UNIVERSITY OF LUSAKA

SCHOOL OF SOCIAL SCIENCES & TECHNOLOGY

AN ASSESSMENT OF THE SOCIAL, ECONOMIC, AND ENVIRONMENTAL BENEFITS OF ACHIEVING OPEN DEFECATION FREE (ODF) STATUS IN NDAKE VILLAGE

BY

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DECLARATION

I Sinyinza Clara do hereby declare that this research report is my own work to the best of my knowledge and that it has never been produced or submitted to this University or indeed any other institution for similar purposes. All other works of people used in this research have been duly acknowledged.

Supervisor: Mr Samuel Mwanangobe

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Date: 4 February, 2026

DEDICATION

This work is dedicated to my family as a token of appreciation for being by my side from the start of my course to the end and my elder sister for being my role model from childhood. I'm what I am today because of your encouragements and guidance that you have given me. To my husband your financial support and you believing in me made me always work hard so that I do not disappoint you.

I also dedicate this work to the Nyimba community and my two beautiful children whose encouragement, patience and understanding made me to endure in completing this work.

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ABSTRACT

This study investigates the sanitation experiences and perceptions of Ndake Village residents in Luangwa District, Zambia, following the attainment of Open Defecation Free (ODF) status. Using a qualitative design, the research draws on focus group discussions, household interviews, and key informant insights from Community-Led Total Sanitation (CLTS) champions and the District Water, Sanitation and Hygiene Education (DWASH) committee. The study was guided by the general objective of assessing the social, economic, and environmental benefits of achieving ODF status in Ndake Village, with specific objectives focusing on economic impacts, social well-being, and environmental improvements.

The target population comprised residents of Ndake Village under Luezi Ward, including male- and female-headed households, community leaders, and key stakeholders involved in sanitation governance. A total of 50 respondents participated in the study, consisting of 42 community members, 4 government and non-governmental officials, and 4 community leaders. Of the respondents, 53.3% were male and 46.7% were female, with the majority engaged in farming as their main livelihood.

The findings reveal that achieving ODF status significantly improved public health outcomes, personal dignity, and community cohesion. Women reported enhanced safety and privacy, while households noted reductions in diarrhoeal diseases and improvements in school attendance among children. Social norms around defecation transformed substantially, with strong community pressure to maintain clean and functional latrines. Economic benefits were also observed, including reduced medical expenditures and increased productivity.

However, the sustainability of ODF status faces several challenges. Seasonal flooding frequently damages shallow pit latrines, financial constraints limit the construction of durable facilities, and water access remains inconsistent. Some households struggle to maintain handwashing stations and replace worn-out latrine components, threatening long-term sanitation gains.

The study concludes that sustaining ODF achievements requires ongoing behaviour change reinforcement, targeted support for vulnerable households, and investment in flood-resistant sanitation technologies. Strengthened local governance and climate-resilient WASH interventions are essential for advancing and sustaining rural sanitation outcomes in Ndake

Village and similar contexts. The findings have important implications for policy and practice, highlighting the need for sustained post-ODF monitoring, integration of climate-resilient sanitation technologies into rural development planning, and strengthened collaboration between government institutions, non-governmental organisations, and community leadership to prevent slippage and ensure long-term sanitation sustainability.

CHAPTER ONE

INTRODUCTION AND BACKGROUND

Overview

This study provides an assessment of the effectiveness of achieving Open Defecation Free (ODF) status in rural Zambia, with specific focus on Ndake Village in Nyimba District. Like many other sub-Saharan African countries, Zambia has a large proportion of its population residing in rural areas, where communities face economic hardships, limited mobility, and inadequate access to basic sanitation services. These challenges increase vulnerability to sanitation-related diseases and environmental degradation, underscoring the need for sustainable sanitation interventions.

1.0 Introduction

Achieving Open Defecation Free (ODF) status has been widely studied, particularly in rural settings where open defecation poses serious public health risks. Research has shown that eliminating open defecation contributes to reduced incidences of diarrhoeal diseases, improved child health outcomes, and enhanced dignity and safety, especially for women and girls (WHO, 2017; UNICEF, 2017).

By assessing the impact of ODF attainment in Ndake Village, this study seeks to generate context-specific evidence on how sanitation interventions function as coping mechanisms for improving rural livelihoods. The findings are intended to inform sanitation policy and programming in Zambia and other regions with similar demographic and socio-economic characteristics.

Zambia has implemented several studies and programmes under the Community-Led Total Sanitation (CLTS) approach, which was officially adopted in 2012 as a national strategy for eliminating open defecation.

Empirical studies conducted in districts such as Chiengi, Nyimba, and Mansa demonstrate that CLTS has been effective in triggering collective behaviour change and increasing household latrine coverage (Morris-Iveson and Siantumbu, 2011; Ministry of Health, 2016).

For instance, a study in Chiengi District reported the achievement of 100% latrine coverage and verified ODF status following strong community mobilisation and traditional leadership involvement (Author et al., 2016). However, other studies highlight sustainability challenges, with some communities experiencing slippage due to inadequate follow-up, weak infrastructure, and financial constraints (Moses et al., 2023).

Behavioural change and education form a central component of CLTS interventions. These initiatives employ community sensitisation campaigns aimed at transforming attitudes and practices related to sanitation by emphasising the health risks associated with open defecation and the benefits of improved hygiene (Sigler, 2015).

Evidence suggests that communities exposed to sustained hygiene education are more likely to adopt and maintain improved sanitation behaviours.

Infrastructure development and accessibility also play a critical role in achieving and sustaining ODF status. While the provision of affordable and accessible sanitation facilities has supported progress in many rural communities, the absence of construction materials, technical expertise, and financial resources continues to hinder long-term success (Alhassan, 2018). In flood-prone and low-income rural areas, shallow pit latrines are particularly vulnerable to collapse, threatening sanitation gains.

Furthermore, the effectiveness of Community-Led Total Sanitation is strongly influenced by supportive policy frameworks and active involvement of local authorities. Strong government commitment, regular monitoring, enforcement of sanitation regulations, and collaboration with non-governmental organisations have been shown to enhance both ODF attainment and sustainability (UNICEF, 2017).

Nevertheless, despite these efforts, sustaining ODF status remains a challenge in many rural communities, highlighting the need for continued research into post-ODF outcomes and long-term impacts.

Against this background, the social, economic, and environmental benefits of achieving Open Defecation Free status in Ndake Village identifies sustainability challenges and policy relevance for rural sanitation programming in Zambia.

1.1 Background of Open Defecation and Its Global Context

Open defecation is the practice of defecating in fields, forests, bodies of water, or other open spaces instead of using a designated toilet facility. According to the World Health Organization (WHO), approximately 673 million people globally still practice open defecation, which poses significant public health risks, particularly in low-income and rural areas. Open defecation contributes to the spread of waterborne diseases, including cholera and diarrhoea, which disproportionately affect children under five. (W.H.O, 2017)

Achieving open defecation free (ODF) status represents a pivotal step toward sustainable development, particularly in rural communities such as Ndake Village. This assessment explores the multifaceted benefits that accompany ODF status, delving into its social, economic, and environmental dimensions. By eliminating open defecation, communities not only improve public health but also foster social cohesion, enhance economic opportunities, and contribute to environmental preservation (Prüss-Ustün et al., 2019; Hutton and Varughese, 2016).

Through the lens of Ndake Village as a case study, this evaluation highlights how achieving ODF status can serve as a transformative milestone for rural development. ODF status has been shown to reduce diarrhoeal disease burden, improve dignity and safety for women, strengthen school attendance, and stimulate local economies through reduced healthcare costs and increased productivity (UNICEF, 2017; Crocker et al., 2017). At the environmental level, safe sanitation prevents contamination of water bodies and agricultural soils, contributing to cleaner ecosystems and resilience against climate-related shocks (World Bank, 2016; Smiley et al., 2025).

Importantly, these local gains align with broader global initiatives such as the Sustainable Development Goals (SDGs), particularly SDG 6.2, which calls for equitable access to sanitation and hygiene for all by 2030 (United Nations, 2015). The Ndake Village experience therefore underscores how community-driven sanitation achievements reinforce national strategies and global commitments toward sustainable development.

As promoted by the United Nations and other global sanitation campaigns, aims to eliminate open defecation and promote proper sanitation facilities, thereby improving public health,

economic conditions, and environmental sustainability. This study focuses on Ndake Village, located in Nyimba District, Zambia, and evaluates the benefits of reaching ODF status.

1.2 Statement of the Problem

Before Ndake Village achieved ODF status, many villagers practiced open defecation, which led to a series of health and environmental issues. The lack of proper sanitation impacted the community's overall wellbeing, economic productivity and quality of life. Meanwhile, achieving Open Defecation Free (ODF) status has been promoted as a solution for Ndake village of Nyimba district.

However, there is limited research on the actual social, economic, and environmental benefits that result from attaining this status in Ndake.

This paper aims to explore these benefits resulting from the transition to open defecation free status by providing evidence on how achieving ODF status impacts public health, economic productivity and environmental sustainability. Understanding these impacts can help development organizations design more effective sanitation programs and interventions tailored to the needs of the community.

1.3 General objective:

To assess the Social, Economic, and Environmental Benefits of Achieving Open Defecation Free (ODF) Status in Ndake Village.

1.3.0 Specific objectives:

- To analyse the economic benefits, including savings in healthcare and the effects on agriculture and productivity.
- To examine the social benefits of ODF status in terms of health improvements and quality of life.
- To assess the environmental advantages, such as reduced contamination and improved ecosystem health.

1.3.1 Research questions

- How has the attainment of ODF status influenced healthcare costs among households in Ndake Village?
- What changes in quality of life have been observed among households after achieving ODF status?
- How has ODF status reduced contamination of water sources, soil, and the general environment in Ndake Village?

1.4 Significance of the study

Achieving Open Defecation Free (ODF) status is a crucial step in promoting sustainable development, as it directly impacts economic growth and environmental sustainability. Successful ODF initiatives requires infrastructure development like composting toilets and biogas production. Access to proper sanitation enhances dignity, safety and overall well-being fostering healthier communities.

On the Economic aspect ODF reduces healthcare costs, leading to improved work efficiency and economic output. ODF Reduces contamination of water sources, decreasing the costs associated with water purification. It also prevents faecal matter from polluting rivers, lakes, and groundwater.

Proper sanitation reduces the risk of environmental degradation, helping communities adapt to climate change.

Limits open dumping and foul odours, leading to a healthier ecosystem. Other than that clean surroundings attract tourists and investors, which adds to the country's economy and improves local businesses

Achieving ODF status aligns with the United Nations Sustainable Development Goal 6 (Clean Water and Sanitation) and contributes to better public health, economic prosperity, and environmental conservation.

1.3.2 Delimitation and Scope of the Study

- This study explores the impact of achieving ODF status in the rural areas of eastern province Zambia. However, the findings may not apply to other areas due to environmental constrains and behavioural and cultural barriers.

- The study focuses on the long-term effects of achieving ODF status.
- Data collection methods may have limitations and the study only examines areas that have achieved ODF status, how their social, economic and environmental developments have benefited their wellbeing.
- One limitation of this study is the potential for bias in self-reported data from community members. Additionally, the short time frame since most Villages achieved ODF status may not capture long-term benefits fully.

1.3.3 Definition of Key Terms

- Economic benefits refer to the positive outcomes or advantages that individuals, businesses, or societies gain from economic activities, investments, or decisions. These benefits often include increased income, cost savings, improved efficiency, and enhanced quality of life. Economic benefits can be measured in monetary terms, such as profits or reduced expenses, or through broader impacts like job creation, technological advancements, and infrastructure improvements (Hutton,2018)
- Environmental benefits refer to the positive impacts that actions, policies, or practices have on the natural environment and public health. These benefits often include improved air and water quality, enhanced biodiversity, reduced pollution, conservation of natural resources, and the preservation of ecosystems. They contribute to a healthier planet and promote sustainability, ensuring that future generations can thrive in a balanced and resilient environment. Environmental benefits (UNICEF, 2021).
- Open defecation free (ODF) refers to a status where a community or area has completely eliminated the practice of open defecation. This means that all individuals in the community use proper sanitation facilities, such as toilets, instead of defecating in open spaces like fields, bushes, or waterways. Achieving ODF status often involves efforts to improve sanitation infrastructure, promote hygiene awareness, and encourage behaviour change to ensure sustainable use of toilets. (WHO, 2023).
- Social benefits refer to the total advantages or positive outcomes that society as a whole gains from a particular action, decision, or policy. These benefits include both direct advantages to individuals or groups and indirect benefits that extend to the broader community. Social benefits often encompass improvements in public welfare, health, education, environmental quality, and overall societal well-being. They are a key

consideration in evaluating the impact of policies or initiatives aimed at enhancing collective prosperity. (Hulatt,2023)

- Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs2. It emphasizes balancing economic growth, environmental protection, and social well-being to ensure long-term sustainability. (Jarvie,1987).

1.4 Significance of the study

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CHAPTER TWO

2.0 LITERATURE REVIEW

Overview

This chapter reviewed literature relevant to the topic under study: to assess the social, economic and environmental benefits of achieving open defecation free status in Ndake village. The review of literature also aims to provide a literary environment in which to emphasize and illuminate the numerous concerns surrounding the research topic. This section is vital in proving the validity of this research, as supported by secondary data, as well as the analytical and critical analysis that comprise it.

2.1EMPIRICAL REVIEW

2.1.0 Global Perspective on Achieving Open Defecation Free

From a global perspective, achieving Open Defecation Free (ODF) status is recognized as a critical step toward sustainable development, with significant social, economic, and environmental benefits (WHO & UNICEF, 2017; UN, 2015).

There is a mixed-method systematic review of evidence and its quality. This review assesses the quality of Community Led Total Sanitation studies and UNICEF's game plan to end open defecation; it summarises what works and what doesn't work (Venkataramanan et al., 2018; UNICEF, 2017).

It also analyses contextual predictors of ODF achievement & sustainability, showing variation across contexts. For example, Quantifying Predictors of CLTS Performance in these Four Countries: Cambodia, Ghana, Liberia and Zambia (Crocker et al., 2016).

UNICEF's Game Plan to End Open Defecation (2017). UNICEF emphasizes the importance of achieving ODF status as part of the Sustainable Development Goals (SDGs), particularly SDG 6.2, which focuses on sanitation and hygiene (UNICEF, 2017; United Nations, 2015).

Globally, achieving Open Defecation Free (ODF) status is seen as a vital step toward improving public health, dignity, and environmental sustainability. Key global perspectives include:

Open Defecation Practice and its Determinants among Households in sub-Saharan Africa: an analysis of 33 Sub-Saharan African countries according to DHS data where pooled to provide prevalence estimates and determinants like wealth, education, and water access, showing how open defecation is concentrated among poorer households (Endris et al., 2017; WHO & UNICEF, 2019).

Open defecation contributes to the spread of diseases like diarrhoea and cholera, which disproportionately affect children. Eliminating this practice can significantly reduce child mortality rates (Prüss-Ustün et al., 2019; WHO, 2014).

Access to sanitation facilities enhances safety and dignity for women and girls, reducing risks of harassment and improving school attendance (Sommer et al., 2015; UNICEF, 2019).

Investments in sanitation infrastructure stimulate local economies and reduce healthcare costs. Countries save billions annually by preventing sanitation-related diseases. Productivity gains are achieved through a healthier population, which contributes more effectively to economic activities (Hutton & Varughese, 2016; World Bank, 2018).

Proper waste management prevents contamination of water sources and soil, promoting cleaner ecosystems (UNEP, 2016; WHO, 2018).

Climate resilience contributes to sustainable sanitation solutions contributing to environmental conservation (UNICEF & WHO, 2020; UN-Water, 2018).

Organizations like UNICEF and Global Citizen emphasize the importance of achieving ODF status to ensure equitable access to sanitation and hygiene for all (UNICEF, 2017; Global Citizen, 2020).

Therefore, achieving Open Defecation Free (ODF) status is widely recognized as a milestone toward sustainable development, with international development frameworks, particularly the Sustainable Development Goals (SDGs) which underscore sanitation as a fundamental human right and a prerequisite for public health, environmental protection, and human dignity (United Nations, 2015; WHO & UNICEF, 2017).

Specifically, SDG 6.2 aims to achieve access to adequate and equitable sanitation and hygiene for all, with an explicit focus on ending open defecation. A growing body of empirical literature

has examined the effectiveness of Community-Led Total Sanitation (CLTS) as a primary strategy for achieving ODF status.

A mixed-methods systematic review by Venkataramanan et al. (2018) assessed the quality and outcomes of CLTS interventions globally and found that while CLTS can be effective in reducing open defecation, results vary considerably across contexts. Hence the highlights that success depends not only on community triggering but also on follow-up support, governance structures, and socio-economic conditions are true.

Similarly, UNICEF's Game Plan to End Open Defecation synthesizes global evidence on sanitation interventions, outlining what works and what does not in different settings (UNICEF, 2017).

Empirical studies further demonstrate that contextual factors significantly influence both the achievement and sustainability of ODF status. Crocker, Saywell, and Bartram (2016), in a multi-country study conducted in Cambodia, Ghana, Liberia, and Zambia, quantified predictors of CLTS performance and revealed substantial variation across countries. Their findings indicate that factors such as baseline sanitation coverage, local leadership, household wealth, and community cohesion play a decisive role in determining CLTS outcomes.

This evidence underscores the importance of adapting sanitation interventions to local socio-economic and cultural contexts rather than applying uniform approaches.

The large-scale analyses of Demographic and Health Survey (DHS) data provide further insight into open defecation practices. A pooled analysis of 33 sub-Saharan African countries revealed that open defecation remains highly prevalent among poorer households, those with lower educational attainment, and communities with limited access to improved water sources (Endris et al., 2017; WHO & UNICEF, 2019). These findings brings out the persistent inequalities in sanitation access which suggest that poverty reduction and education are integral to eliminating open defecation.

Economic analyses further demonstrate that investments in sanitation yield substantial returns. According to Hutton and Varughese (2016), countries save billions of dollars annually through reduced healthcare costs and increased productivity resulting from improved sanitation. A

healthier population contributes more effectively to economic activities, reinforcing sanitation as both a public health and economic development priority (World Bank, 2018).

Environmental sustainability is another key dimension emphasized in the literature. Proper sanitation and waste management reduce contamination of water bodies and soil, thereby protecting ecosystems and improving water quality (UNEP, 2016; WHO, 2018). In addition, climate-resilient sanitation solutions are increasingly recognized as essential for sustaining ODF gains in the face of climate variability, floods, and droughts (UNICEF & WHO, 2020; UN-Water, 2018).

Globally, organizations such as UNICEF, WHO, and Global Citizen consistently advocate for the elimination of open defecation as a pathway to equitable access to sanitation and hygiene for all. Their policy frameworks and advocacy efforts emphasize that achieving and sustaining ODF status requires integrated approaches that combine behavior change, infrastructure development, institutional support, and community ownership (UNICEF, 2017; Global Citizen, 2020).

2.2.1 Regional Perspective

From a regional perspective, achieving Open Defecation Free (ODF) status varies significantly depending on local contexts, challenges, and priorities. Here's an overview with a focus on regions like Sub-Saharan Africa and South Asia, where open defecation is most prevalent:

The Case of EcoSan Waterless Toilets is a sustainable sanitation solution that has brought SADC countries together. The EcoSan toilet, invented in South Africa (2000), EcoSanitation works with a network of agents who sell EcoSan toilets to customers in their geographic regions. Agents are located in African countries including Namibia, Zambia, Mozambique, and Tanzania. Such eco-friendly toilets contribute to environmental conservation (Esrey et al., 2001; Winblad & Simpson-Hébert, 2004).

For example, these EcoSan Waterless Toilets may come in handy when looking at spatial barriers to improved Water and Sanitation in Rural Zambia. Geography, migration, flood-plain location affect access to sanitation and hygiene especially in Western Province, Zambia (Mulenga et al., 2020; MDPI).

The EcoSan Waterless Toilets is a must adopt initiative just like India's Swachh Bharat Mission in South Asia. India constructed millions of toilets and declared many areas ODF in 2014. This demonstrates how ODF status can lead to better educational outcomes, with improved school attendance among girls. Schools with proper sanitation facilities see higher attendance rates, particularly among girls, as they feel safer and more comfortable (Government of India, 2017; UNICEF, 2019; Coffey et al., 2014).

Other than missionary initiatives, most Sub-Saharan African countries have adopted Community-Led Total Sanitation (CLTS), with some success in mobilizing communities to build and use latrines. However, sustainability remains a concern (Kar & Chambers, 2008; Venkataramanan et al., 2018).

Major Factors Influencing the Effectiveness of Community-Led Total Sanitation among Communities in Kilifi and Marsabit Counties in Kenya are geographical location, knowledge of latrine use and sustainability of sanitation and hygiene behaviour change; these examine factors that help or hinder CLTS effectiveness locally (Owino et al., 2019).

For example, the Effect of a Community-Led Total Sanitation Intervention on Sanitation and Hygiene in Pallisa District, Uganda is an empirical evaluation of CLTS effects on knowledge, latrine use, hygiene and diarrhoea among children under five (Bwire et al., 2020).

Across regions, ensuring long-term behaviour change and addressing gaps in sanitation infrastructure enhances collaboration between governments, NGOs, and international organizations (WHO & UNICEF, 2017).

Despite efforts to tailor solutions and accelerate progress, challenges like high poverty levels, deeply ingrained cultural practices, and limited access to sanitation infrastructure hinder progress and make behaviour change campaigns essential, especially in rural areas particularly affected by the lack of basic latrines in many households (JMP, 2019; Hanchett et al., 2011).

Addressing disparities in sanitation access, especially for impoverished and rural populations, is critical (UNICEF, 2017).

Regional efforts often involve collaboration between governments, NGOs and international organizations to tailor solutions to local contexts (UN-Water, 2018).

2.2.2 Local Perspective

In Zambia, achieving Open Defecation Free (ODF) status is a critical goal, particularly in rural areas where open defecation remains a significant challenge. Here's an overview of the Zambian perspective:

Zambia has adopted the CLTS approach to mobilize communities in eliminating open defecation. Several studies illustrate both successes and sustainability challenges. This method emphasizes behaviour change and community ownership rather than relying solely on external aid (Kar & Chambers, 2008; Morris-Iveson & Siantumbu, 2011).

CLTS was officially adopted in 2012 in Nyimba District, as reported by the Ministry of Health ODF status verification in four wards of Nyimba District (2024). Training was conducted among technical personnel, gatekeepers, and community-led total sanitation champions, as well as training of village sanitation action groups, which triggered villages to conduct monitoring and evaluation among themselves (Ministry of Health Zambia, 2024).

Ngozi Village was the first to attain Open Defecation Free status in 2012. With time, the coming of World Vision and WASH support strengthened ODF activities, especially among Luezi, Ngozi, Nyimba Central, and Mtilizi wards (World Vision Zambia, 2015).

Several villages, such as Mafipe and Chimangeni, have celebrated achieving ODF status. These milestones were achieved through partnerships between the government, NGOs like World Vision Zambia, and local leaders (SNV Zambia, 2018; Ministry of Local Government, 2019).

For example, in Mtilizi Ward, three villages were declared ODF in 2024, benefiting over 400 households. Similarly, Luezi and Nyimba Central in Nyimba District achieved ODF status, significantly reducing waterborne diseases (Ministry of Health Zambia, 2024; District Health Office Nyimba, 2024).

The Zambian government, through the Ministry of Water Development and Sanitation, has been actively involved in promoting sanitation and hygiene. These efforts align with Zambia's Vision 2030 and the Sustainable Development Goals (SDGs) (Government of the Republic of Zambia, 2017).

For example, CLTS was successful in Chiengi District for over one year, achieving 100% household latrine coverage and verified ODF status, led by traditional leadership, chiefs to be precise and community mobilisation (Zulu et al., 2016).

Another study shows that where chiefs were oriented and mobilized, the chance of achieving complete adequate sanitation in villages increased by about 23% (Tidwell et al., 2019).

However, sustainability remains a significant issue: a recent analysis of all chiefdoms certified ODF found that none fully maintained their ODF status over time, pointing to slippage and challenges in follow-up, behaviour reinforcement, and infrastructure maintenance (Moses et al., 2023).

Sustaining ODF status requires ongoing education, maintenance of facilities, and community engagement (WHO, 2018).

Zambia's journey toward ODF status highlights the importance of collaboration, community involvement, and sustained efforts (Morris-Iveson & Siantumbu, 2011).

Zambia's efforts, such as the adoption of the Community-Led Total Sanitation (CLTS) approach and the ODF Zambia 2030 National Strategy, emphasize these benefits. These initiatives aim to create lasting social norms around sanitation and hygiene while addressing the unique challenges faced by rural and peri-urban communities (Morris-Iveson & Siantumbu, 2011).

2.3 THEORETICAL REVIEW

Theoretical Framework

Open defecation has profound implications for health, social well-being, and environmental sustainability. It is a widespread practice in many rural areas, often linked to cultural norms, economic constraints, and inadequate sanitation infrastructure. To understand the multidimensional impacts of sanitation interventions, this study draws on three interrelated theories: the Environmental Kuznets Curve (EKC), Sustainable Development Theory, and Social Norms Theory. Together, these frameworks provide a lens for examining how improved sanitation, particularly the achievement of open defecation free (ODF) status, generates benefits for individuals, communities, economies, and ecosystems.

2.3.1 Environmental Kuznets Curve

The Environmental Kuznets Curve suggests that in the early stages of economic development, environmental degradation tends to increase as societies prioritise industrialisation and rapid growth. Industrial processes often release pollutants such as nitrogen oxides, ammonia, mercury and carbon dioxide into the atmosphere, resulting in air, water and soil contamination (Grossman and Krueger, 1995).

However, the EKC also proposes that as income levels rise, societies invest in environmental protection, cleaner technologies and stronger regulations. This leads to reduced emissions, improved waste management, and greater adoption of renewable energy (Dinda, 2004).

Applied to sanitation and hygiene, economic growth provides opportunities for households and governments to invest in improved toilet facilities, waste management systems, and community-led sanitation programmes, which help to reduce open defecation and its environmental impacts.

2.3.2 Sustainable Development Theory

Another framework is the Sustainable Development Theory, this theory emphasises meeting the needs of the present without compromising the ability of future generations to meet their own (WCED, 1987). Access to safe sanitation is integral to sustainable development because it cuts across the Social well-being, Economic stability and Environmental sustainability which are the three pillars of sustainable development.

Improved social well-being reduces the incidence of diarrhoeal diseases, enhances dignity, and particularly protects women's health and safety (Prüss-Ustün et al., 2019).

Better Economic stability reduces healthcare costs, improves labour productivity, and contributes to poverty reduction (Hutton and Varughese, 2016).

Environmental sustainability entails safe waste disposal preventing water contamination, protects ecosystems, and contributes to cleaner environments.

By promoting ODF status, communities advance multiple Sustainable Development Goals (SDGs), including Goal 3 (Health and Well-being), Goal 6 (Clean Water and Sanitation), and Goal 13 (Climate Action).

2.3.3 Social Norms Theory

Social Norms Theory explains how behaviours are shaped and reinforced by perceptions of what others in a community do and expect (Cialdini and Trost, 1998).

In the context of sanitation and hygiene, this theory is particularly useful in understanding why approaches like Community-Led Total Sanitation (CLTS) are effective. CLTS interventions aim to trigger collective disgust against open defecation, shifting it from a tolerated behaviour to a socially unacceptable one (Kar and Chambers, 2008).

Achieving ODF status, therefore, is not just about building toilets but about reshaping social expectations. Households adopt and sustain sanitation innovations when they perceive that their peers are also participating and when non-compliance is socially disapproved. Empirical evidence shows that monitoring, follow-up visits and community mobilisation significantly increase the sustainability of ODF status, though many programmes underinvest in these activities (Crocker et al., 2017).

Together, these three theories explain the multidimensional benefits of sanitation interventions. The EKC shows how economic development initially exacerbates but eventually helps resolve environmental challenges, Sustainable Development Theory situates sanitation improvements within broader social, economic, and ecological goals and Social Norms Theory highlights the importance of community behaviour change and collective action.

For example, in Ghana's Nadowli-Kaleo District, the Community-Led Total Sanitation (CLTS) programme led to mixed results: 34% of households adopted and sustained Open Defecation Free (ODF) innovations, 32% relapsed to open defecation, and 34% never adopted them (UNICEF, 2014).

This reflects the intersection of economic capacity in the Environmental Kuznets Curve (EKC), sustainability concerns highlighted in the Sustainable Development Theory (SDT), and entrenched cultural practices of the Social Norms theory.

By combining these theoretical perspectives, this study therefore, strengthens its ability to analyse not only the adoption of sanitation innovations but also the social, economic, and environmental factors that influence their sustainability.

2.4 Conceptual Framework

The study aims to evaluate how attaining ODF status influences social, economic, and environmental factors in Ndake.

In this study, the dependent variable is the achievement of Open Defecation Free (ODF) status. This outcome is influenced by three key independent variables, namely social benefits, economic benefits, and environmental benefits. These variables are interrelated and collectively determine whether ODF status is achieved and sustained within a community.

The relationship between the independent variables and the dependent variable however is reinforcing and cyclical. The social, economic, and environmental benefits not only emerge from achieving ODF status but also act as enabling factors that sustain it. As communities experience these benefits, their commitment to sanitation and hygiene practices is strengthened, leading to the long-term achievement and sustainability of Open Defecation Free status.

Therefore, Social benefits play a critical role in influencing the achievement and sustainability of ODF status. Improved health outcomes, better education, and strengthened social cohesion contribute to positive sanitation behaviours. When communities experience reduced incidence of sanitation-related diseases, households are more likely to consistently use latrines and practice good hygiene. Improved access to sanitation facilities also enhances dignity, safety, and school attendance, particularly among children and girls, which reinforces social norms that discourage open defecation.

Strong social cohesion further promotes peer monitoring and collective responsibility, reducing the likelihood of reverting to open defecation. All in all social benefits both motivate and sustain community commitment to ODF practices.

Economic benefits significantly influence the sustainability of ODF status by strengthening household and community capacity to maintain sanitation facilities. Healthcare cost savings resulting from reduced disease burden free up household income, allowing families to invest

in latrine construction, maintenance, and upgrades. Increased agricultural productivity, driven by a healthier labour force, improves livelihoods and economic stability.

In addition, improved sanitation can stimulate local business opportunities, such as sanitation supply chains and construction services. These economic gains create incentives for communities to sustain ODF status, as households recognize the financial advantages of maintaining improved sanitation behaviours.

Environmental benefits are both a result of and a contributor to sustained ODF status. Improved environmental cleanliness and enhanced water quality reduce contamination of soil and water sources, thereby lowering the risk of disease transmission. Cleaner surroundings reinforce positive sanitation behaviours by making open defecation socially unacceptable and environmentally undesirable.

In turn, a healthier environment supports the long-term functionality of sanitation infrastructure and strengthens community resilience to environmental shocks such as flooding. Thus, environmental benefits create a supportive setting that enables the continued practice of open defecation–free behaviours.

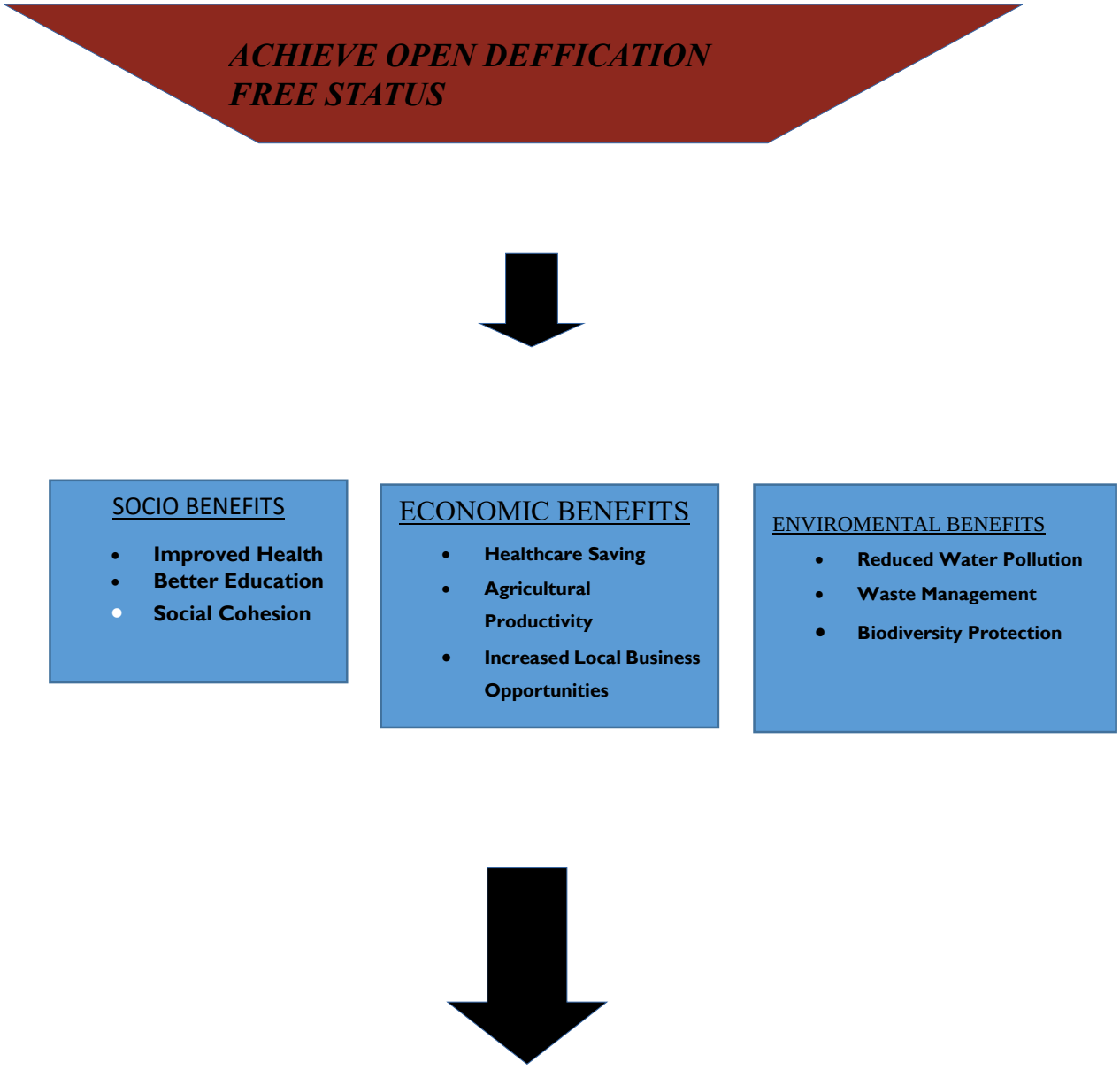

ACHIEVE OPEN DEFFICATION FREE STATUS
SOCIO BENEFITS
Improved Health
Better Education
Social Cohesion
ECONOMIC BENEFITS
Healthcare Saving
Agricultural Productivity
Increased Local Business Opportunities
ENVIROMENTAL BENEFITS
Reduced Water Pollution
Waste Management
Biodiversity Protection
OPEN DEFFICATION FREE

Figure 2.4

CHAPTER THREE

3.0 Research Methodology

Overview

The study used a mixed-methods approach, integrating both quantitative and qualitative methods

3.1 Research approach

In order to ensure a holistic understanding of the social, economic, and environmental benefits of achieving Open Defecation Free (ODF) status in Ndake Village. The quantitative component will generate measurable data on variables such as healthcare costs, productivity levels, and sanitation coverage, while the qualitative component will provide deeper insights into community perceptions, attitudes, and lived experiences regarding ODF. The use of a mixed-methods strategy is justified as it allows for triangulation, thereby enhancing the reliability, validity, and richness of findings.

3.2 Research Design

The study used survey research design, supported by complementary qualitative methods. Surveys allowing the collection of standardized information from a representative sample, while focus group discussions (FGDs) and in-depth interviews providing nuanced explanations of observed patterns. This design is appropriate as it captures both the breadth (via surveys) and depth (via interviews and FGDs) of the research problem.

3.3 Sample Design

A combination of purposive sampling and proportional stratified sampling will be used.

Purposive Sampling will target key informants such as Ministry of Health officials, World Vision staff, Water, Sanitation and Hygiene (WASH) representatives, and community leaders who possess specific knowledge relevant to the study objectives.

Whereas community members will be selected proportionally from different demographic groups for example, gender, age, and household size to capture diverse perspectives within Ndake Village.

The two approaches ensure that there is inclusivity of respondents who can provide both generalizable data and expert insights.

3.4 Study Location

This study was conducted in Ndake Village of Nyimba District, located in Zambia's Eastern Province. Nyimba lies between longitude 30°–31° East and latitude 13°55′–15° south. The district covers an approximate land area of 125,000 square kilometers and has a total population of 145,119 according to the 2022 Census. Geographically, Nyimba is divided into two: the eastern part lies on a plateau, while the western part falls within the Luangwa River valley. The district serves as the gateway to the Eastern Province, located about 340 km east of Lusaka along the Great East Road. Ndake Village is purposively chosen as the study site due to its recent attainment of ODF status and its suitability for assessing the associated socio-economic and environmental benefits.

3.5 Study Population

With regards to this study, the target population for Ndake village under Luezi ward is 325people, 65 households, 40 households with toilets and 62.5% ODF status. (Ministry of health nyimba district health office).

Therefore the study consist of residents of Ndake Village including both male- and female-headed households across age categories. Residents and community leaders in Ndake village, along with key informants from ministry of health, world vision, wash and the area councillor.

This population is considered ideal since it encompasses both direct beneficiaries of ODF status and stakeholders involved in planning, implementation, and monitoring.

3.6 Sample Size

The sample size for this study consisted of 50 respondents, determined based on feasibility, representativeness, and methodological suitability for a community-based case study. Ndake

Village, located under Luezi Ward, has a total population of 325 people across 65 households, of which 40 households have functional latrines, representing an ODF coverage of 62.5%. Given the relatively small and finite population, the study adopted a qualitative-dominant research design focusing on community experiences and perceptions regarding the achievement and sustainability of Open Defecation Free (ODF) status.

The determination of the sample size was guided by Yamane's (1967) simplified formula for calculating sample size from a finite population:

$$n = \frac{N}{1 + N(e)2}$$

Where:

- n = sample size
- N= total population (325)
- e = margin of error (0.05)

Using a 95% confidence level and a 5% margin of error, the formula produced a sample size that was approximated to 50 respondents, considered sufficient for capturing representative community views while remaining logistically manageable in the study area.

Of the total sample, 42 community residents were selected using simple random sampling to ensure household diversity and minimize selection bias. These respondents formed the primary unit of analysis, as Community-Led Total Sanitation (CLTS) interventions are implemented and sustained at household level. The remaining 8 respondents were selected through purposive sampling due to their direct involvement in sanitation governance and CLTS implementation. This group included:

- Four government and non-governmental officials: the area councillor, an Environmental Health Practitioner from the Ministry of Health, a World Vision representative, and a WASH programme officer.
- Four community leaders: chiefs, headmen, and sanitation champions.

The combined use of probability (random) and non-probability (purposive) sampling techniques ensured adequate representation of both households and key stakeholders. The sample size was sufficient to achieve data saturation, capturing diverse perspectives and producing findings that are reliable, credible, and aligned with the study objectives.

Note: The sample also proportionally reflects the village's ODF status, capturing both households with and without latrines to understand the social, economic, and environmental impacts of ODF attainment.

3.7 Sampling Techniques

The study used Standardized Surveys, Semi-Structured In-depth Interviews and Focus Group Discussions (FGDs).

Standardized Surveys were administered to randomly selected residents to gather quantitative data on demographics, healthcare savings, agricultural productivity, and sanitation practices. Whereas the Semi-Structured In-depth Interviews were conducted with elderly individuals, community leaders, and key officials to explore personal experiences, cultural beliefs, and policy perspectives.

Lastly Focus Group Discussions (FGDs) were held with groups of beneficiaries to explore collective attitudes, social dynamics, and community-level impacts of ODF.

This mix of techniques ensures that both objective data and subjective perceptions are captured.

3.8 Data Analysis

Data analysis used both quantitative and qualitative techniques:

Quantitative Data has been coded and analysed using frequencies, percentages, means, and cross-tabulations to summarize patterns in socio-economic and environmental benefits. While Qualitative Data has been transcribed, coded, and subjected to thematic analysis to identify recurring themes, attitudes, and perceptions.

Both data sets has been integrated to cross-validate findings and enhance the credibility of conclusions.

3.9 Ethical Considerations

The study adheres to ethical guidelines for research involving human subjects. Informed consent, voluntary participation and confidentiality principles among others has been observed. Additionally ethical approval were sought from relevant institutional review boards or ethical committees.

CHAPTER FOUR:

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.0 Overview

Chapter three looked at the methodology used in conducting this research. This chapter therefore presents the findings collected from respondents in Ndake Village, which sought to establish the impact of open defecation free (ODF).Including both qualitative and quantitative data on the social, economic, and environmental benefits of achieving Open Defecation Free (ODF) status.

4.1 Introduction

Presentation of data was discerning because it was not probable to present all stories. Stake (1995) as in Rwegelera (2010), notes that preference is foreseeable even though many researchers would like to tell the entire story. According to this study, preference and collection of statistics were made as well as choice on how a great deal and on what to tell others according to the study rationale. Data was transcribed, sorted and analysed using controlled data scrutiny called Statistical Package for Social Sciences (SPSS) according to specific objectives of this study. The findings are presented in line with the research questions which were;

- How has the attainment of ODF status influenced healthcare costs and food security in Ndake Village?
- What changes in quality of life have been observed among households after achieving ODF status?
- How has ODF status reduced contamination of water sources, soil, and the general environment in Ndake Village?

4.2 Demographic Information of Respondents

Figure 4.2 presents the frequency distribution of respondents by gender, age group, and occupation.

Variable	Frequency	Percentage (%)
Gender: Male	32	53.3
Gender: Female	28	46.7
Age Group: 18 -35	20	33.3
Age Group: 36-55	25	41.7
Age Group: 56+	15	25.0
Occupation: Farmers	38	63.3
Occupation: traders	12	20.0
Occupation: Other (teacher, leader)	10	16.7

Source: Field Data, 2025

The results indicate that male respondents constituted 53.3% (n = 32) of the sample, while female respondents accounted for 46.7% (n = 28). This shows a relatively balanced gender representation, suggesting that the findings reflect perspectives from both men and women within the community, which is important in sanitation-related studies where responsibilities and impacts are shared across genders.

In terms of age distribution, the majority of respondents were within the 36–55 years age group (41.7%, n = 25), followed by those aged 18–35 years (33.3%, n = 20). Respondents aged 56 years and above constituted 25.0% (n = 15). This distribution indicates that most participants were within the economically active and decision-making age brackets, which is relevant for understanding household sanitation practices and the sustainability of Open Defecation Free (ODF) status.

Regarding occupation, the findings reveal that farmers formed the largest proportion of respondents (63.3%, n = 38), reflecting the predominantly agrarian nature of Ndake Village.

Traders accounted for 20.0% (n = 12), while other occupations, including teachers and community leaders, constituted 16.7% (n = 10). This occupational distribution suggests that the study captured views from respondents whose livelihoods are closely linked to environmental conditions and community health, thereby providing relevant insights into the social and economic benefits associated with achieving and sustaining ODF status.

Overall, the demographic composition of respondents demonstrates adequate representation across gender, age, and occupation categories, enhancing the credibility and relevance of the study findings.

4.3 Household Demographics and Sanitation Facilities

This section presents household demographic characteristics and sanitation facilities for respondents in Ndake Village. The data were collected through household questionnaires to understand how household structure, education, and latrine access relate to sanitation practices and ODF sustainability.

4.3.0 Household Size and Children under Five

Household Size (members)	Frequency	Percentage (%)
1–3	5	10.0
4–6	30	60.0
7+	15	30.0
Total	50	100
Children Under 5	Frequency	Percentage (%)
0	20	40.0
1–2	25	50.0
3+	5	10.0
Total	50	100

Figure 4.3.0

- Most households in Ndake Village (60%) consist of 4–6 members, reflecting typical rural household sizes in Zambia.
- Half of the households have 1–2 children under five, highlighting the importance of sanitation interventions in reducing vulnerability to diarrhoeal diseases among young children. This supports the observed social benefits of ODF, such as improved health outcomes.

4.3.1 Highest Level of Education of Household Head

Education Level	Frequency	Percentage (%)
No formal education	10	20.0
Primary	15	30.0
Secondary	20	40.0
Tertiary / College	5	10.0
Total	50	100

Figure 4.3.1

- Most household heads (40%) completed secondary education, while 10% attained tertiary or college education.
- Higher education levels among household heads are likely associated with greater awareness of sanitation practices, higher adoption of latrine use, and stronger support for household hygiene, which aligns with the study's social and economic findings.

4.3.2 Latrine Ownership and Type

Latrine Ownership	Frequency	Percentage (%)
Yes	42	84.0
No	8	16.0
Total	50	100
Type of Latrine	Frequency	Percentage (%)
Traditional pit latrine	10	20.0
Improved pit latrine	15	30.0
VIP / Ventilated pit	12	24.0
Pour-flush / Flush toilet	3	6.0
Composting / EcoSan	2	4.0
Public / shared latrine	0	0.0
Other	0	0.0
Total	42	100

Figure4.3.2

- The majority of households (84%) have access to some form of latrine.
- Improved pit latrines and ventilated pits are the most common types, reflecting progress toward safer and more hygienic sanitation.
- The high prevalence of household latrines supports the observed reduction in open defecation and improvements in community health and environmental cleanliness.

4.3.3 Latrine Location, Users, and Duration

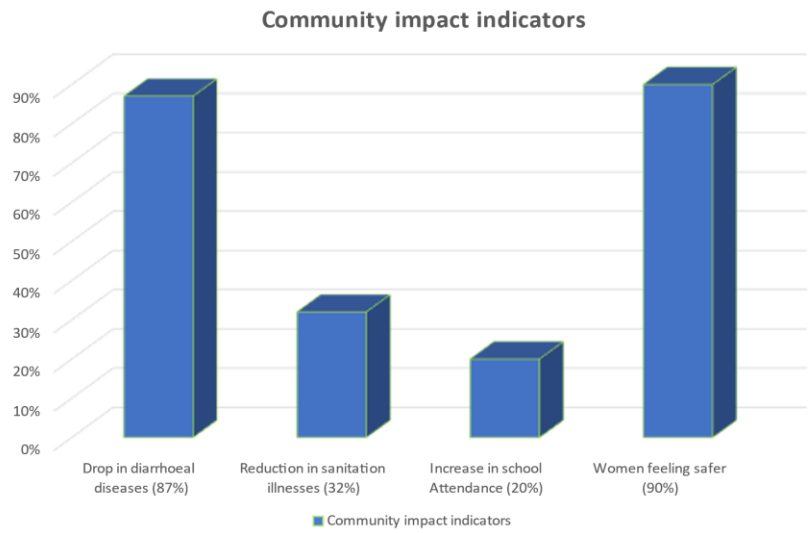
Latrine Located in Yard?	Frequency	Percentage (%)
Yes	42	100.0
No	0	0.0
Latrine Users	Frequency	Percentage (%)
All household members	35	83.3
Adults only	5	11.9
Men only	1	2.4
Women only	1	2.4
Children only	0	0.0
Other	0	0.0
Total	42	100.0

Duration of Latrine Use	Frequency	Percentage (%)
1–3 years	18	42.9
>3 years	19	45.2

Figure 4.3.3

- All latrines are located inside household compounds, ensuring privacy and safety, particularly for women and children.
- Most latrines are used by all household members, demonstrating adoption of hygienic practices across age and gender groups.
- A majority of households (45.2%) have had latrines for more than three years, suggesting sustained ODF compliance and long-term behavioural change.

Figure 4.4 Social Benefits of Achieving ODF Status



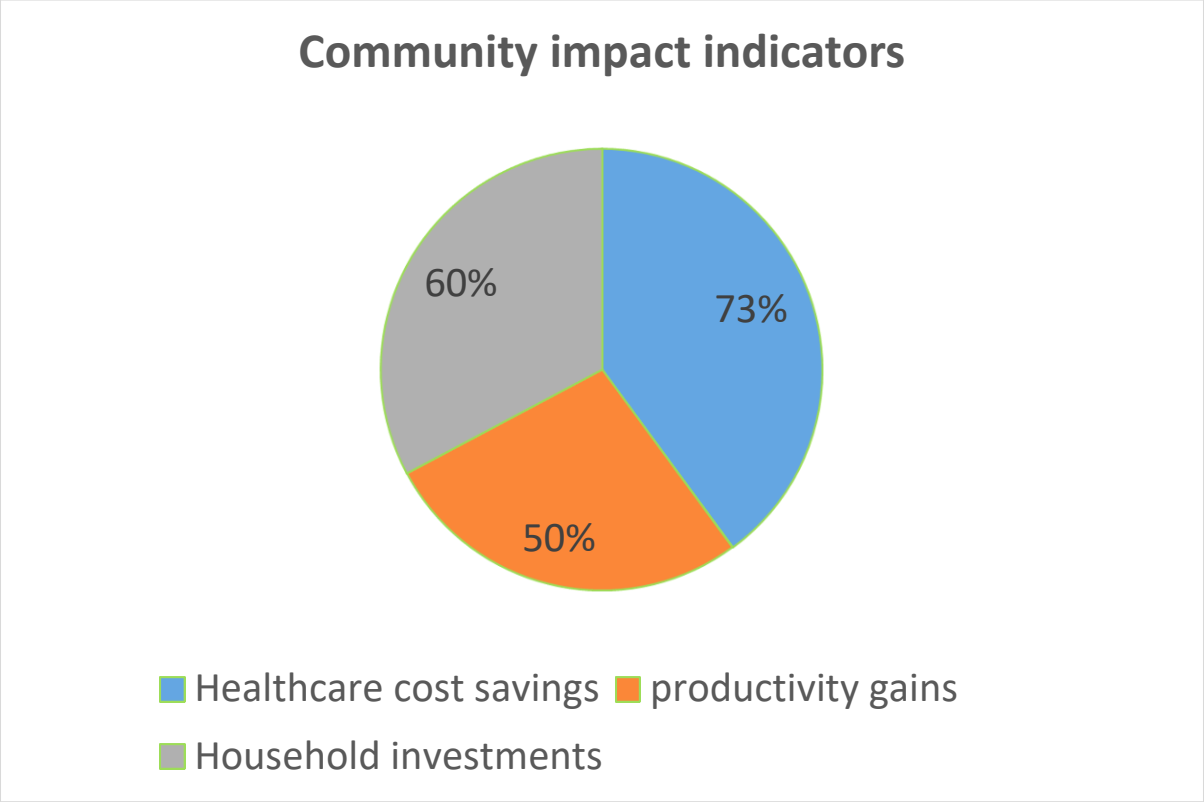
- Improved Health Outcomes by 87% of households reported a significant drop in diarrhoeal disease among children since the ODF declaration.
- Clinic records from the local health post show a 32% reduction in sanitation-related illnesses (2022–2024).
- School Attendance reported a 20% increase in consistent school attendance, especially among girls, attributed to cleaner environments and improved school latrines.
- Dignity and Safety rated 90% of women surveyed stated they felt safer and more dignified using household toilets instead of venturing out, especially at night.

The findings demonstrate that the achievement of Open Defecation Free (ODF) status in Ndake Village has had substantial positive social implications for households and the wider community. The reported 87% reduction in diarrhoeal diseases among children highlights the direct relationship between improved sanitation practices and public health outcomes. This implies a reduced disease burden at household level, which can contribute to lower healthcare costs, improved child survival, and enhanced overall community well-being. The 32% reduction in sanitation-related illnesses recorded at the local health post further validates household perceptions and suggests

that ODF interventions have had a measurable impact on community health systems by reducing pressure on local health services.

- The reported 20% increase in consistent school attendance, particularly among girls, implies that improved sanitation and hygiene facilities create a more supportive learning environment. Cleaner surroundings and access to functional latrines reduce health-related absenteeism and address privacy and menstrual hygiene challenges faced by school-going girls. This finding suggests that ODF status contributes not only to improved educational participation but also to long-term human capital development within the community.
- Furthermore, the finding that 90% of women felt safer and more dignified using household toilets indicates significant gender-related and psychosocial benefits associated with improved sanitation. Reduced exposure to risks such as harassment, snake bites, and other dangers linked to open defecation enhances personal safety, while increased privacy contributes to improved dignity and self-esteem. This implies that ODF initiatives play a critical role in promoting gender equity and protecting vulnerable groups, particularly women and girls.
- Overall, these findings imply that the benefits of achieving ODF status extend beyond sanitation infrastructure to include improved health, educational outcomes, and social dignity. This underscores the importance of sustaining ODF practices and integrating sanitation programmes into broader community development and public health strategies.

Figure 4.5 Economic Benefits



- Healthcare cost savings on average, households previously spent K150 every month on treating diarrhoea and related illnesses. Post-ODF, this dropped to K40 every month, this means a 73% reduction.
- Productivity has gained, farmers noted fewer sick days resulting in increased participation in farming activities and early harvesting. This improved household food security to 50%.
- Rise in household investments 60% of respondents indicated that money saved on medical bills was redirected toward farming inputs, education, or starting small businesses.

Overall, these findings imply that sanitation interventions should not be viewed solely as public health measures but as cost-effective economic development investments. By reducing health-related expenditures and improving productivity, ODF initiatives contribute to poverty reduction, food security, and sustainable rural livelihoods. This underscores the importance of sustaining ODF status and integrating sanitation programmes into broader rural development and economic empowerment strategies.

4.6 Environmental Benefits

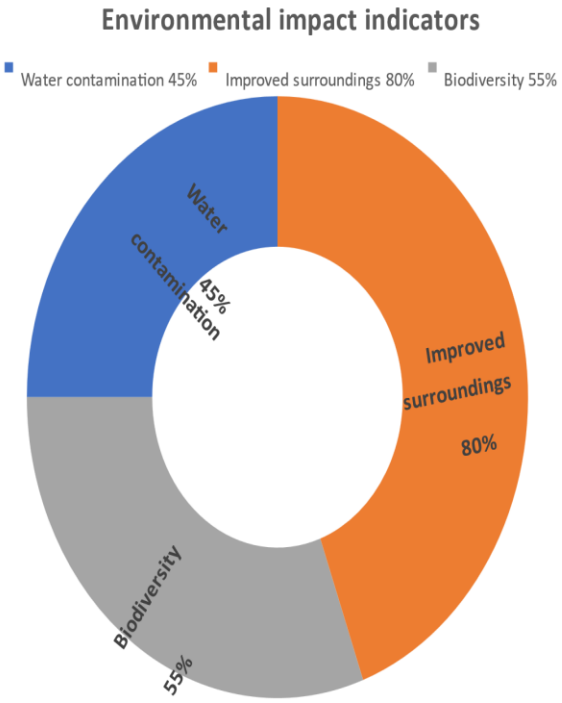


Figure4.6

The environmental findings of this study demonstrate that achieving and sustaining Open Defecation Free (ODF) status in Ndake Village has contributed positively to environmental quality and ecosystem protection. These outcomes directly address the study objective of

examining the environmental benefits associated with ODF status and align with Zambia's national environmental policies and global sustainability commitments.

The observed 45% reduction in E. coli contamination in borehole water sources implies that the elimination of open defecation significantly reduces faecal pollution of groundwater. This finding underscores the role of sanitation as a critical environmental protection measure, particularly in rural communities that rely heavily on boreholes for domestic water supply. From a policy perspective, this supports the need to strengthen the integration of sanitation interventions within water resource management frameworks. This implication aligns with SDG 6 (Clean Water and Sanitation), which calls for improved water quality by reducing pollution and contamination, and with Zambia's National Water Policy, which prioritises the protection of water sources from pollution to safeguard public health and environmental sustainability (GRZ, 2020; United Nations, 2015).

The finding that 80% of community members reported cleaner surroundings with fewer flies and foul smells implies improved environmental hygiene and reduced ecological degradation at the community level. Cleaner environments reduce vectors of disease and enhance the quality of life for residents, reinforcing the importance of sanitation in environmental health management. This outcome aligns with SDG 11 (Sustainable Cities and Communities) and SDG 3 (Good Health and Well-Being), which emphasise safe, healthy, and clean living environments. It is further consistent with Zambia's Environmental Management Act No. 12 of 2011, which mandates the prevention of environmental pollution and the promotion of sustainable environmental management (GRZ, 2011). Policymakers should therefore strengthen enforcement of community sanitation by-laws and integrate ODF indicators into local environmental monitoring systems.

Furthermore, reports of the return of small wildlife to nearby bushes and rivers suggest early signs of ecosystem recovery resulting from reduced human waste pollution. Although largely observational, this finding implies that sanitation improvements can contribute to biodiversity conservation by restoring natural habitats and improving soil and water quality. This aligns with SDG 15 (Life on Land), which promotes the protection and restoration of terrestrial ecosystems, and supports Zambia's commitments under the National Biodiversity Strategy and Action Plan (NBSAP), which seeks to reduce human-induced environmental degradation and promote ecosystem resilience (GRZ, 2015; United Nations, 2015). Sanitation programmes

should therefore be recognised as complementary to environmental conservation and biodiversity protection initiatives.

Overall, these findings indicate that sanitation interventions generate significant environmental co-benefits that extend beyond immediate public health gains. In line with Zambia's Eighth National Development Plan (8NDP), which emphasises environmental sustainability and climate-resilient development, sanitation policies should be mainstreamed into environmental planning and natural resource management strategies (GRZ, 2022). Sustaining ODF status through continuous community engagement, post-ODF monitoring, and environmental education will be essential to preserving water quality, environmental cleanliness, and ecosystem integrity in rural communities.

4.7 DISCUSSION OF FINDINGS

4.7.1 Introduction

This chapter interprets the findings in light of the research objectives and questions. It also compares the results with literature reviewed in Chapter Two. It also brings out different implications, relationships and generalizations shown by the results as well as the agreements and disagreements between the results and the reviewed and available literature.

4.7.2 Impacts of achieving open defecation free status (ODF)

The study revealed considerable improvements in public health and personal dignity after achieving ODF status. Moreover, these findings align with UNICEF's evidence that ODF practices reduce child mortality and promote school attendance. In addition, women in Ndake Village expressed enhanced security, a trend that mirrors global studies emphasizing the protection sanitation facilities offer.

Furthermore, social norms around defecation changed significantly. According to CLTS champions interviewed, there is now strong peer pressure to maintain cleanliness, illustrating the influence of Social Norms Theory in action.

Similarly, the economic benefits observed in Ndake correspond with the Environmental Kuznets Curve theory, where growth—reflected here through reduced disease burden and improved productivity—ultimately leads to environmental improvements. As a result, the cost

savings on healthcare, and their subsequent reinvestment into livelihoods, suggest that ODF status indirectly contributes to socioeconomic empowerment, particularly among low-income households.

At the environmental level, the findings affirm Sustainable Development Theory, especially its emphasis on long-term ecological balance. Cleaner water sources, fewer vectors such as flies, and minor biodiversity returns all indicate ecological recovery.

Nevertheless, some respondents voiced concern about pit latrines overflowing during rainy seasons, highlighting the need for improved infrastructure to ensure that environmental gains are maintained.

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary of Findings

This study assessed the social, economic, and environmental benefits of achieving Open Defecation Free (ODF) status in Ndake Village. The findings demonstrate that ODF attainment has generated multidimensional benefits that extend beyond sanitation infrastructure to influence overall community well-being and sustainable development.

From a social perspective, the study found a marked reduction in waterborne and sanitation-related diseases, particularly diarrhoeal illnesses among children, indicating improved public health outcomes. Improved sanitation also contributed to increased and more consistent school attendance, especially among girls, due to cleaner learning environments and improved access to safe and private sanitation facilities. In addition, the provision of household toilets enhanced personal safety and dignity, particularly for women and children, by reducing exposure to risks associated with open defecation, such as harassment, insecurity, and health hazards.

In terms of economic benefits, the achievement of ODF status led to significant reductions in household healthcare expenditure, allowing families to save resources previously spent on treating preventable illnesses. Improved health resulted in fewer sick days, increased labour productivity, and greater participation in farming and other livelihood activities. Furthermore, many households redirected financial savings toward productive investments, including agricultural inputs, education, and small-scale businesses, thereby strengthening household economic resilience and contributing to poverty reduction.

Regarding environmental benefits, the study recorded improvements in water quality, evidenced by reduced faecal contamination of borehole water sources. Community members also reported cleaner surroundings, characterised by fewer flies, reduced foul odours, and improved environmental hygiene. Additionally, early signs of ecological

recovery, such as the return of small wildlife to nearby bushes and river areas, were observed, suggesting that reduced human waste pollution has positively influenced local ecosystems.

5.2 Conclusion

The study was conducted in Ndake Village of Nyimba District, located in Zambia's Eastern Province. Nyimba district covers an approximate land area of 125,000 square kilometres and has a total population of 145,119 according to the 2022 Census.

With regards to this study, the total population for Ndake village under Luezi ward is 325people, 65 households, 40 households with toilets and 62.5% ODF status. (Ministry of health nyimba district health office)

The district serves as the gateway to the Eastern Province, located about 340 km east of Lusaka along the Great East Road. Ndake Village is purposively chosen as the study site due to its recent attainment of ODF status and its suitability for assessing the associated socio-economic and environmental benefits.

The findings of this study provide evidence that achieving and sustaining Open Defecation Free (ODF) status in Ndake Village has delivered measurable social benefits, including improved health outcomes, increased school attendance, and enhanced dignity and safety for women. These outcomes align strongly with Zambia's national policy frameworks and international commitments, and should inform ongoing and future policy actions (Government of the Republic of Zambia [GRZ], 2022; United Nations, 2015).

Furthermore, the Government's ongoing National Rural Water Supply and Sanitation Programme (NRWSSP) and the development of a consolidated National Water Policy provide important platforms for scaling rural sanitation interventions. Given the demonstrated social benefits, policymakers should ensure that rural sanitation receives sustained funding and technical support within these programmes, supported by performance-based monitoring frameworks (GRZ, 2018; GRZ, 2020). Strengthening rural WASH investment aligns with the 8NDP's strategic focus on improving water and sanitation infrastructure and equitable access across rural communities (GRZ, 2022).

Finally, these study outcomes support Zambia's commitment under SDG 6 and national development strategies to strengthen community participation and sustainability in water, sanitation and hygiene management. District authorities, development partners and community organisations should institutionalise post-ODF monitoring and follow-up, to consolidate behavioural gains and prevent slippage. This community-led approach is explicitly endorsed in SDG 6 targets, which call for increased local community participation in water and sanitation management (United Nations, 2015; GRZ, 2018).

The economic findings of this study demonstrate that the achievement and sustainability of Open Defecation Free (ODF) status in Ndake Village has produced tangible household-level economic gains. These outcomes directly address the study's objective of examining the economic benefits associated with achieving and sustaining ODF status, and they align with Zambia's national development priorities and global development commitments.

The substantial 73% reduction in household healthcare expenditure following ODF attainment implies that sanitation interventions are a cost-effective mechanism for reducing preventable health-related expenses. This finding supports the study objective of assessing healthcare cost savings linked to ODF status. From a policy perspective, sanitation should therefore be recognised as an economic and poverty-reduction intervention, rather than solely a public health measure. This implication aligns with SDG 3 (Good Health and Well-Being) and SDG 6 (Clean Water and Sanitation), which emphasise the prevention of disease through improved sanitation and hygiene (United Nations, 2015). Policymakers should integrate sanitation investments into health financing and social protection frameworks to enhance household financial stability.

The reported increase in agricultural productivity, resulting from fewer illness-related workdays, implies that improved sanitation positively influences labour availability and efficiency. This finding directly addresses the research objective of examining productivity gains associated with ODF status. Increased participation in farming activities and earlier harvesting, leading to improved household food security for 50% of respondents, highlights sanitation's contribution to livelihood sustainability. This outcome aligns with SDG 2 (Zero Hunger) and SDG 8 (Decent Work and Economic Growth), which promote productivity and food security through improved living conditions (United Nations, 2015). Policy actions should therefore integrate sanitation programmes into rural livelihood and agricultural development strategies under national development plans.

Furthermore, the finding that 60% of households redirected savings from reduced medical expenses toward farming inputs, education, and small business activities implies that ODF status supports household investment and income diversification. This addresses the research objective of analysing broader economic benefits beyond health outcomes. Such reinvestment enhances household resilience and contributes to local economic development. This implication aligns with SDG 1 (No Poverty) and SDG 8, which emphasise economic empowerment and sustainable livelihoods (United Nations, 2015). Policymakers and development partners should therefore promote sanitation programmes as enablers of micro-level investment and entrepreneurship, particularly in rural communities.

The environmental findings of this study demonstrate that achieving and sustaining Open Defecation Free (ODF) status in Ndake Village has contributed positively to environmental quality and ecosystem protection. These outcomes directly address the study objective of examining the environmental benefits associated with ODF status and align with Zambia's national environmental policies and global sustainability commitments.

The observed 45% reduction in E. coli contamination in borehole water sources implies that the elimination of open defecation significantly reduces faecal pollution of groundwater. This finding underscores the role of sanitation as a critical environmental protection measure, particularly in rural communities that rely heavily on boreholes for domestic water supply. From a policy perspective, this supports the need to strengthen the integration of sanitation interventions within water resource management frameworks. This implication aligns with SDG 6 (Clean Water and Sanitation), which calls for improved water quality by reducing pollution and contamination, and with Zambia's National Water Policy, which prioritises the protection of water sources from pollution to safeguard public health and environmental sustainability (GRZ, 2020; United Nations, 2015).

The finding that 80% of community members reported cleaner surroundings with fewer flies and foul smells implies improved environmental hygiene and reduced ecological degradation at the community level. Cleaner environments reduce vectors of disease and enhance the quality of life for residents, reinforcing the importance of sanitation in environmental health management. This outcome aligns with SDG 11 (Sustainable Cities and Communities) and SDG 3 (Good Health and Well-Being), which emphasise safe, healthy, and clean living environments. It is further consistent with Zambia's Environmental Management Act No. 12 of 2011, which mandates the prevention of environmental pollution and the promotion of

sustainable environmental management (GRZ, 2011). Policymakers should therefore strengthen enforcement of community sanitation by-laws and integrate ODF indicators into local environmental monitoring systems.

Furthermore, reports of the return of small wildlife to nearby bushes and rivers suggest early signs of ecosystem recovery resulting from reduced human waste pollution. Although largely observational, this finding implies that sanitation improvements can contribute to biodiversity conservation by restoring natural habitats and improving soil and water quality. This aligns with SDG 15 (Life on Land), which promotes the protection and restoration of terrestrial ecosystems, and supports Zambia's commitments under the National Biodiversity Strategy and Action Plan (NBSAP), which seeks to reduce human-induced environmental degradation and promote ecosystem resilience (GRZ, 2015; United Nations, 2015). Sanitation programmes should therefore be recognised as complementary to environmental conservation and biodiversity protection initiatives.

5.3 Recommendations

Based on the findings of this study, the following recommendations are proposed to sustain the benefits of Open Defecation Free (ODF) status and inform policy, practice, and future research:

1. Strengthen Infrastructure

Encourage the construction of durable, flood-resistant latrines, particularly in low-lying and flood-prone areas. Infrastructure improvements should be guided by local environmental conditions to ensure long-term functionality and sustainability. Policymakers should develop standards and guidelines for household and public sanitation facilities as part of national rural sanitation policy frameworks.

2. Sustain Behaviour Change

Continuous education and follow-up by Village Sanitation Action Groups (VSAGs) are essential to prevent relapse into open defecation. Policy measures should institutionalize community-led behaviour change communication programs, ensuring that sanitation education is embedded within primary healthcare, schools, and local governance systems.

3. Incentivize Innovation

Provide subsidies, micro-loans, or other financial incentives to households seeking to upgrade to eco-friendly and sustainable sanitation solutions, such as composting or ventilated improved pit latrines. Policy development should include mechanisms for supporting low-income households, integrating sanitation financing within broader rural development and poverty alleviation strategies.

4. Scale up Successful Models

Replicate the Ndake Village model in neighboring communities, using context-specific approaches that account for local cultural, social, and environmental conditions. Policy frameworks should encourage district-level adaptation and scaling of community-led total sanitation models, supported by monitoring, evaluation, and knowledge-sharing platforms.

5. Enhance Government-Community Partnerships

Strengthen collaboration between district health and sanitation departments and community structures to institutionalize monitoring, supervision, and technical support. Policies should promote inter-sectoral coordination between health, water, education, and local government authorities to ensure that sanitation gains are sustained over the long term.

6. Policy Development Recommendations

- Integrate ODF sustainability into national sanitation strategies: Develop clear policies for post-ODF monitoring, maintenance, and enforcement of sanitation standards.
- Incorporate gender and social inclusion: Ensure that policies explicitly address the needs of women, children, and vulnerable groups in sanitation planning and implementation.
- Link sanitation to economic development: Formulate policies that recognize the economic benefits of improved sanitation, such as reduced healthcare costs and increased productivity, and allocate resources accordingly.
- Strengthen data-driven decision-making: Establish routine data collection and reporting systems for sanitation coverage, water quality, and health outcomes to inform policy review and adjustment.

7. Recommendations for Future Research

- Conduct longitudinal studies to assess the long-term sustainability of ODF status and the persistence of social, economic, and environmental benefits.
- Investigate the impact of sanitation improvements on women's empowerment and gender equity, including safety, dignity, and economic participation.
- Explore innovative financing mechanisms for rural sanitation, including microcredit schemes, public-private partnerships, and community-led savings models.
- Examine the link between improved sanitation and environmental biodiversity, using systematic ecological surveys to validate observational findings.
- Compare the effectiveness of different community-led sanitation models in diverse Zambian contexts to inform national scaling strategies.

APPENDIX

Household Questionnaire Ndake Village: ODF Assessment

Hello. My name is Sinyinza Clara a fourth year student at the University of Lusaka pursuing a bachelor's degree in Development studies. We are conducting a short survey about sanitation and hygiene in this community. There a few questions with me that I would like to ask you in line with the survey. Your participation is voluntary. Your answers will be confidential and used only for this study.

1. How many people normally live in this household?

2. How many children under 5 yers live in this household?

3. Main source of household income :

- Farming
- Formal employment
- Small business
- other (specify) _____

4. Highest level of education completed by household head: No formal education;

- Primary;
- Secondary;
- Tertiary or college;
- Other (specify) _____

5. Does this household have a toilet/latrine facility?

- Yes
- No
- If No, skip to 9

6. Type of toilet (observe and choose one)

- Traditional pit latrine (unlined)
- Improved pit latrine (lined, slab)
- VIP latrine or ventilated pit
- Pour-flush or septic or flush toilet
- Composting or EcoSan
- Public or shared latrine
- Other (specify) _____

7. Is the latrine located inside the yard? Yes, the latrine is located inside the yard

8. Who mainly uses the latrine?

- All household members
- Adults only
- Men only
- Women only
- Children only
- Other (specify) _____

9. If no household latrine: Where do household members usually go to ease themselves?

- Open field / bush
- Public latrine
- Neighbour's latrine
- other (specify) _____

10. How long has the household had access to this latrine?

- Months
- Years

11. Do you believe that using a latrine prevents disease? No

12. Do you think most people in this village have stopped open defecation?

- Yes
- No
- Don’t know

13. Have local leaders encouraged latrine construction and use in the past year?

- Yes
- No
- Don’t know

14. Has your village ever participated in a CLTS or sanitation campaign?

- Yes
- No
- Don’t know

15. Has any household in this community received support (materials, subsidies, technical) for latrine construction?

- Yes
- No
- Don’t know

16. Have you observed any changes in the cleanliness of water sources near the village?

- Better
- No change
- Worse
- Don’t know

17. Do you feel that achieving ODF would improve economic opportunities (e.g., tourism, market access)?

- Strongly agree
- Agree
- Neutral
- Disagree

- Strongly disagree

What do you recommend to sustain ODF in this village?

N/B most of the questions were be asked in the local language.

QUESTIONNAIRE

Key Informant Interview (KII)

Target Group: Government officials involved in sanitation and hygiene.

Hello. My name is Sinyinza Clara a fourth year student at the University of Lusaka pursuing a bachelor's degree in Development studies. We are conducting a short survey about sanitation and hygiene in this community. There a few questions with me that I would like to ask you in line with the survey. Your participation is voluntary. Your answers will be confidential and used only for this study

1. What is your current position and role related to sanitation and hygiene?

2. How long have you worked in this role/office? _____ years/months

3. Has your department adopted or supported the Community-Led Total Sanitation (CLTS) approach?

- Yes
- No
- Don't know

4. If yes, what activities has your office undertaken to support CLTS/ODF?

5. What policies guide your sanitation work (for example, the ODF Zambia 2030, Vision 2030 or Sustainable Development Goal's)?

6. Does your department allocate a budget for sanitation/ODF activities?

- Yes
- No
- Don't know

6. What resources are limiting in supporting ODF campaigns?

- Human
- Financial
- technical

7. How many communities in your jurisdiction have been declared ODF?

8. What follow-up and monitoring systems are in place to sustain ODF once declared?

9. What challenges have you observed in sustaining ODF communities?

10. Which partners have supported sanitation programs in your area?

- NGOs
- CBOs
- Donors

11. How effective has collaboration between government, NGOs, and community leaders been in achieving ODF?

- Very effective
- Somewhat effective
- Not effective
- Explain:

12. How are village headmen, sanitation champions, and VSAGs engaged in planning, implementing and monitoring sanitation initiatives?

13. In your opinion, what are the biggest benefits of achieving ODF status for communities?

14. What are the major barriers preventing all communities from achieving ODF?

15. Is there anything else you would like to share about sanitation and hygiene efforts in the district or region or even the nation at large?

Thank you for your time and contributions.

QUESTIONNAIRE

THE ORGANIZATION IMPLEMENTING ODF STATUS

Hello. My name is Sinyinza Clara a fourth year student at the University of Lusaka pursuing a bachelor's degree in Development studies. We are conducting a short survey about sanitation and hygiene in this community. There a few questions with me that I would like to ask you in line with the survey. Your participation is voluntary. Your answers will be confidential and used only for this study.

1. Name of organization:
2. How long have you saved in the organization:

    - Less than 1 year ☐
    - 1–5 years ☐
    - 6–10 years ☐
    - More than 10 years☐

3. How is the organisation involved in sanitation and hygiene projects:

    - Direct☐
    - Indirect ☐
    - Supervisory☐

4. What role did your organization play in the implementation of ODF programs in Ndake Village?

        - Funding☐
        - Training and sensitization☐
        - Monitoring and evaluation☐
        - Policy support and coordination☐
        - Technical support☐
        - Other (specify): _____

5. How would you rate the level of community participation in ODF activities?

- Very High☐
- High☐
- Moderate☐
- Low☐
- Very Low

6. In your opinion, what are the main social benefits observed after Ndake Village attained ODF status?

7. What are the main economic benefits observed?

8. What are the main environmental benefits observed?

9. On a scale of 1–5, how would you rate the sustainability of ODF practices in Ndake Village?

    - Not sustainable ☐
    - Low sustainability ☐
    - Moderate sustainability ☐
    - High sustainability ☐
    - Very sustainable ☐

10. What challenges did your organization face during ODF implementation? (Tick all that apply)
    - Financial constraints☐
    - Limited community buy-in☐

- Inadequate infrastructure☐
- Cultural resistance☐
- Weak
- Other (specify): _____

11. In your opinion, what are the key risks that could reverse ODF gains in Ndake Village?

12. What measures would you recommend to ensure the sustainability of ODF in Ndake Village?

13. What additional support would be required from government, NGOs, or community members to enhance ODF outcomes?

14. Any additional suggestions on the ODF program in Ndake Village?

Thank you all for participating.