. *Materials Today: Proceedings*, *45*, pp.6567-6571.

Pan, S.M., Armitage, N.P. and van Ryneveld, M.B., 2018. Assessing equity: a way to improve sanitation service delivery in South African informal settlements. *Journal of Water, Sanitation and Hygiene for Development*, *8*(3), pp.429-438.

Parker, C., Scott, S. and Geddes, A., 2019. Snowball sampling. *SAGE Research Methods Foundations*, pp.1-13.

Pathak, V., Jena, B. and Kalra, S., 2013. Qualitative research. *Perspectives in Clinical Research*, *4*(3), p.192.

Patino, C.M. and Ferreira, J.C., 2018. Inclusion and exclusion criteria in research studies: definitions and why they matter. *Journal Brasileiro de Pneumologia*, *44*, pp.84-84.

Peng, L., Xu, D. and Wang, X., 2019. Vulnerability of rural household livelihood to climate variability and adaptive strategies in landslide-threatened western mountainous regions of the Three Gorges Reservoir Area, China. *Climate and Development*, *11*(6), pp.469-484.

Pereira, M.A. and Marques, R.C., 2022. From a millennium to a sustainable water and sanitation development: were we there already?. *AQUA—Water Infrastructure, Ecosystems and Society*, *71*(2), pp.293-300.

Peter, A.K. and Umar, U., 2018. Combating diarrhoea in Nigeria: the way forward. *J Microbiol Exp*, *6*(4), pp.191-197.

Phillips, L., 2017. History of South Africa's bantustans. In *Oxford Research Encyclopedia of African History*. Available at https://doi.org/10.1093/acrefore/9780190277734.013.80. Accessed on 5 January 2024.

Pichel, N., Vivar, M. and Fuentes, M., 2019. The problem of drinking water access: A review of disinfection technologies with an emphasis on solar treatment methods. *Chemosphere*, *218*, pp.1014-1030.

Pieterse, M., 2014. Development, the right to the city and the legal and constitutional responsibilities of local government in South Africa. *South African Law Journal*, *131*(1), pp.149-177.

Píša, J. and Hruška, V., 2019. Entrepreneurial in-migration and rural development in Czechia: A challenge of integrating the local and extra-local in rural planning. *Geographia Polonica*, *92*(3), pp.347-363.

Pooi, C.K. and Ng, H.Y., 2018. Review of low-cost point-of-use water treatment systems for developing communities. *NPJ Clean Water*, *1*(1), p.11.

Pories, L., Fonseca, C. and Delmon, V., 2019. Mobilising finance for WASH: Getting the foundations right. *Water*, *11*(11), p.2425.

Porter, G., 2014. Transport services and their impact on poverty and growth in rural sub-Saharan Africa: A review of recent research and future research needs. *Transport Reviews*, *34*(1), pp.25-45.

Potgieter, N., Heine, L., Ngandu, J.P.K., Ledwaba, S.E., Zitha, T., Mudau, L.S., Becker, P., Traore, A.N. and Barnard, T.G., 2023. High Burden of Co-Infection with Multiple Enteric Pathogens in Children Suffering with Diarrhoea from Rural and Peri-Urban Communities in South Africa. *Pathogens*, *12*(2), p.315.

Queirós, A., Faria, D. and Almeida, F., 2017. Strengths and limitations of qualitative and quantitative research methods. *European journal of education studies*, *3*(9), pp.369-387.

Radebe, M., 2023. Spotlight on poor access to water in KZN. Available at Spotlight on poor access to water in KZN - SABC News - Breaking news, special reports, world, business, sport coverage of all South African current events. Africa's news leader. Accessed on 22 March 2024.

Rahman, M.S., 2020. The advantages and disadvantages of using qualitative and quantitative approaches and methods in language “testing and assessment” research: A literature review. *Journal of Education and Learning*, *6(*1), pp.102-112.

Raidimi, E.N. and Kabiti, H.M., 2019. A review of the role of agricultural extension and training in achieving sustainable food security: A case of South Africa. *South African Journal of Agricultural Extension*, *47*(3), pp.120-130.

Ramavandi, B., 2014. Treatment of water turbidity and bacteria by using a coagulant extracted from Plantago ovata. *Water Resources and Industry*, *6*, pp.36-50.

Reed, M.S., Vella, S., Challies, E., De Vente, J., Frewer, L., Hohenwallner-Ries, D., Huber, T., Neumann, R.K., Oughton, E.A., Sidoli del Ceno, J. and van Delden, H., 2018. A theory of

participation: what makes stakeholder and public engagement in environmental management work?. *Restoration ecology*, *26*, pp.S7-S17.

Richard, D. and Kiani, S., 2019. Rapid review of disability and older age inclusion in humanitarian WASH interventions, pp.1-38.

Ritchie, H. and Roser, M., 2021. Clean water and sanitation. *Our World in data*. Available at https://ourworldindata.org/clean-water-sanitation. Accessed on 15 January 2024.

Rivett, M.O., Halcrow, A.W., Schmalfuss, J., Stark, J.A., Truslove, J.P., Kumwenda, S., Harawa, K.A., Nhlema, M., Songola, C., Wanangwa, G.J. and Miller, A.V., 2018. Local scale water-food nexus: Use of borehole-garden permaculture to realise the full potential of rural water supplies in Malawi. *Journal of Environmental Management*, *209*, pp.354-370.

Roche, R., Bain, R. and Cumming, O., 2017. A long way to go–Estimates of combined water, sanitation, and hygiene coverage for 25 sub-Saharan African countries. *PloS one*, *12*(2), p.e0171783.

Ross, A.G., Rahman, M., Alam, M., Zaman, K. and Qadri, F., 2020. Can we 'WaSH'infectious diseases out of slums?. *International Journal of Infectious Diseases*, *92*, pp.130-132.

Saba, A., 2020. Sisulu and the bucket toilet stink. Available at Sisulu and the bucket toilet stink | The Mail & Guardian (mg.co.za). Accessed on 01 August 2023.

Salom, N. and Khumalo, P., 2022. Challenges Facing Community Management of Rural Water Supply: The Case of Ohangwena Region, Namibia. *African Studies Quarterly*, *21*(1), pp.28-42.

Sandham, L.A., Chabalala, J.J. and Spaling, H.H., 2019. Participatory rural appraisal approaches for public participation in EIA: Lessons from South Africa. *Land*, *8*(10), p.150.

Scheihing, K.W., Tanner, J., Weaver, M. and Schöniger, M., 2020. A strategy to enhance management of free basic water via communal taps in South Africa. *Utilities Policy*, *64*, p.101043.

Seelen, L.M., Flaim, G., Jennings, E. and Domis, L.N.D.S., 2019. Saving water for the future: Public awareness of water usage and water quality. *Journal of Environmental Management*, *242*, pp.246-257.

Sewell, S.J., Desai, S.A., Mutsaa, E. and Lottering, R.T., 2019. A comparative study of community perceptions regarding the role of roads as a poverty alleviation strategy in rural areas. *Journal of Rural Studies*, *71*, pp.73-84.

Shahrokh, Z.D. and Miri, S.M., 2019. A short introduction to comparative research. *Allameh Tabataba'i Unversity*, p.6.

Sharma, D.N.K., 2022. Instruments Used in the Collection of Data in Research. *Poonam Shodh Rachna*, *1*(1), pp.1-8.

Sindane, J.T., and Modley, L.A.S., 2023. The impacts of poor water quality on the residential areas of Emfuleni local municipality: A case study of perceptions in the Rietspruit River catchment in South Africa. *Urban Water Journal*, *20*(10), pp.1568-1578.

Singh, A.S., 2017. Common procedures for development, validity, and reliability of a questionnaire. *International Journal of Economics, Commerce and Management*, *5*(5), pp.790-801.

Sinharoy, S.S., Pittluck, R. and Clasen, T., 2019. Review of drivers and barriers of water and sanitation policies for urban informal settlements in low-income and middle-income countries. *Utilities Policy*, *60*, p.100957.

Smiley, S.L., Agbemor, B.D., Adams, E.A. and Tutu, R., 2020. COVID-19 and water access in Sub-Saharan Africa: Ghana's free water directive may not benefit water insecure households. *African Geographical Review*, *39*(4), pp.398-404.

Sohail, M. and Cavill, S., 2008. Water for the poor: corruption in water supply and sanitation. *Global Corruption Report 2008: Corruption in the Water Sector*, pp.44-52.

Soucheray, S., 2018. CIDRAP News. Available at: https://www.cidrap.umn.edu/public-health/studies-diarrheal-disease-rates-vary-across-africa-world#:~:text=The%20highest%20diarrhea%2Drelated%20case,16%2C%2011%20to%2021) Accessed on 31 March 2023.

South African Government News Agency., 2023. Hammanskraal residents cautioned not to buy water from unauthorised tankers. Available at: https://www.sanews.gov.za/south-africa/hammanskraal-residents-cautioned-not-buy-water-unauthorised-tankers. Accessed on 11 August 2023.

Ssemugabo, C., Wafula, S.T., Ndejjo, R., Osuret, J., Musoke, D. and Halage, A.A., 2021. Characteristics of sanitation and hygiene facilities in a slum community in Kampala, Uganda. *International Health*, *13*(1), pp.13-21.

Ssozi-Mugarura, F., Blake, E. and Rivett, U., 2017. Codesigning with communities to support rural water management in Uganda. *CoDesign*, *13*(2), pp.110-126.

Stahl, N.A. and King, J.R., 2020. Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of Developmental Education*, *44*(1), pp.26-28.

Statistics of South Africa (Community Survey)., 2016. Available at Microsoft Word - (NT 30-06-2016) RELEASE for CS 2016 _Statistical releas_1 July 2016.docx (statssa.gov.za). Accessed on 8 August 2022.

Statistics of South Africa., 2011. Available at Main Place | Statistics South Africa (statssa.gov.za). Accessed on 8 August 2022.

Statistics of South Africa., 2020. Available at Bucket toilets increase in 2020 | Statistics South Africa (statssa.gov.za). Accessed on 01 August 2023.

Stip, C., Mao, Z., Bonzanigo, L., Browder, G. and Tracy, J., 2019. *Water Infrastructure Resilience: Examples of Dams, Wastewater Treatment Plants, and Water Supply and Sanitation Systems*. World Bank.

Stratton, S.J., 2021. Population research: convenience sampling strategies. *Prehospital and Disaster Medicine*, *36*(4), pp.373-374.

Street, R., Malema, S., Mahlangeni, N. and Mathee, A., 2020. Wastewater surveillance for Covid-19: an African perspective. *Science of the Total Environment*, *743*, p.140719.

Sweetman, C. and Medland, L., 2017. Introduction: gender and water, sanitation, and hygiene. *Gender & Development*, *25*(2), pp.153-166.

Swyngedouw, E. and Ward, C., 2022. Land as an asset. *Political Economy of Land. London: Routledge*.

Sylvia, M.L., 2018. Primary Data Collection. *Clinical Analytics and Data Management for the DNP*, p.87.

Tambe, S., 2022. Sustainable Livelihoods Approach. In *Teaching and Learning Rural Livelihoods*, pp. 45-56.

Tarantino, R., 2019. South African Water Rights and the Legacies of Apartheid.

Tatsvarei, S., Mwale-Manjoro, M., Mapiye, C., Marufu, M.C., Singh, J.A., Letty, B.A., Naidoo, S., Wright, C. and Aremu, A., 2021. Situational Analysis and Strategic Advisory of Framing and Food Security in South Africa in the Aftermath of Widespread Public Violence and Looting in KwaZulu-Natal and Gauteng Between 10-14 July 2021. *SAGE*, pp.1-11.

Tempelhoff, J., 2017. The Water Act, No. 54 of 1956 and the first phase of apartheid in South Africa (1948–1960). *Water History*, *9*, pp.189-213.

Thiede, R.N., Fabris-Rotelli, I.N., Stein, A., Debba, P. and Li, M., 2020. Uncertainty quantification for the extraction of informal roads from remote sensing images of South Africa. *South African Geographical Journal*, *102*(2), pp.249-272.

Thomas, B., Vinka, C., Pawan, L. and David, S., 2022. Sustainable groundwater treatment technologies for underserved rural communities in emerging economies. *Science of the Total Environment*, *813*, p.152633.

Thomson, D.R., Gaughan, A.E., Stevens, F.R., Yetman, G., Elias, P. and Chen, R., 2021. Evaluating the accuracy of gridded population estimates in slums: a case study in Nigeria and Kenya. *Urban Science*, *5*(2), p.48.

Todes, A. and Turok, I., 2018. Spatial inequalities and policies in South Africa: Place-based or people-centred?. *Progress in Planning*, *123*, pp.1-31.

Trepanier, L., Orare, J., Nyagwencha, J. and Grady, C., 2021. How are we actually doing? Comparing water and sanitation in Kenya with MDG and SDG criteria. *Journal of Water, Sanitation and Hygiene for Development*, *11*(4), pp.638-656.

Tseole, N.P., Mindu, T., Kalinda, C. and Chimbari, M.J., 2022. Barriers and facilitators to Water, Sanitation and Hygiene (WaSH) practices in Southern Africa: A scoping review. *Plos one*, *17*(8), p.e0271726.

Tusting, L.S., Bisanzio, D., Alabaster, G., Cameron, E., Cibulskis, R., Davies, M., Flaxman, S., Gibson, H.S., Knudsen, J., Mbogo, C. and Okumu, F.O., 2019. Mapping changes in housing in sub-Saharan Africa from 2000 to 2015. *Nature*, *568*(7752), pp.391-394.

Twani, N. and Soyapi, C.B., 2022. The legal accountability of local government in South Africa for the failure to deliver sanitation services. *South African Journal on Human Rights*, *38*(1-2), pp.92-111.

Vaismoradi, M. and Snelgrove, S., 2019. Theme in qualitative content analysis and thematic analysis. *FQS 20*(3), pp.1-14.

Van Hear, N., Bakewell, O. and Long, K., 2020. Push-pull plus: reconsidering the drivers of migration. In *Aspiration, Desire and the Drivers of Migration*, pp. 19-36.

Venter, C.J., Molomo, M. and Mashiri, M., 2014. Supply and pricing strategies of informal rural transport providers. *Journal of Transport Geography*, *41*, pp.239-248.

Vergunst, R., Swartz, L., Hem, K.G., Eide, A.H., Mannan, H., MacLachlan, M., Mji, G., Braathen, S.H. and Schneider, M., 2017. Access to health care for persons with disabilities in rural South Africa. *BMC Health Services Research*, *17*, pp.1-8.

Voleti, S., 2019. Data Collection. In *Essentials of Business Analytics*, pp. 19-39.

Wang, C., Pan, J., Yaya, S., Yadav, R.B. and Yao, D., 2019. Geographic inequalities in accessing improved water and sanitation facilities in Nepal. *International Journal of Environmental Research and Public Health*, *16*(7), p.1269.

Waniganeththi, G., 2017. Role of Participatory Rural Appraisal (PRA) Tools and Techniques for Rural Development Planning. Available at http://repository.kln.ac.lk/bitstream/handle/123456789/17709/349-364.pdf. Accessed on 5 June 2022.

Weston, S.J., Ritchie, S.J., Rohrer, J.M. and Przybylski, A.K., 2019. Recommendations for increasing the transparency of analysis of preexisting data sets. *Advances in Methods and Practices in Psychological Science*, *2*(3), pp.214-227.

Weststrate, J., Dijkstra, G., Eshuis, J., Gianoli, A. and Rusca, M., 2019. The sustainable development goal on water and sanitation: learning from the millennium development goals. *Social Indicators Research*, *143*, pp.795-810.

Whaley, L. and Cleaver, F., 2017. Can 'functionality'save the community management model of rural water supply?- *Water Resources and Rural Development*, *9*, pp.56-66.

White, S., Kuper, H., Itimu-Phiri, A., Holm, R. and Biran, A., 2016. A qualitative study of barriers to accessing water, sanitation and hygiene for disabled people in Malawi. *PloS one*, *11*(5), p.e0155043.

WHO/UNICEF Joint Water Supply and Sanitation Monitoring Programme, 2015. *Progress on sanitation and drinking water: 2015 update and MDG assessment*. World Health Organization. Available at: 9789241509145_eng.pdf;jse (who.int) Accessed on 20 May 2023.

Winkler, I.T., 2017. The human right to water. In *Routledge handbook of water law and policy*, pp. 109-119.

Winter, J.C., Darmstadt, G.L. and Davis, J., 2021. The role of piped water supplies in advancing health, economic development, and gender equality in rural communities. *Social Science & Medicine*, *270*, p.113599.

Wohl, A.R., Ludwig-Barron, N., Dierst-Davies, R., Kulkarni, S., Bendetson, J., Jordan, W., Bolan, R., Smith, T., Cunningham, W. and Pérez, M.J., 2017. Project engage: snowball sampling and direct recruitment to identify and link hard-to-reach HIV-infected persons who are out of care. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *75*(2), pp.190-197.

Wolf, J., Johnston, R., Freeman, M.C., Ram, P.K., Slaymaker, T., Laurenz, E. and Prüss-Ustün, A., 2019. Handwashing with soap after potential faecal contact: global, regional, and country estimates. *International Journal of Epidemiology*, *48*(4), pp.1204-1218.

World Health Organisation, 2019. *Progress on household drinking water, sanitation, and hygiene 2000-2017: special focus on inequalities*. World Health Organization. Available at https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=World+Health+Organisation%2C+2019.+Progress+on+household+drinking+water%2C+sanitation%2C+and+hygiene+2000-2017%3A+special+focus+on+inequalities&btnG= . Accessed on 3 February 2023.

World Health Organisation, 2021. Progress on household drinking water, sanitation and hygiene 2000-2020: five years into the SDGs.

World Health Organisation, 2023. Cholera: World Health Organization warns of rising cases in Africa. Available at https://doi.org/10.1136/bmj.p488. Accessed on 31 March 2023.

World Health Organisation. 2017a., UN-Water global analysis and assessment of sanitation and drinking-water (GLAAS) 2017 report: financing universal water, sanitation and hygiene

under the sustainable development goals. Available at https://www.who.int/publications/book-orders. Accessed on 7 February 2023.

World Health Organisation. 2017b., *Progress on household drinking water, sanitation, and hygiene 2000-2017: special focus on inequalities*. Available at Progress on Drinking Water, Sanitation and Hygiene: 2017 update and SDG baselines - UNICEF DATA. (Accessed on 20 May 2023).

World Health Organisation. 2018., *Who water, sanitation and hygiene strategy 2018-2025* (No. WHO/CED/PHE/WSH/18.03). World Health Organisation.

World Health Organisation., 2022. UN-Water global analysis and assessment of sanitation and drinking-water (GLAAS) 2022 report: evidence on key insights into accelerating progress on sanitation, drinking-water and hygiene. Available at: https://iris.who.int/bitstream/handle/10665/365297/9789240065031-eng.pdf?sequence=1. Accessed on 11 November 2023.

Wrisdale, L., Mokoena, M.M., Mudau, L.S. and Geere, J.A., 2017. Factors that impact on access to water and sanitation for older adults and people with disability in rural South Africa: An occupational justice perspective. *Journal of Occupational Science*, *24*(3), pp.259-279.

Xiong, X., 2022. Critical Review of Quantitative and Qualitative Research. In *2022 3rd International Conference on Mental Health, Education and Human Development (MHEHD 2022)*, pp. 956-959.

Xu, Z., Yao, L., Zhang, Q., Dowaki, K. and Long, Y., 2020. Inequality of water allocation and policy response considering virtual water trade: a case study of Lanzhou city, China. *Journal of Cleaner Production*, *269*, p.122326.

Yaya, S., Hudani, A., Udenigwe, O., Shah, V., Ekholuenetale, M. and Bishwajit, G., 2018. Improving water, sanitation and hygiene practices, and housing quality to prevent diarrhea among under-five children in Nigeria. *Tropical medicine and infectious disease*, *3*(2), p.41.

Yeboah-Antwi, K., MacLeod, W.B., Biemba, G., Sijenyi, P., Höhne, A., Verstraete, L., McCallum, C.M. and Hamer, D.H., 2019. Improving sanitation and hygiene through community-led total sanitation: the Zambian experience. *The American Journal of Tropical Medicine and Hygiene*, *100*(4), p.1005.

Yoosefi Lebni, J., Mohammadi Gharehghani, M.A., Soofizad, G. and Irandoost, S.F., 2020. Challenges and opportunities confronting female-headed households in Iran: a qualitative study. *BMC Women's Health*, *20*(1), pp.1-11.

Young, E., 2017. *Tribal communities in rural areas*. Canberra, ACT: Development Studies Centre, The Australian National University.

Zakar, M.Z., Zakar, D.R. and Fischer, F., 2020. Climate change-induced water scarcity: a threat to human health. *South Asian Studies*, *27*(2), pp.293-312

Zerbo, A., Delgado, R.C. and González, P.A., 2021. Water sanitation and hygiene in Sub-Saharan Africa: Coverage, risks of diarrheal diseases, and urbanization. *Journal of Biosafety and Biosecurity*, *3*(1), pp.41-45.

Ziegenfuss, J.Y., Easterday, C.A., Dinh, J.M., JaKa, M.M., Kottke, T.E. and Canterbury, M., 2021. Impact of demographic survey questions on response rate and measurement: A randomized experiment. *Survey Practice*, *14*(1), pp.1-11

Ziervogel, G., New, M., Archer van Garderen, E., Midgley, G., Taylor, A., Hamann, R., Stuart-Hill, S., Myers, J. and Warburton, M., 2014. Climate change impacts and adaptation in South Africa. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(5), pp.605-620.

Zindi, B. and Shava, E., 2022. COVID-19 and the attainment of Sustainable Development Goal 6 (clean water and sanitation) in South Africa. *Journal of Local Government Research and Innovation*, *3*, pp.1-10.

Zuin, V., Delaire, C., Peletz, R., Cock-Esteb, A., Khush, R. and Albert, J., 2019. Policy diffusion in the rural sanitation sector: lessons from community-led total sanitation (CLTS). *World Development*, *124*, p.104643.

Appendix 1 Questionnaire English version

College of Humanities

Discipline of Geography

University of KwaZulu-Natal

Howard College

269 Mazisi Kunene Road

Durban

4041

South Africa

HSSREC Research Office

University of KwaZulu-Natal

Research Office: Ethics

Govan Mbeki Centre

Tel +27312604557

Fax +27312604609

COMMUNITY PERCEPTIONS REGARDING CHALLENGES ASSOCIATED WITH WATER AND SANITATION. A COMPARATIVE STUDY OF MSUNDUZE, INTAPHUKA, KWAZINI, AND MKHUKHUZE, NDWEDWE LOCAL MUNICIPALITY, KWAZULU-NATAL

QUESTIONNAIRE FOR HOUSEHOLD SURVEY

Ndwedwe Local Municipality

Community _____

1. DEMOGRAPHIC INFORMATION

1.1 Gender

1. Male	
2. Female	

1.2 Age

1. 18-25	
2. 26-35	
3. 36-45	
4. 46-55	
5. 56-65	
6. > 65	

1.3 Nationality

1. South African citizen	
2. Foreign national	
3. Permanent resident	

1.3.1 If a South African citizen, identify race

1. African	
2. White	
3. Indian	
4. Coloured	
5. Other (Specify)	

1.4 Home language

1. IsiZulu	
2. English	
3. IsiXhosa	
4. Afrikaans	
5. Other (Specify)	

1.5 Disability

1. Yes	
2. No	

1.5.1 If yes, identify the disability that you have.

1.6 Marital status

1. Single	
2. Living with partner	
3. Married	
4. Separated	
5. Widowed	

1.6.1 If married, is your spouse a migrant labourer?

1. Yes	
2. No	

1.7 Do you suffer from any health issues (Multiple response – tick as many as are applicable)

1. Tuberculosis	
2. Influenza	
3. Diabetes	
4. High blood pressure	
5. Skin rashes	
6. Cholera	
7. Bilharzia	
8. Asthma	
9. Cancer	
10. Other (Specify)	

1.8 How far away is the nearest clinic?

1. <500 m	
2. 0-1 km	
3. 2-5 km	
4. 6-10 km	
5. 11-15 km	
6. 16-20 km	
7. >20 km	

1.9 Are you the head of your household?

1. Yes	
2. No	

1.9.1 If not, who is the head of your household?

1.10 Highest level of education

1. None	
2. Left in primary school	
3. Left in secondary school	
4. Matriculated	
5. Tertiary education (Specify)	
6. Other (Specify)	

1.11 What type of employment do you hold?

1. Unemployed	
2. Domestic	
3. Laboured	
4. Business owner	
5. Manager	
6. Technical	
7. Artisan	
8. Professional	
9. Grant holder (Specify type of grant)	
10. Other (Specify)	

2. HOUSEHOLD BACKGROUND INFORMATION

2.1 Number of people living in your household

0	1	2	3	4	5	6	7	8	9	>10

2.2 Under which category does this household fall?

1. Male headed	
2. Female headed	
3. Other (Specify)	

2.3 How many people are working in this household?

1. None	
2. 1-3	
3. 4-6	
4. > 7	

2.4 Main source of monthly income in this household

1. None	

2. Child support grant	
3. Remittances	
4. Salary (formal)	
5.Wage (contract)	
6. Pension	
7. Disability grant	
8. Other (Specify)	

2.5 Total monthly income level

1. None	
2. R100-R500	
3. R501-R1000	
4. R1001-R3000	
5. R3001-R5000	
6. > R5000	

2.6 Does this family own this land?

1. Yes	
2. No	

2.6.1 If not, who is the owner?

_____

2.7 How long have you been living in this area?

1. < 1 year	
2. 1-5 years	
3. 6-15 years	
4. 16-30 years	
5. > 30 years	

2.8 Have you or your family lived elsewhere before?

1. Yes	

2. No	

2.8.1 If yes, why did you relocate here?

1. Forced removals	
2. Better prospects	
3. Other (Specify)	

3. ACCESS TO WATER

3.1 Household's main source of water

1. Borehole	
2. River	
3. Stream	
4. Rainwater tanker	
5. Water tanker	
6. Local water scheme	
7. Spring	
8. Dam	
9. Pool	
10. Water vendor	
11. Piped tap water	
12. Tap within household	
13. Other (Specify)	

3.2 Is the water always available at the source?

1. Yes	
2. No	

3.2.1 If not, identify the cause?

1. Lack of rain	
2. Lack of municipal action	
3. Lack of infrastructure	
4. Other (Specify)	

3.3 Identify whom collects the water?

1. Mother	
2. Father	
3. Girl child	
4. Boy child	
5. Other (Specify)	

3.4 How many times per day do you collect water?

1. Once	

2. Twice	
3. Thrice	
4. Other (Specify)	

3.5 Do you walk a long distance to the water source?

1. Yes	
2. No	

3.6 What is the distance to the water source?

1. < 1km	
2. 1km	
3. 2km	
4. 3km	
5. > 3km	

3.7 What is the appropriate time it takes you to fetch water?

1.30 minutes	
2. 1 hour	
3. 1 hour and 30 minutes	
4. 2 hours	
5. Other (Specify)	

3.8 Are you at risk when travelling long distances?

1. Yes	
2. No	

3.8.1 If yes, elaborate on the risk when travelling long distances.

_____

_____

_____

4. SANITATION AND DISEASES

4.1 Is the water safe for consumption from the source?

1. Yes	
2. No	

4.1.1 If not, why is the water not safe for consumption from the source?

_____

_____

4.2 Type of household sanitation (Multiple responses – tick as many as are applicable)

1. None	
2. Flush toilet (connected to sewage system)	
3. Flush toilet (with septic tank)	
4. Chemical toilet	
5. Pit latrine (with ventilation)	
6. Pit latrine (without ventilation)	
7. Bucket toilet	
8. Other (Specify)	

4.3 Is water available for sanitation purposes?

1. Yes	
2. No	

4.3.1 If not, identify the cause relating to the unavailability of water for sanitation purposes.

_____

_____

4.4 Have you contracted diseases due to poor sanitation?

1. Yes	
2. No	

4.4.1 If yes, identify the diseases that you have contracted due to poor sanitation.

_____

_____

_____

4.5 Have your family members contracted diseases due to poor sanitation?

1. Yes	
2. No	

4.5.1 If yes, identify the diseases that the family have contracted due to poor sanitation.

_____

_____

_____

4.6 Have you suffered from any of these diseases below? (Multiple responses – tick as many as are applicable)

1. Diarrhoea	
2. Coronavirus (COVID-19)	
3. Cholera	
4. Malaria	
5. Typhoid fever	
6. Poliovirus	
7. Other (Specify)	

4.7 Identify whom suffers the most from these diseases?

1. Men	
2. Women	
3. Children	
4. Other (Specify)	

4.7.1 Please elaborate further on your choice above.

_____

_____

4.8 Do you practice safe hygiene as the country is currently under the COVID-19 pandemic?

1. Yes	
2. No	

4.8.1 If not, what limits you from practicing safe hygiene?

_____

_____

4.9 Do you practice safe hygiene during menstruation? (Applicable to females only)

1. Yes	
2. No	

4.9.1 If not, what is the cause for not practicing safe hygiene during menstruation?

_____

_____

5. COMMUNITY'S COPING MECHANISMS

5.1 What other alternative water sources do you use? (Multiple responses –tick as many as are applicable)

1. Well communal	
2. River	
3. Borehole	
4. Dam	
5. Public taps	
6. Flowing streams	
7. Rainwater tanks on site	
8. Other (Specify)	

5.2 Are these alternative sources reliable?

1. Yes	
2. No	

5.2.1 If not, why are these alternative sources unreliable?

_____

_____

5.3 Is the walking distance longer to the alternative sources in comparison to the main water sources?

1. Yes	
2. No	

5.4 Identify the container that you fetch water in (Multiple responses – tick as many as are applicable)

1. 20L Plastic bottle	
2. 30L Plastic bottle	
3. 20L Bucket	

4. 30L Bucket	
5. Roller drum	
6. Other (Specify)	

5.5 What do you use to carry the water? (Multiple responses – tick as many as are applicable)

1. Wheelbarrow	
2. Head loading	
3. Carry by hands	
4. Car	
5. Bicycle	
6. Other (Specify)	

5.6 Where do you store water? (Multiple response – tick as many as are applicable)

1. Steel drum	
2. Plastic drum	
3. Buckets	
4. Plastic bottles	
5. Plastic tank	
6. Jojo tanks	
6. Other (Specify)	

5.7 Have you ever been forced to purchase water due to unavailability?

1. Yes	
2. No	

5.7.1 If yes, where do you buy the water?

1. Vendors within your area	
2. Vendors nearest to your area	
3. Other (Specify)	

5.7.2 How much do you pay for water?

1. < R200	
2. R200-R400	
3. > R400	
4, Other (Specify)	

6. COMMUNITY INITIATIVES

6.1 Are there any community initiatives that have been developed to counteract the issue of water?

1. Yes	
2. No	

6.1.1 If yes, please elaborate on these community initiatives that have been developed to counteract the issues of water.

_____
_____
_____
_____
_____
_____

6.2 Is the community assisted by Non-Governmental Organisations?

1. Yes	
2. No	

6.2.1 If yes, please identify these Non-Governmental Organisations.

_____
_____
_____

6.2.2 How would you rate the Non-Governmental Organisations in terms of providing assistance?

1. Very good	
2. Good	
3. Bad	
4. Very bad	

6.3 Is the community assisted by Non-Profit Organisations?

1. Yes	
2. No	

6.3.1 If yes, please identify these Non-Profit Organisations.

_____
_____
_____

6.3.2 How would you rate the Non-Profit Organisations in terms of providing assistance?

1. Very good	
2. Good	
3. Bad	
4. Very bad	

7. NDWEDWE LOCAL MUNICIPALITY INTERVENTIONS

7.1 Which of these water supply infrastructures have been installed by the municipality? (Multiple responses – tick as many as are applicable)

1. Reservoir	
2. Borehole pumps	
3. Reticulation pipes	
4. Standpipes	
5. Tanks	
6. Electrical water pump engine	
7. Other (Specify)	

7.2 Are the water infrastructures well maintained in the community?

1. Yes	
2. No	

7.2.1 If not, identify the reasons for the malfunctioning of water infrastructure?

_____
_____
_____

7.3 Does the community sometimes experience damage of water infrastructure?

1.Yes	
2. No	

7.3.1 If yes, does the community experience failure of water infrastructure?

1.Yes	
2. No	

7.4 Rate the service of the current water supply?

1. Very good	
2. Good	
3. Bad	
4. Very bad	

7.4.1 Please elaborate further on your rating above?

_____
_____

7.5 Is the community notified about unavailability of water?

1. Yes	
2. No	

7.5.1 If not, why do you think the community is not notified?

_____
_____
_____

7.6 Do you feel the municipality is adequately tackling the issue of water availability in the community?

1. Yes	
2. No	

7.6.1 If not, why do you feel that the municipality is not adequately tackling the issue of water availability in the community?

_____
_____
_____
_____

8. SUGGESTIONS

8.1 Provide a list of stakeholders that you perceive can improve the issue of water in this community.

_____
_____
_____
_____
_____

8.2 Do you feel that the community is an important stakeholder who could be involved in issues pertaining to water and sanitation?

1. Yes	
2. No	

8.2.1 If yes, how can the community's involvement be more effective?

_____
_____
_____
_____

8.3 Can you provide future initiatives whereby the community is at the forefront of decisions regarding water and sanitation issues?

_____
_____
_____
_____

8.4 List and elaborate on the various ways that the community can be involved with the maintenance of water infrastructure.

_____
_____
_____

8.5 Are there any additional comments you would like to add on this matter?

_____
_____
_____
_____
_____

END OF QUESTIONNAIRE. THANK YOU FOR YOUR COOPERATION.

Appendix 2 Questionnaire IsiZulu version

College of Humanities

Discipline of Geography

University of KwaZulu-Natal

Howard College

269 Mazisi Kunene Road

Durban

4041

South Africa

HSSREC Research Office

University of KwaZulu-Natal

Research Office: Ethics

Govan Mbeki Centre

Tel +27312604557

Fax +27312604609

IZINDLELA UMPHAKATHI OBUKA NGAYO IZINSELELO EZIMAYELANA NAMANZI KANYE NOKUTHUTHWA KWENDLE. UCWANINGO OLUQHATHANISA UMSUNDUZE, INTAPHUKA, KWAZINI NOMKHUKHUZE KUMASIPALA WASENDWEDWE ESIFUNDAZWENI SAKWAZULU NATAL

IMIBUZO YOCWANINGO EBHEKISWE KUMUZI NOMUZI

uMasipala waseNdwedwe

Umphakathi _____

1. ULWAZI NGEZIBALO ZABANTU

1.1 Ubulili

1. Isilisa	
2. Isifazane	

1.2 Iminyaka

1. 18-25	
1. 26-35	
2. 36-45	
3. 46-55	
4. 56-65	
5. > 65	

1.3 Ubuzwe

1. Ungowase Ningizimu Afrika	
2. Ungowokufika kuleli	
3. Ungumhlali oseneminyaka kuleli	

1.3.1 Uma ungumnsinsi eNingizimu Afrika, yisho ubuzwe bakho

1. Um-Afrika	
2. Umlungu	
3. Indiya	
4. Ikhaladi	
5. Okunye (Kubalule)	

1.4 Ulimi lwasekhaya

1. IsiZulu	
2. Isingisi	
3. IsiXhosa	
4. Isibhunu	
5. Okunye (Kubalule)	

1.5 Ukukhubazeka

1. Yebo	
2. Cha	

1.5.1 Uma uthi yebo, balula uhlobo lokukhubazeka onakho.

1.6 Isimo sakho somshado

1. Awushadile	
2. Unomasihlalisane	
3. Ushadile	
4. Uhlukanisile	
5. Umfelwa/Umfelokazi	

1.6.1 Uma ushadile, ngakube oshade naye owafika kule ndawo esuka kwenye indawo ngenxa yomsebenzi?

1. Yebo	
2. Cha	

1.7 Ngakube bukhona ubuthakathaka onabo ngokwempilo (Izimpendulo zingaba ziningi, khetha zonke ezikulungele)

1. Isifo sofuba	
2. Umkhuhlane	
3. Isifo sikashukela	
4. Umfutho wegazi ophezulu	
5. Amaqhuqhumba emzimbeni	
6. Ikholera	
7. Isichenene	
8. Isifo somoya	
9. Umdlavuza	
10. Okunye (Kubalule)	

1.8 Umtholampilo uqhele kangakanani nalapho ohlala khona?

1. <500 m	
2. 0-1 km	
3. 2-5 km	
4. 6-10 km	
5. 11-15 km	
6. 16-20 km	
7. >20 km	

1.9 Ngakube uyinhloko yekhaya yini?

1. Yebo	

2. Cha	

1.9.1 Uma ungeyona, ngubani oyinhloko yekhaya?

_____

1.10 Amazinga emfundo ephakeme

1. Awekho nhlobo	
2. Ngashiya emabangeni aphansi	
3. Ngashiya emabangeni aphezulu	
4. Ngafika kumatikuletsheni	
5. Ngafika emfundweni ephakeme	
6. Okunye (Kubalule)	

1.11 Ngakube uyasebenza?

1. Angisebenzi	
2. Ngisiza ezindlini	
3. Ngingumsebenzi ojwayelekile	
4. Nginebhizinisi	
5. Ngiyimenenja	
6. Ngisebenza ngobuchwepheshe	
7. Nginekhono lomsebenzi engiwenzayo	
8. Nginolwazi/Ngiwufundele umsebenzi	
9. Ngiyahola (Balula uhlobo lokuhola)	
10. Okunye (Kubalule)	

2. IMININGWANE NGOMUZI

2.1 Isibalo sabantu abahlala kulo muzi

0	1	2	3	4	5	6	7	8	9	>10

2.2 Ngakube lo muzi ungena ngaphansi kwaluphi uhla kulezi ezilandelayo?

1. Owesilisa oyinhloko yekhaya	
2. Owesifazane oyinhloko yekhaya	
3. Okunye (Kubalule)	

2.3 Bangakhi abantu abasebenzayo kulo muzi?

1. Akekho	
2. 1-3	
3. 4-6	
4. > 7	

2.4 Imali itholakala kanjani nyanga zonke kulo muzi?

1. Akutholakali mali	
2. Isondlo sezingane	
3. Ukuthunyelelwa imali	
4. Umholo (Umuntu osebenzayo)	
5.Umholo (Umuntu otohozayo)	
6. Impesheni	
7. Umholo wokukhubazeka	
8. Okunye (Kubalule)	

2.5 Isamba semali engenayo ngenyanga

1. Ayikho	
2. R100-R500	
3. R501-R1000	
4. R1001-R3000	
5. R3001-R5000	
6. > R5000	

2.6 Ngakube lo mndeni ungabanikazi bale ndawo?

1. Yebo	
2. Cha	

2.6.1 Uma kungenjalo, ngubani umnikazi?

_____

2.7 Sewunesikhathi esingakanani uhlala kule ndawo?

1. < unyaka	
2. 1-5 weminyaka	
3. 6-15 weminyaka	
4. 16-30 weminyaka	
5. > 30 weminyaka	

2.8 Ngakube wena noma umndeni wakho uke wahlala kwenye indawo ngaphambilini?

1. Yebo	
2. Cha	

2.8.1 Uma uthi yebo, yini eyakuletha kule ndawo?

1. Ukususwa ngenkani	
2. Ukufuna amadlelo aluhlaza	
3. Okunye (Kubalule)	

3. **INDLELA YOKUTHOLA AMANZI** 3.1 Indlela lo muzi othola ngayo amanzi

1. Amomwa phansi	
2. Emfuleni	
3. Emaxhaphozini/emihosheni	
4. Amanzi emvula	
5. Amaloli amanzi	
6. Uhlelo lomphakathi lokuthola amanzi	
7. Iziphethu	
8. Amadanyini	
9. Ezingoxweni	
10. Kwabawadayisayo	
11. Amanzi kampompi	
12. Umpompi osegcekeni	
13. Okunye (Kubalule)	

3.2 Ngakube amanzi ahlala ekhona yini la etholakala khona?

1. Yebo	
2. Cha	

3.2.1 Uma kungenjalo, balula isizathu?

1. Imvula ayikho	
2. UMasipala akasizi	

3. Ukungabibikho kwengqalasizinda	
4. Okunye (Kubalule)	

3.3 Ngubani okha amanzi?

1. Umama	
2. Ubaba	
3. Intombazane	
4. Umfana	
5. Okunye (Kubalule)	

3.4 Uwakha kangakhi amanzi ngosuku??

1. Kanye	
2. Kabili	
3. Kathathu	
4. Okunye (Kubalule)	

3.5 Ngakube uhamba ibanga elide yini uma uyokha amanzi?

1. Yebo	
2. Cha	

3.6 Uhamba ibanga elingakanani ukuyokha amanzi?

1. < 1km	
2. 1km	
3. 2km	
4. 3km	
5. > 3km	

3.7 Ngakube kucishe kube isikhathi esingakanani ukuyokha amanzi ?

1. 30 wemizuzu	
2. 1 ihora	
3. 1ihora nemizuzu engama-30	
4. 2 amahora	
5. Okunye (Kubalule)	

3.8 Bukhona yini ubungozi uma uhamba amabanga amade??

1. Yebo	
2. Cha	

3.8.1 Uma uthi yebo, chaza ingozi ekhona uma uhamba amabanga amade.

_____

_____

_____

4. UHLELO LOKUTHUTHWA KWENDLE KANYE NEZIFO

4.1 Ngakube amanzi aphephile ukuba angasetshenziswa ngabantu lapho niwathola khona?

1. Yebo	
2. Cha	

4.1.1 Uma kungenjalo, iyini imbangela yokuba amanzi angakulungeli ukusetshenziswa ngabantu lapho eniwakha khona?

_____

_____

4.2 Ihlelo lo muzi lokuthuthwa kwendle (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

1. Alukho	
2. Ithoyilethi elishaywayo (elixhunywe epayipini elihambisa indle)	
3. Ithoyilethi elishaywayo (elixhunywe ethangini eliqoqa indle)	
4. Ithoyilethi elisebenzisa izibulali magciwane	
5. Ithoyilethi lomgodi (elingena umoya)	
6. Ithoyilethi lomgodi (elingangeni umoya)	
7. Uhlelo lwamabhakede	
8. Okunye (Kubalule)	

4.3 Ngakube amanzi akhona yini okuhambisa indle?

1. Yebo	
2. Cha	

4.3.1 Uma kungenjalo, yini edala ukuba amanzi angabibikho ukuhambisa indle?

_____

_____

4.4 Uke wangenwa yini yizifo ngenxa yokungahanjiswa ngendlela kwendle?

1. Yebo	
2. Cha	

4.4.1 Uma impendulo kunguyebo, shono izifo ezakungena ngenxa yokungahanjiswa ngendlela kwendle.

_____

_____

_____

4.5 Ngakube akhona yini amanye amalunga omndeni wakho ake azithola engenwa yizifo ezithile ngenxa yokungathuthwa ngendlela kwendle?

1. Yebo	
2. Cha	

4.5.1 Uma impendulo kunguyebo, nikeza uhlobo lwezifo ezabangena.

_____

_____

_____

4.6 Ngakube wake waphathwa yini esinye salezi zifo ezilandelayo (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

1. Isifo sohudo esidalwa ngamanzi angcolile	
2. Ikhorona	
3. Ikholera	
4. Umlaleveva	
5. i-Typhoid fever	
6. Isifo sephepha	
7. Ezinye (Zibalule)	

4.7 Ngakube ngobani abaphathwa kakhulu yilezi zifo?

1. Amadoda	
2. Abesifazane	
3. Izingane	
4. Abanye (Babalule)	

4.7.1 Ngicela uchaze wenabe ngempendulo oyikhethile ngenhla.

_____

_____

4.8 Ngakube uyayiqikelela yini inhlanzeko njengoba izwe lihlaselwe wubhubhane lwesifo sekhorona?

1. Yebo	
2. Cha	

4.8.1 Uma impendulo kungu-cha, yini ebangela ukuba ungayinaki inhlazeko?

_____

_____

4.9 Ngakube uma usezinsukwini zakho, uyakuqhaphela yini ukuthi kufanele uhlale uhlanzekile? (Abasefazane kuphela abangaphendula lo mbuzo)

1. Yes	
2. No	

4.9.1 Uma impendulo kungu-cha, yini evimba ukuba ungayinaki inhlanzeko uma usezinsukwini zakho?

_____

_____

5. INDLELA UMPHAKATHI OKWAZI UKUPHILA NGAYO

5.1Yiziphi ezinye izindlela zokuthola amanzi eniyisebenzisayo? (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

Isiphethu somphakathi owazakhela wona	
2. Umfula	
3. amanzi ambiwa phansi	
4. Idamu	
5. Ompompi bomphakathi	
6. Emihosheni egelezayo	
7. Amanzi emvula angena emathangini akhongezelwe egcekeni	
8. Okunye (Kubalule)	

5.2 Ngakube lezi zindlela zokuthola amanzi zithembekile?

1. Yebo	
2. Cha	

5.2.1 Uma kungenjalo, kungani lezi zindlela zokuthola amnzi zingathembekile?

_____

_____

5.3 Ngakube ibanga olihambayo lide kakhulu yini ukuya kwizindawo enithola kuzo amanzi uma uqhathanisa nale enijwayele ukuwathola kuyo?

1. Yebo	
2. Cha	

5.4 Balula uhlobo lwesiqukathi osisebenzisayo uma ukha amanzi (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

1. 20L isigubhu	
2. 30L isigubhu	
3. 20L ibhakede	
4. 30L ibhakede	
5. Idilamu	
6. Okunye (Kubalule)	

5.5 Yini oyisebenzisayo ukuthwala amanzi? (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

1. Ibhala	
2. Uyawathwala	
3. Uwaphatha ngezandla	
4. Ngemoto	
5. Ngebhayisikili	
6. Okunye (Kubalule)	

5.6 Uwagcina kuphi amanzi? (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

1. Idilamu lensimbi	
2. Idilamu likaplastiki	
3. Amabhakede	

4. Amabhodlela kaplastiki	
5. Amathangi kaplastiki	
6. Ojojo	
6. Okunye (Kubalule)	

5.7 Ngakube wake waphoqeleka yini ukuthenga amanzi ngenxa yokushoda kwawo?

1. Yebo	
2. Cha	

5.7.1. Uma wake wawathenga, uwathenga kuphi?

1. Kwabawadayisayo endaweni	
2. Kwabawadayisayo abaseduze nalapho ohlala khona	
3. Okunye (Kubalule)	

5.7.2 Ukhokha malini uma uthenga amanzi?

1. < R200	
2. R200-R400	
3. > R400	
4.Okunye (Kubalule)	

6. IQHAZA LOMPHAKATHI

6.1 Ngakube zikhona yini izinhlelo lapho umphakathi uzama khona ukubhekana nenselelo yokushoda kwamanzi?

1. Yebo	
2. Cha	

6.1.1 Uma uthi yebo, yiziphi lezo zindlela ezasungulwa umphakathi ukuzama ukuxazulula inkinga yamanzi?

_____

_____

_____

_____

_____

6.2 Ngakube izinhlangano ezingekho ngaphansi kukahulumeni ziyawusiza yini umphakathi kule nkinga yamanzi?

1. Yebo	
2. Cha	

6.2.1 Uma impendulo kungu-yebo, zibalule lezo zinhlangano.

6.2.2 Ngakube izinhlangano ezingekho ngaphansi kukahulumeni zilibamba kangakanani iqhaza ekusizeni umphakathi?

1. Zilusizo ngendlela eyisimanga	
2. Zilusizo kakhulu	
3. Azinalo usizo	
4. Zifana nezingekho	

6.3 Ngakube izinhlangano ezizimele futhi ezingekho ngaphansi kukahulumeni ziyawusiza yini umphakathi kule nkinga yamanzi?

1. Yebo	
2. Cha	

6.3.1 Uma impendulo kungu-yebo, zibalule lezo zinhlangano.

6.3.2 Ngakube izinhlangano ezizimele futhi ezingekho ngaphansi kukahulumeni zilibamba kangakanani iqhaza ekusizeni umphakathi?

1. Zilusizo ngendlela eyisimanga	
2. Zilusizo kakhulu	
3. Azinalo usizo	
4. Zifana nezingekho	

7. UKUNGENELELA KUKAMASIPALA WASENDWEDWE

7.1 Ngakube iyiphi ingqalasizinda eyafakwa uMasipala kulezi ezilandelayo (Izimpendulo zingaba ziningi – khetha zonke ezikulungele)

1. Izigcini manzi	
2. Uhlelo lokumpontshwa kwamanzi	

3. Amanzi ahanjiswa ngamapayipi	
4. Ompompi abaxhunyelwe ezintweni zokubambisa	
5. Amathangi	
6. Izinjini ezimpompa amanzi ngogesi	
7. Okunye (Kubalule)	

7.2 Ngakube ingqalasizinda inakekeleke kahle yini emphakathini?

1. Yebo	
2. Cha	

7.2.1 Uma kungenjalo, veza izizathu ezenza ukuba ingqalasizinda inganakekeleki?

_____

_____

_____

7.3 Ngakube umphakathi uke ukubone yini ukucekelwa phansi kwengqilasizinda?

1.Yebo	
2. Cha	

7.3.1 Uma kunjalo, ngakube umphakathi uye ukubone yini ukuhluleka kokusebenza kwengqalasizinda yamanzi?

1.Yebo	
2. Cha	

7.4 Ake ulinganise usizo olunikezwe uhlelo lokulethwa kwamanzi olukhona njengamanje emphakathini ngokwalezi zilinganiso ezilandelayo ?

1. Ilusizo ngendlela eyisimanga	
2. Ilusizo kakhulu	
3. Ayinalusizo	
4. Ifana nengekho nhlobo	

7.4.1 Chaza kabanzi ngalokhu okukhethile ngenhla?

_____

_____

7.5 Ngabe umphakathi uyaziswa yini ngokungabibikho kwamanzi?

1. Yebo	
2. Cha	

7.5.1 Uma ungazwisa, ucabanga ukuthi iyini imbangela yokungaziswa kwawo?

_____

_____

_____

7.6 Ucabanga ukuthi uMasipala uluthatha ngendlela efanele yini udaba lokutholakala kwamanzi emphakathini?

1. Yebo	
2. Cha	

7.6.1 Uma kungenjalo, yini eyenza ukuthi ucabange ukuthi uMasipala akenzi okwanele ukuxazulula inkinga yamanzi?

_____

_____

_____

_____

8. IZIPHAKAMISO

8.1 Nikeza uhla lwabantu ocabanga ukuthi bangabamba iqhaza ekuxazululeni inkinga yamanzi kulo mphakathi.

_____

_____

_____

_____

_____

8.2 Ucabanga ukuthi umphakathi uyingxenye ebalulekile yini ukuba ubandakanywe odabeni lokuxazulula inkinga yamanzi nokuthuthwa kwendle?

1. Yebo	
2. Cha	

8.2.1 Uma uvuma, kungenzeka kanjani ukuthi ukuzibandakanya komphakathi kulolu hlelo kuthele izithelo ezinhle?

_____

8.3 Ake unikeze izinhlelo ezingalandelwa lapho umphakathi unganikezwa khona ithuba lokuba ngongqaphambili ekuthathweni kwezinqumo ezinhlelweni zokulethwa kwamanzi nokuthuthwa kwendle.

8.4 Yisho bese uchaza kabanzi izindlela ezahlukahlukene lapho umphakathi ongabandakanywa ngazo ukugcina ingqalasizinda isebenza ngendlela efanele.

8.5 Ngakube kukhona yini okunye ongafisa ukukuphawula ngalolu daba?

IMIBUZO IYAPHELA SIYABONGA KAKHULU NGOKUBAMBISANA NAMI.

Appendix 3 Consent form English version

College of Humanities
Discipline of Geography
University of KwaZulu-Natal
Howard College
269 Mazisi Kunene Road
Durban
4041
South Africa

HSSREC Research Office
University of KwaZulu-Natal
Research Office: Ethics
Govan Mbeki Centre
Tel +27312604557
Fax +27312604609

COMMUNITY PERCEPTIONS REGARDING CHALLENGES ASSOCIATED WITH WATER AND SANITATION. A COMPARATIVE STUDY OF MSUNDUZE, INTAPHUKA, KWAZINI, AND MKHUKHUZE, NDWEDWE LOCAL MUNICIPALITY, KWAZULU-NATAL

Consent to participate in Masters project

I, Nelile Nosipho Hlongwa, with student number (217019104), am a masters student at the University of KwaZulu-Natal. I am conducting a research project titled: "Community perceptions regarding challenges associated with water and sanitation. A comparative study of Msunduze, Intaphuka, Kwazini, and Mkhukhuze, Ndwedwe Local Municipality".

The aim of this study is to to assess community perceptions regarding challenges associated with water and sanitation in Msunduze, Intaphuka, Kwazini, and Mkhukhuze, Ndwedwe Local Municipality, KwaZulu-Natal, South Africa.

The objectives of this study are as follow:

- To investigate the causes resulting in the lack of access to clean water in Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities in Ndwedwe Local Municipality, KwaZulu-Natal.

- To assess the impacts of poor sanitation on relevant diseases in Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities in Ndwedwe Local Municipality, KwaZuluNatal.

- To identify adaptive capacities used to counteract issues of access to safe water in Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities in Ndwedwe Local Municipality, KwaZulu-Natal.

- To review existing literature on themes associated with water and sanitation challenges in Sub-Saharan Africa.

- To provide recommendations in ensuring there is adequate access to water and improved sanitation in Msunduze, Intaphuka, Kwazini, and Mkhukhuze communities in Ndwedwe Local Municipality, KwaZulu-Natal.

Participation in this study is undertaken with a consideration that:

1. You will remain anonymous at all times.
2. Your confidentiality will be ensured.
3. No personal information such as names or addresses will be stated when the information is used in the thesis.
4. Participation is voluntary. You can choose to withdraw from participating at any time.
5. The information you provide will only be used for the purpose of this research.
6. The responses given by you will provide this research with information on the challenges associated with water and sanitation in Ndwedwe Local Municipality, KwaZulu-Natal.
7. The data obtained will be stored by Dr S.A Desai, the supervisor of this research project, at the University of KwaZulu-Natal.

For further information:

Researcher: Nelile Nosipho Hlongwa – 217019104@stu.ukzn.ac.za

Cell number: 0636756768

Supervisor: Dr S.A Desai – Desai@ukzn.ac.za

Cell number: 0725481410

Declaration:

I……

(full names of the participant) hereby confirm that I understand the content of this document and the nature of the research project, and I consent to participate in the research project. I understand that I am at liberty to withdraw from the project at any time, should I wish to do so.

……. ……

Signature Date

Appendix 4 Consent form IsiZulu version

College of Humanities
Discipline of Geography
University of KwaZulu-Natal
Howard College
269 Mazisi Kunene Road
Durban
4041
South Africa

HSSREC Research Office
University of KwaZulu-Natal
Research Office: Ethics
Govan Mbeki Centre
Tel +27312604557
Fax +27312604609

IZINDLELA UMPHAKATHI OBUKA NGAYO IZINSELELO EZIMAYELANA NAMANZI KANYE NOKUTHUTHWA KWENDLE. UCWANINGO OLUQHATHANISA UMSUNDUZE, INTAPHUKA, KWAZINI, NOMKHUKHUZE KUMASIPALA WASENDWEDWE ESIFUNDAZWENI SAKWAZULU NATAL

Imvume yokubamba iqhaza kwiziqu ze-Masters

Mina, Nelile Nosipho Hlongwa, inombolo yokufunda ithi (217019104), ngenza iziqu zami ze-Masters eNyuvesi yaKwaZulu-Natal. Ngenza ucwaningo ngesihloko esithi: "Indlela umphakathi obuka ngayo izinselelo ezimayelana namanzi kanye nokuthuthwa kwendle. Ucwaningo oluqhathanisa uMsunduze, Intaphuka, Kwazini noMkhukhuze kukaMasipala waseNdwedwe esifundazweni sakwaZulu-Natali.

Inhloso yalolu cwaningo ukuhlolisisa indlela umphakathi obuka ngayo izinselelo ezimayelana namanzi kanye nokuthuthwa kwendle emphakathini waseMsunduze, eNtaphuka, Kwazini naseMsunduze kuMasipala waseNdwedwe esifundazweni saKwaZulu-Natali, eNingizimu

Afrika.

Izinhlosongqangi zalolu cwaningo yilezi ezilandelayo:

- Ukuphenya imbangela yokuthi umphakathi ungakwazi ukuthola amanzi ahlanzekile eMsunduze, eNtaphuka, Kwazini, naseMkhukhuze kuMasipala waseNdwedwe esifundazweni saKwaZulu-Natali.
- Ukubheka iqhaza elibanjwa ukungathuthwa ngendlela kwendle ekuqubekeni kwezifo eMsunduze, eNtaphuka, Kwazini naseMkhukhuze kuMasipala waseNdwedwe esifundazweni saKwaZulu-Natali.
- Ukubheka izindlela ezifanele ezisetshenziswa ukubhekana nezinkinga zokutholakala kwamanzi ahlanzekile emphakathini waseMsunduze, eNtaphuka, Kwazini, naseMkhukhuze kuMasipala waseNdwedwe esifundazweni saKwaZulu-Natali.
- Ukubheka kabusha imibhalo ekhona njengamanje emayelana nezingqikithi zamanzi kanye nokuthuthwa kwendle e-Sub-Saharan Afrika.
- Ukunikeza izincomo ezifanele ukuqinisekisa ukuthi kunendlela efanele yokuthuthukisa endlela yokuthola amanzi kanye neyokuthuthwa kwendle emphakathini waseMsunduze, eNtaphuka, Kwazini naseMkhukhuze kuMasipala waseNdwedwe esifundazweni saKwaZulu-Natali.

Ukubamba iqhaza kulolu cwaningo kuqinisekiswe yile migomo elandelayo:

1. Ngeke livezwe igama lakho.
2. Imfihlo yakho iyohlala iyimfihlo.
3. Alukho ulwazi ngomuntu oluyovezwa noma imininingwane yekheli ezovezwa kulwazi oluzosetshenziswa kulolu cwaningo.
4. Akuphoqelekile ukubamba iqhaza kulolu cwaningo. Unelungelo lokuhoxisa igqaza lakho kulolu cwaningo noma inini.
5. Ulwazi olunikezile luyosetshenziswa ngenhloso yokwenza lolu cwaningo kuphela.
6. Izimpendulo ozinikezile zizosiza lolu cwaningo ngolwazi olufanele mayelana nezingqinamba ezithinta amanzi nokuthuthwa kwendle kuMasipala waseNdwedwe esifundazweni saKwaZulu-Natali.
7. Ulwazi olutholakele luzogcinwa ngu Dr S.A Desai ongumaluleki kulolu cwaningo eNyuvesi yaKwaZulu-Natali.

Uma udinga olunye ulwazi ungaxhumana noNkosazana Nelile Nosipho Hlongwa – 217019104@stu.ukzn.ac.za

Inombolo kamakhalekhukhwini: 0636756768

Umeluleki: Dr S.A Desai – Desai@ukzn.ac.za

Inombolo yocingo: 0725481410

Ukuzibophezela

Mina…….
(igama eliphelele lalowo obambe iqhaza) ngiyaqinisekisa ukuthi ngiyakuqonda okuqukethwe yilo mqulu kanye nengqikithi yocwaningo nokuthi ngiyavuma ukubamba iqhaza kulona. Ngiyaqonda futhi ukuthi nginelungelo lokungaqhubeki nokuba yingxenye yalo uma sengicabanga ukwenza kanjalo.

…… ……..

Ukusayina Usuku

Appendix 5 Ethical clearance letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

08 December 2022

Nelile Nosipho Hlongwa (217019104)
School Of Social Sciences
Howard College

Dear NN Hlongwa,

Protocol reference number: HSSREC/00004974/2022
Project title: Community perceptions regarding challenges associated with water and sanitation. A comparative study of Msunduze, Intaphuka, Kwazini, and Mkhukhuze, Ndwedwe Local Municipality, KwaZulu-Natal
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 07 November 2022 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 08 December 2023.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

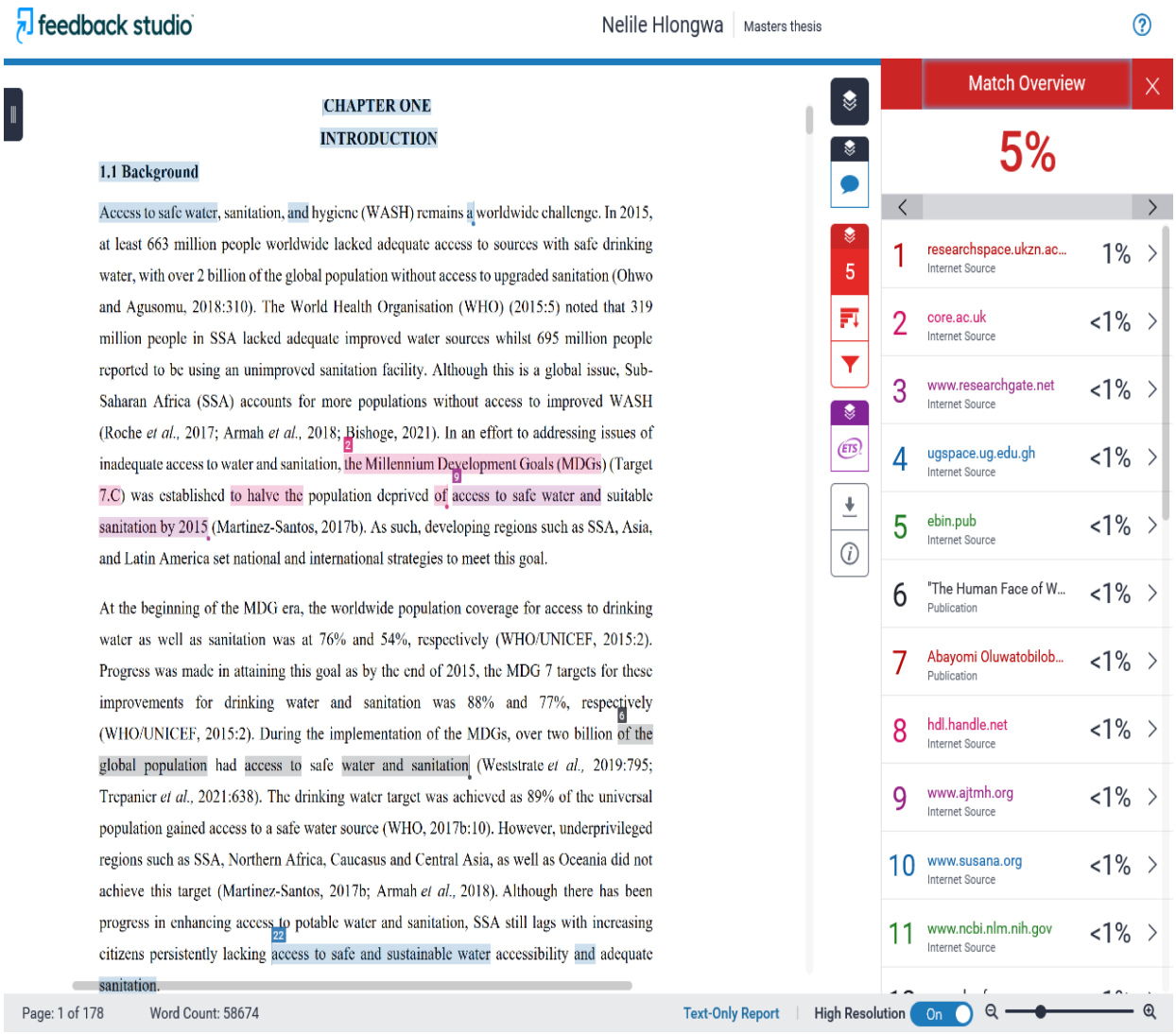
Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

/dd

Appendix 6 Turnitin report



turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Nelile Hlongwa
Assignment title:	Thesis final
Submission title:	Masters thesis
File name:	Nelile_masters_thesis_2024.docx
File size:	10.55M
Page count:	178
Word count:	58,674
Character count:	319,066
Submission date:	21-Jan-2024 07:10PM (UTC+0200)
Submission ID:	2274784325

CHAPTER ONE
INTRODUCTION

1.1 Background

Access to safe water, sanitation, and hygiene (WASH) remains a worldwide challenge. In 2015, at least 663 million people worldwide lacked adequate access to sources with safe drinking water, with over 2 billion of the global population without access to upgraded sanitation (Olivo and Agnoorre, 2018:310). The World Health Organisation (WHO) (2015:5) noted that 319 million people in SSA lacked adequate improved water sources whilst 695 million people reported to be using an unimproved sanitation facility. Although this is a global issue, Sub-Saharan Africa (SSA) accounts for more populations without access to improved WASH (Roche *et al*., 2017; Arnuh *et al*., 2018; Bisbogz, 2021). In an effort to addressing issues of inadequate access to water and sanitation, the Millennium Development Goals (MDGs) (Target 7.C) was established to halve the population deprived of access to safe water and suitable sanitation by 2015 (Martinez-Santos, 2017b). As such, developing regions such as SSA., Asia, and Latin America set national and international strategies to meet this goal.

At the beginning of the MDG era, the worldwide population coverage for access to drinking water as well as sanitation was at 76% and 54%, respectively (WHO/UNICEF, 2015:2). Progress was made in attaining this goal as by the end of 2015, the MDG 7 targets for these improvements for drinking water and sanitation was 88% and 77%, respectively (WHO/UNICEF, 2015:2). During the implementation of the MDGs, over two billion of the global population had access to safe water and sanitation (Weststrate *et al*., 2019:795; Trepanier *et al*., 2021:638). The drinking water target was achieved as 89% of the universal population gained access to a safe water source (WHO, 2017b:10). However, underprivileged regions such as SSA, Northern Africa, Caucasus and Central Asia, as well as Oceania did not achieve this target (Martinez-Santos, 2017b; Arnuh *et al*., 2018). Although there has been progress in enhancing access to potable water and sanitation, SSA still lags with increasing citizens persistently lacking access to safe and sustainable water accessibility and adequate sanitation.

In addressing the slow progress of meeting this goal, the upgrade from MDG 7 to Sustainable Development Goal (SDG) 6 was implemented to achieve the goal of ensuring there is available water and sanitation services managed sustainably by 2030 (WHO, 2017; Howard, 2021). Like other low-income regions, SSA failed to meet the MDG target, but still progressed during the

1