

**FOOD WASTE REDUCTION STRATEGIES FOR SUSTAINABLE FOOD SECURITY IN
VHEMBE DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA**

By

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DECLARATION

I, Joseph-Matthieu MUKA MUNDADI, hereby declare that this proposal for Doctor of Philosophy in Rural Development (PHDRDV) submitted to the Institute for Rural Development, Faculty of Science, Engineering and Agriculture at the University of Venda has not been submitted previously for any degree at this or another university. It is original in design and in execution, and all reference material contained therein has been duly acknowledged.



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ABSTRACT

Food waste (FW) concern has recently received global considerable attention. Within the broad spectrum of waste types, food loss and waste are produced worldwide in large quantities. Religiosity is an important driver of moral intuitions and as such marketers would do well to consider the diverse effects of moral foundations on specialty food consumption. Due to the current environmental crisis, sustainable consumption behaviour and its drivers has gained significant attention among researchers. It is well documented that consumer behaviour is guided by consumer's beliefs and values and Minton *et al.* (2019) recommend that marketers consider the diverse effects of religiosity and moral foundations in their marketing strategies to promote food consumption. It is, therefore, plausible that religious leaders may be key role-players in the quest to reduce food wastage in line with SDG goal 12.3, namely, to halve food waste by 2030. The overall objective of this research is, therefore, to determine what role religious leaders (RLs) can play to facilitate food waste reduction for sustainable food security in the Vhembe District. Also, COVID-19 significantly affected people's food purchasing and consumption habits. Fears of disruptions in the food supply chain have caused an increase in the quantity and type of food bought by households. Yet, increases in food purchases give rise to FW with negative ramifications for the environment in terms of greenhouse emissions and groundwater pollution. Thus, this study explored both the role of religion in food conservation and the part religious leaders can play in reducing FW, while taking a fresh look at food wastage from a religious and moral perspective. In doing the above, this leads to the generation of new knowledge in support of food security, and the fight against climate change. It is worth noting that the study area is faced with the triple challenges leading to many socio-economic problems worsened by the COVID-19. This study applied a theoretically-informed framework of the hope theory; using a mixed method approach with a sequential exploratory and descriptive design. Purposive sampling was used. Appreciative inquiry using key informant interviews and questionnaire survey, as well as preference snowball and random sampling procedures were applied in the study. Government publications, journals and related books were used to acquire data to answer the objectives of the study. Descriptive statistics and factor analysis were computed using the Statistical Package for Social Sciences (SPSS) to analyse the quantitative data. Thematic content analysis, frequency distribution analysis were applied using Atlas TI version 8 to measures central tendency in order to answer the objectives of the study. The results of this research provides compelling scientific evidence and guidance for the necessary strategies to adopt for FWR interventions. Further, it revealed that even poor and developing countries need to tackle FW to fight hunger and FS. Also, the findings add value to the academic literature in rural development and policy interventions.

Key Words: Food Security, households, food waste, Limpopo province, religion, sustainable consumption.

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LIST OF ABBREVIATIONS

AU	African Union
FW	Food Waste
FWR	Food Waste Reduction
SD	Sustainable Development
FLW	Food Loss and Waste
HHFW	Household Food Waste
RLs	Religious Leaders
SDGs	Sustainable Development Goals
UN	United Nations

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CHAPTER 1: INTRODUCTION

1.1 Background

Waste is one of the issues posing serious problem globally, and food waste (FW) is one of the biggest types of waste beside plastic (Pietilä, 2019). The international community continues to face a gigantic key challenge of providing safe food for over 9.1 billion people by the year 2050 and beyond (Parfitt *et al.*, 2010; Abdelradi, 2018). To reach this huge target, Hodges *et al.* (2011) indicate that the main focus is still targeting increased food production by 50-70 percent; but the reduction of food loss and waste (FLW) remain an ignored factor. Over the past years, there has been a dramatic increase in FLW worldwide (Quested *et al.*, 2013; Jörissen *et al.*, 2015; Secondi *et al.*, 2015) and due to losses and wastage that occur yearly during the various phases of the Food Supply Chain (FSC), approximately one third of edible food resulting at a total of 1.32 billion tonnes has been thrown away without being consumed by humans (Gustavsson *et al.*, 2013; Graham-Rowe *et al.*, 2015; Schmidt, 2016; Martindale & Schiebel, 2017; Netherlands Nutrition Centre (NNC), 2018).

Worldwide, food rotting in landfills represents the third greatest source of anthropogenic methane emissions, which is a major contributor to climate change globally (EPA, 2016; Minton *et al.*, 2020). Moreover, the Food and Agriculture Organization (FAO) (2018) acknowledges and indicates that FW is an important issue for the global food security and good environmental governance. Globally, it is increasingly known that FW is a problem that needs to be solved on the way to achieve sustainable development (SD) (Hocke, 2014), even though throughout the developed world, food is treated as a disposable commodity (Oelofse & Nahman, 2013), as well as a vehicle for passing down cultural and religious traditions (Phillips, 2008).

The role of religion and religious leaders indicated by Elhoushy & Jang (2020b) is among the motives for reducing FW and has gained attention even though this area of research is still in the beginning stages as well as not explored. Religion provides teachings that focus on waste reduction and using only what is necessary. The Holy Bible states "Gather up the leftover fragments so that nothing is wasted" (John 6:12-13); as well as "Do not join those who drink too much wine or gorge themselves on meat, for drunkards and gluttons become poor, and drowsiness clothes them in rags" (Proverbs 23: 20 - 21, New International Version). Equally, the Holy Quran states that "...and eat and drink, but do not waste; surely Allah/God does not love the wasteful" (Quran 7:31). Given that Holy statements dictate specific teachings concerning food and waste, it could be argued that religion influences believers' conceptions of FW. Yet, this

influence is subject to one's religiosity, which reflects an individual's commitment to following the teachings of God (McDaniel & Burnett, 1990).

Researchers have studied the role of religion and religious leaders in shaping different consumption behaviours (Casidy & Arli, 2018; Garay-Quintero *et al.*, 2018; Mumuni *et al.*, 2018; Siyavooshi *et al.*, 2018). Specifically, a growing number of studies have examined the impact of religiosity on sustainable consumer behaviours (Abdelradi, 2018; Bhuian *et al.*, 2018; Minton *et al.*, 2018; Pichon *et al.*, 2007; Raggiotto *et al.*, 2018). This growing interest is understandable given that most of the world's population affiliates with a religion (Skirbekk *et al.*, 2015). In addition, religious beliefs span geographic boundaries, which makes them appealing to marketers (Minton *et al.*, 2015). Yet, earlier studies have found mixed results. Martin and Bateman (2014) found that religious commitment is negatively related to consumers' egocentric attitudes, but positively related to their sustainable behaviours. Also, a growing body of research stresses the importance of religion and religious leaders in understanding and addressing societal challenges (Koehrsen, 2021). However, religious leaders might be considered as initiator of strategies to promote FW reduction and advance the need to improve behaviour change among their congregants and community at large.

Changing behavior in the community requires both input from individuals who possess knowledge and credibility and a receptive audience. One group of individuals who may be uniquely positioned to promote community change but have been virtually ignored in the applied social science, health and consulting psychology literature is religious leaders (Anshel & Smith, 2014). One group of individuals who have a strong influence on the behaviors of others (Anshel & Smith, 2014), particularly in regard to FW behavior changes, is religious leaders. Heward-Mills *et al.* (2018) postulate that a religious leader is exclusively positioned to promote behaviour change as an integral member of the community. Religious leaders have a particularly strong influence on the behaviour of members of their religious institution and in the community, in general especially for the hard-to-reach populations the clergy were able to significantly facilitate behaviour change (Heward-Mills *et al.*, 2018; Anshel & Smith, 2014; Lasater *et al.*, 1997).

These individuals possess extraordinary credibility and influence in promoting healthy behaviors by virtue of their association with time-honored religious traditions and the status which this affords them, as well as their communication skills, powers of persuasion, a weekly (captive) audience, mastery over religious texts that espouse the virtues of healthy living, and the ability to anchor health-related actions and rituals in a person's values and spirituality. Most believed they had influence on their congregation for issues related to health/wellness, most commonly in the

form of increasing awareness. A majority talked about the importance of being a role model (Anshel & Smith, 2014; Baruth *et al.*, 2015). As a result, it is vital to understand how to most effectively capitalize on the strengths of and engage religious leaders in FWR (food waste reduction) efforts for food security in South Africa.

As the significance of religion being accredited within the field of consumer behaviour; the field should follow the pragmatic belief that what matters is not whether religious beliefs are true but, rather, the effect these beliefs have on human behaviour (Minton, 2014; James, 2004). This is key because Minton (2014) reveals that religion is the backbone of everyday behaviour. It influences, for instance, what consumers' value, with whom they spend time, from where they get information, and in which activities are deemed acceptable to participate. Adding to this, Dasgupta & Ramanathan (2014) indicate that religion shapes public opinion and societal policy in communities where religion is important for the majority of people living in (Dasgupta & Ramanathan, 2014; Minton, 2014) while also influencing food consumption behavior (D'Haene *et al.*, 2019). Resulting this pragmatic belief, religion can be considered an individual difference variable and a predictor of sustainable consumption practices. Thus, this study focuses on the role of religious leaders and how they can influence consumer behaviour, specifically with FWR for sustainable consumption practices at the households' level.

The recognition of FW as a major societal challenge by the United Nations Environment Programme (UNEP) calls for imperative measures to prevent its occurrence (UNEP, 2021). Precautionary measures according to Filimonau *et al.* (2020a) should target consumer behavior that contributes significantly to FW generation domestically. Scholarly research can inform the design of preventative measures by revealing the antecedents of FW behavior in various contexts of food consumption (Aschemann-Witzel *et al.*, 2015). Despite, being overlooked (Hodges *et al.*, 2011; Reynolds *et al.*, 2019; Khorakian *et al.*, 2022), ample attention has been attracted by governments, organisations, policy makers and researchers due to increasing levels of household food waste. And also this although, the role of religious beliefs in shaping consumer FW behavior remains under explored (Porpino, 2016).

Of all, food produced for human consumption across the world, nearly 33% is lost and wasted (FAO, 2019). According to Chakona & Shackleton (2017), this occurs while the amount of food needed to eradicate world hunger is wasted and almost two billion people go to bed hungry. Moreover, FAO (2013) estimate that the global carbon footprint of wasted food in 2007 was calculated to be equal to 3.3 gigatons of carbon dioxide emissions (CO₂). FWR has been perceived (Quested *et al.*, 2013; Jörisen *et al.*, 2015) as a key lever for achieving global food

security (GFS), in order to freeing up finite resources such as water and energy for other uses, diminishing environmental risks as well as avoiding financial related losses. In addition, the study conducted by Gustavsson *et al.* (2011) indicates that in poor and developing countries, FW is a potentially important factor in efforts to combat hunger and improve food security (FS). Yet, it is also revealed by FAO (2018) that FW is a significant issue for the global food security. So, it is observed by the researcher of this study that even poor and developing countries need to tackle FW to fight hunger and FS.

Janjic *et al.* (2019) emphasize the significance of FW on FS, economy, and environmental sustainability which continue making it a pertinent universal problem. Although the reduction of FLW ranks high on the agenda of many policy makers and academics; Koester (2014) highlights that FLW remains a serious economic and policy problem and has been seen as a priority in accordance with many international organisations including the European Parliament. It has attracted public, academic, and political attention; making it an essential topic of environmental, societal, and economic concern while it has become a main challenge for sustainability (Von Braun, 2007; Wang *et al.*, 2018; Filimonau *et al.*, 2019; Huang & Tseng, 2020). They argue that this will increase the efficiency of resource use and have beneficial environmental effects. Indeed, in accordance with (Filimonau *et al.*, 2019; Huang & Tseng, 2020), attempts to reduce FLW may ultimately reduce the efficiency of resource use. Further, Papargyropoulou *et al.* (2014) state that the unprecedented scale of FW in global food supply chains (GFSC) is attracting increasing attention due to its environmental, social and economic impacts.

With the United States (US) losing about 150 million metric tonnes (MMT) of food between farm and fork annually, of which about 70 MMT is edible FL; while \$31 billion worth of food is wasted in Canada each year, this is approximately 40% of food produced yearly in Canada (Gooch *et al.*, 2014). Australia wastes 4 MMT of food each year, estimated at about \$8 billion worth of edible food per year (Elmenofi *et al.*, 2015, House of Commons, 2017). This equates to 523 kg per household. In Europe, FW per capita is among the highest (280 kg/year/capita), while in 2022 the estimated amount of FW was 132 kg per inhabitant in the European Union (EU) and targeted a reduction of 50% by the year 2030. Households generated 54% of food waste, accounting for 72 kg per inhabitant (Eurostat, 2024). In the United Kingdom (UK), it is estimated that 10 MMT of food and drink waste arises post-farm gate each year with a value of over £17 billion a year, and is associated with around 20 million tonnes (MT) of greenhouse gas (GHG) emissions (House of Commons, 2017) while in China wasted food is roughly estimated at 17 to 18 million tonnes of food yearly. While the entire net food production (FP) of sub-Saharan Africa (SSA) is estimated

at 230 million tonnes yearly; still a large quantity of the food produced is wasted throughout the FSC, from initial agricultural production down to final household consumption (HHC). In Egypt, increased rate of food losses and waste reaches about 50% in vegetables and fruits, 40% in fish, 30% in milk and the amount of wheat losses and waste reaches 1.5 million tons/per annum (Elmenofi *et al.*, 2015; FAO, 2014). In Kenya, household lost annually about Kshs 9600 (US\$96 or equivalent to ZAR 1,800) from the wasted food translating to a loss of Kshs 1.4 billion (US\$ 13.6 million equivalent to ZAR 241, 254 523.52) from the 141,353 households in Garissa County (Huho *et al.*, 2020). National estimates in Nigeria reveals that some 32 million tonnes of waste per year is generated (Obinaju & Ikpeida, 2021). In the Democratic Republic of Congo (DRC) studies on household food waste are not available, although an understanding of economic and social behavior of households is essential to improve the management of household waste (Mukemo *et al.*, 2020).

Thus, being a water scarce country with an increase in the South African population growth, the demand for food and other essential resources such as water and electricity are increasing accordingly (FAO, 2013). In the same fashion, South Africa although committed to achieving the SDGs for 2030, which includes domestication of Goal 12.3 and measuring progress made towards food loss and waste reduction; it still generates about 10.3 million tonnes per annum. Adding to this, in line with SDG 12.3 and to better inform the setting of targets for food waste reduction, urgent updated food waste estimate is required (Oelofse *et al.*, 2021). Considering these amounts of household food waste (HHFW) and the pressure that is being imposed on landfill sites, there is a need to devise practical mitigation measures that can curtail the impacts of FW in order to conserve the environment. Additionally, HHFW has huge impact on attaining household food security. Much work needs to be done to bring about substantial changes in the food utilisation and impact positively toward food security for all (FAO, 2013). The more the HHFW, the more food insecurity experienced at household and national level.

Adding the above mentioned, food insecurity (FI) in Africa has for too long been muddled with hunger (The Conversation, 2015). Despite the country being classified nationally as a food secured nation, in SA up to 70% of households living in informal settlements suffer from FI (Naicker, 2015). As religion influences consumers value; world religions consequently keep encouraging consumers to share surplus food as sharing indicates kindness and promotes equality (Minton *et al.*, 2020; Minton, 2014). Through these teachings of their leaders, the researcher through this study is of the view that consumers can apply their religious beliefs in helping and sharing food with the poor and their neighbours so that no one goes hungry. In the face of the serious and growing threat of climate change and FI challenges, a study is conducted

in Vhembe District Municipality (VDM) of the Limpopo Province (LP) in South Africa (SA) to discuss the role of religious leaders in food conservation (FC) and explore the roles of RL in the war against FW and insights on FI prevention programming in the study area. Furthermore, this study is also concerned with the relation between food wastage reduction and the improvement of FS in SA. By FS it means that all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

It is well documented that consumer behaviour and choices are guided by the consumer's beliefs and values (Filimonau *et al.*, 2022a). Also, better understanding of religion as a factor in food consumption behavior at home can facilitate the development of more effective marketing and management practices (Suki & Suki, 2015; Filimonau *et al.*, 2022b). Consumer behaviour represents the main driver of FW in consumption with multiple factors shaping wasteful behavioural patterns, and in households such factors are represented by personal lifestyles (Secondi *et al.*, 2015; Bilska *et al.*, 2020). The wastage of food is dismayed because it is viewed as a God's blessing by most religions (Elhoushy & Jang, 2021). Minton *et al.* (2019) and Minton *et al.* (2020) recommend that marketers consider the diverse effects of religiosity and moral foundations in their marketing strategies to promote the consumption of special food relating to diets. This is to encourage sharing of surplus food among consumers. It is therefore plausible that religious leaders may be key role-players in the quest to reduce food wastage and, therefore, this study aims to understand the role that religious leaders could play in reducing food waste.

1.2 Statement of the Research Problem

Diener *et al.*, (2011) reveal that approximately 68% of humans claim that religion is a central part of their lives; as it plays a vital role in the lives of many people (Newman & Graham, 2018). Christianity (63%) and Islam (30%) are the two dominant religious affiliations and are amongst the fastest growing religious faiths that have been co-existing for centuries in terms of faiths in Sub-Saharan Africa (SSA). (Pew Research Center, 2014; Schulz & Janson, 2016; D'Haene *et al.*, 2019). According to a 2016 community survey, Christianity is the dominant religion affiliated by the majority of the population (74.1%) in Limpopo. The percentage of the population that adheres to Islam, Hinduism, Buddhism, Bahaism, Judaism, Atheism and Agnosticism is less than one percent (Stats SA, CS, 2018). Similarly, other research suggests that people who engage in religious activities report higher levels of well-being (Diener *et al.*, 2011; Oishi & Diener, 2014; Newman & Graham, 2018). While a significant portion of HHFW accounts for consumers' food wastes (Mumtaz *et al.*, 2022), this truly points to the need for a change in consumers' behavior to

minimize food waste. Given the paramount role of religion in many people's lives, it is important to understand how religious leaders could contribute in individuals' behaviour change in relation to FW.

Food plays an important part in society, and especially in religious practices and festivities both in terms of abstaining during period of fasting and indulgence during various religious feasts. Food abundance and overindulgence is a common thread between different religions. Bossi *et al.* (2014) point out that food is the final product of many interacting dimensions, operating simultaneously on the individual and within a community. Religious feasts and festivities are seen as festive social occasions and represent the living aspects of represented faiths (Chaudhry, 1988). These festive seasons are seen as family time and food takes centre stage during these family gatherings. The risk of food waste generation during these gatherings are high. The researcher notes also that different festivities and practices where food is more important and plays a key role within major world religions such as Christianity, Islam, Judaism, and so on; the food is potentially wasted. The wastage takes place during church services i.e. bread and wine not consumed during communion, meat during Easter weekend, *Eid al-Adha (Tabaski)*, Christmas and funerals. Leftovers are often wasted and not handled with care. At funerals, *Eid al-Adha* and end of Ramadan; customs dictate to feed people when they arrive as the catering is always huge at these events.

Adding to this, research reports (Mathras *et al.*, 2016; Filimonau *et al.*, 2022a) emphasize that religion is a significant factor in consumer behavior. While being a critical socio-demographic characteristic of consumer populations in terms of their beliefs, religion is also an important psychographic feature (Arli *et al.*, 2019). Religion can affect consumer values, opinions, and attitudes, but also influence consumer lifestyles (Arli & Tjiptono, 2014). For example, when speaking of food consumption, religion defines what followers of specific religion eat or don't eat, such as Halal or Kosher food (Minton *et al.*, 2019). Better understanding of religion as a factor in food consumption behavior at home and away can facilitate the development of more effective marketing and management practices (Suki & Suki, 2015).

Studies conducted by Filimonau *et al.* (2022a) and Yetkin Özbük *et al.* (2022) reveal that religion can serve an important antecedent of waste consumer behavior. Most religions define food as a God's blessing and discourage its wastage (Elhoushy & Jang, 2021). This emphasis resides on the principle of major religions for promoting kindness, equality, love and sharing as highlighted

also by Minton *et al.* (2020). This notwithstanding, the role of religious beliefs and religious leaders in shaping consumer FW behavior remains under-researched (Porpino, 2016).

Globally and nationally, sustainability debates have focused on FLW reduction as evidences have shown enormous volumes of wasted food being generated and the resulting adverse social, financial, and environmental consequences (Pavone, 2020). Also, the United Nations Development Programme (UNDP) (2019) reveal that annually roughly 8% of greenhouse gas (GHG) emissions is generated and nearly one-quarter of all agricultural water is being depleted due to food that had been harvested for human consumption (Mathee, 2020), but turned to waste. In South Africa, there is still a lack of reported data on FW throughout the supply chain (Oelofse, 2019). Evidently, FW levels in South Africa imply that FWR is not effectively implemented at sufficient scale, especially at the consumption stage. Although the wastage occurs along the entire food supply chain, however consumers have been identified as key targets to focus reduction efforts.

Understanding that religion is a human activity that might have important effects in conservation behavior (Gonzalez *et al.*, 2018); the authors indicated that to do effective conservation or bring change, scientists require engagement with local community members, especially local church which is one of the most important groups with whom they must engage. Conservationists engage with many different groups, but they rarely consider the religious communities. In this study, we explain why considering RLs as target groups to whom devoted time and efforts is most important. Because, according to Dasgupta & Ramanathan, (2014), in communities where religion is important for the majority, it shapes public opinion and societal policy. The researcher strongly believes that once we are able to manage our food ethics and sustainable consumption, definitely we will be able to come together to survive in unison with the Ubuntu principle for us to prosper indeed as one African nation, as well as transiting to a circular economy. However, there is less research available on food waste reduction strategies for sustainable food security in rural areas involving RLs.

In alignment with SDG 12.3, the South African government aims to reduce food waste by 50% by 2030. Of all food wasted in South Africa, a majority occurs at the consumption stage, i.e. household food waste. In comparison to all the municipalities in South Africa, Nelson Mandela Metropolitan (33%), Polokwane (31%) and Ethekewini (31%), are the areas where the most food is wasted (Mathee, 2020). Adding to that, the researcher is of the view that there are no proper

measurements available so far and thus, the sector remains underestimated. However, it is important to note that of the 284 South African municipalities, only 13 have data available on food waste (Oelofse, 2019). Available FW studies in South Africa confirms existing data on Kimberley (Cronjé *et al.*, 2018), Ethekwini and Johannesburg (Oelofse *et al.*, 2018). To the knowledge of the researcher, no FW data are available for the Vhembe District Municipality in the Limpopo Province; and Cronjé *et al.* (2018) assert that limited research is available about South African HHFW.

Thus, the knowledge of FW can be taken seriously if preached by RLs, reason why we are engaging these actors of the civil society. The study contributes to understand if the awareness is taking place or not. Hence, the research questions address those highlighted issues. The researcher will find out how food is wasted in Vhembe District and what has been done to reduce that? However, locally, provincially and nationally there is no involvement of RLs in the FW reduction process and nothing so far happening to address the wastage of food, reason why this study brings them on board.

1.3 Justification/Rationale of the Study

This study has been influenced by a dramatic increase in FLW worldwide (Jörisen *et al.*, 2015; Secondi *et al.*, 2015). In addition, this study provides a significant opportunity to advance the understanding of the obstacles and predictors of the implementation of FWR interventions strategies in South Africa. So far, there are limited data available on household food waste in South Africa (Mathee, 2020; Cronjé *et al.*, 2018), and both quantitative and qualitative data on household food waste in Vhembe District lacks. This study is further justified by the fact that it will help achieve the “Zero Hunger” and “Responsible Consumption and Production” (Chinie *et al.*, 2021) as correspondingly, reducing food waste correlates with the 2nd and the 12th Sustainable Development Goals of the United Nations; and also the fact that by 2030, the South African government aims to reduce food waste by 50% to align itself to the SDG 12.3. Despite all the efforts, 5% of all food wasted countrywide occurs at the consumption stage, at the household level. This makes it imperative that the proposed study be undertaken to develop strategies and indicators that would be used to measure reduction in food waste, and to fill the gap in exploring the influence of religious leaders in food waste reduction strategies for sustainable food security in Vhembe District. This study will contribute to the scientific literature regarding the role of religious leaders in food waste reduction strategies. The study uses RLs as integral members of

the community who habitually enjoy high credibility where they live and uniquely positioned to promote behaviour change (Heward-Mills *et al.*, 2018; Koehrsen, 2021).

The reduction of FW in SA requires as well the implication of RL as key stakeholders within the civil society for sustainable FS. Hanson and Mitchell (2017) stress that reducing FLW can generate a triple win: for the economy, for food security, and for the environment. Also, the study will highlight the importance of agriculture as food security and nutrition (FSN) provider for poverty alleviation and social integration (NAMC, 2009). The quantity of food wasted annually is more than enough to feed the entire world's hungry people. In fact, it could feed the entire world population. In Africa, food production is dominated by small-scale farmers, who produce food mainly for family consumption (NAMC, 2016). It is estimated that up to 12 million (24.5%) of the South African population go to bed hungry each day (Hosken, 2013) and yet the country has the largest proportion of food wastage in Africa (Allafrica, 2010). In other poor areas around Cape Town and Msunduzi in KwaZulu-Natal, between 80% and 87% of the population, go hungry daily (Hosken, 2013). Yet, needy poor households in South Africa and specifically in these areas grow their own food (SACN, 2011).

Vhembe District face challenges such as droughts, high dependency on grants, huge water backlog with slow response to water supply complaints, lack of agro-processing industries, threats to food security and hunger (VDM, 2021). For example, 12.19% of people in the District run out of money to buy food of which 4.05% is in Thulamela Local Municipality which is the highest percentage compared to other municipalities. Collins Chabane Local Municipality follows Thulamela with 3.54%, then Makhado Local Municipality with 3.36% and lastly Musina Local Municipality with 1.24% (VDM, 2021). Following the above mentioned, at the global level as indicated by FAO (2018), about 1.3 billion tonnes of food is wasted every year, and within South Africa, 10.3 million tonnes of food is wasted annually (Oelofse *et al.*, 2021).

Finally, understanding that human development involves the processes, on an individual and social level, towards fulfillment, not only of basic needs but of values including freedom, security, achievement and belonging; RL are influential in achieving human development (HD) as religious beliefs, values and principles impact human behaviors in a multiple ways (Padela *et al.*, 2010); and remain powerful tool to impact individual behaviours and community actions, including rural community development-related practices. This study puts people on the centre stage of the national and international concerns, reason why it uses an inter-disciplinary approach in solving the problem of food wastage through the implications of RL. Thus, it presents triple contributions namely academically by contributing towards developing FW reduction strategies that could

combat household food wastage. This will also contribute to policies development or recommendations for helping to reduce food waste in South Africa at the government level, while at the international policy set by the United Nations Sustainable Development Goals (UN SDG), this study addresses not only the SDG 12.3 targeting Responsible Consumption and Production but also help achieve the “Zero Hunger” (Chinie *et al.*, 2021) because reducing food waste correlates with the two goals. Lastly, this study will benefit household members at the household level as the issue of zero waste for food security will be taken seriously.

1.4 Research Questions

This study will attempt to provide answers to the following questions:

1. What is the roles of religious leaders in reducing food waste?
2. What are RLs perceptions on the fight against food waste?
3. What factors could influence food waste reduction behaviour at household level?
4. What recommendations should be made for FWR intervention strategies?

1.5 Research Objectives

The main objective of the study will be to examine the role of RLs in food waste reduction strategies for sustainable food security in Vhembe District of Limpopo Province, South Africa.

This will be achieved by carrying out the following specific objectives:

- 1) To explore the role of religious leaders in imparting knowledge on FWR among community members.
- 2) To determine perceptions of RLs in the fight against food waste in Vhembe District.
- 3) To examine factors influencing food waste reduction behaviour at the household level.
- 4) To make recommendations for FWR interventions strategies at both household and other related levels.

1.6 Theoretical Framework of the Study

Attested as the ‘blueprint’ or guide for empirical research, a theoretical framework is a framework based on an existing theory in a field of inquiry that is related and/or reflects the hypothesis of a study (Grant & Osanloo, 2014). It is a blueprint that is often ‘borrowed’ by the researcher to build his/her own house or research inquiry. It serves as the foundation upon which a research is constructed. This current study applied the Hope Theory which is a construct within the positive psychology conceptualised by Snyder and colleagues (Snyder *et al.*, 1991). According to the authors, positive psychologies emphasize the strengths that people exhibit rather than the

symptoms of psychological pathologies (Snyder *et al.*, 1991; 1996; Helland & Winston, 2005). With reference to this study, the symptoms of psychological pathologies are the wasting behaviours that are developed in people and they feel like they no longer have hope to change those behaviours. Hope is a goal-focused cognitive process that is conceptualized by three necessary and interactive components: **goals**, **agency thinking**, and **pathways thinking** (Snyder *et al.*, 2002).

As a guiding theory chosen for this study, it has been alluded that this construct is understood as the capacity to yield pathways to attain desired goals and to motivate one-self to use those pathways (Snyder, 2002). This is the reason, it is revealed that the ultimate goal of positive psychology is to understand and build those factors that allow individuals, communities, and societies to flourish (Seligman, 2002; Helland & Winston, 2005). So, here, the main aim of the construct is to build on the pathways to fully flourish where there was despair. Thus, hopeful people develop many pathways to reach the goals because they anticipate obstacles and do not expect things to be easy. They have high level of agency, meaning they process and sustain their motivation to move towards their goals; they are energized and come up with new and different plans to overcome their obstacles. Snyder (2002) suggest that hope may assist in reducing detrimental consequences by 'inoculating' the communities against despair or hopelessness. As an empirical paradigm, hope has unique significance for understanding the resilience resources for people or communities living in despair situation. The model identifies a mutual association between agency and pathway thinking toward the realisation of any desired goal.

In the case of this study, communities of Vhembe District (Thohoyandou, Muledane and Shayandima) are hopeless as they waste food always. This makes them live in despair situation producing negative wasting behaviours. Consequently, this theory of hope comes to help restore their hopes for them to flourish once again as a strong community. So, household members needed different 'Pathways' with a new 'agentic thinking Agency' that will assist them in realising their expected goal which is reducing FW and ensuring food security. This means that this theory of hope may assist in reducing detrimental consequences by injecting measures of hope to these communities against their desperate situation, because hope is that optimistic state of mind based on an expectation of positive outcomes with respect to events and circumstances in one's life or the community at large. So, because the Vhembe District community was facing that high level of desperation, it was appropriate to bring hope to them by motivating them through RLs in order to achieve the desired goal of having zero food waste attitudes for a sustainable food security rural community.

This theory is seen as the connecting power that can restore shared values and understandings in society that enable individuals and groups to trust each other, working together under the influence of RLs to reduce FW. So, the researcher adopted this theory because it provides the glue to facilitate social cohesion, co-operation, mutual understanding, and innovation by also recognizing the importance of RLs in engaging in a participatory manner with community members to find solutions to problems affecting the people in a coordinated manner. Hence, in this study, the problem is FW which threatens food security. Below is the modified Hope Theory Framework adapted from Snyder (2002) shown in Figure 1.

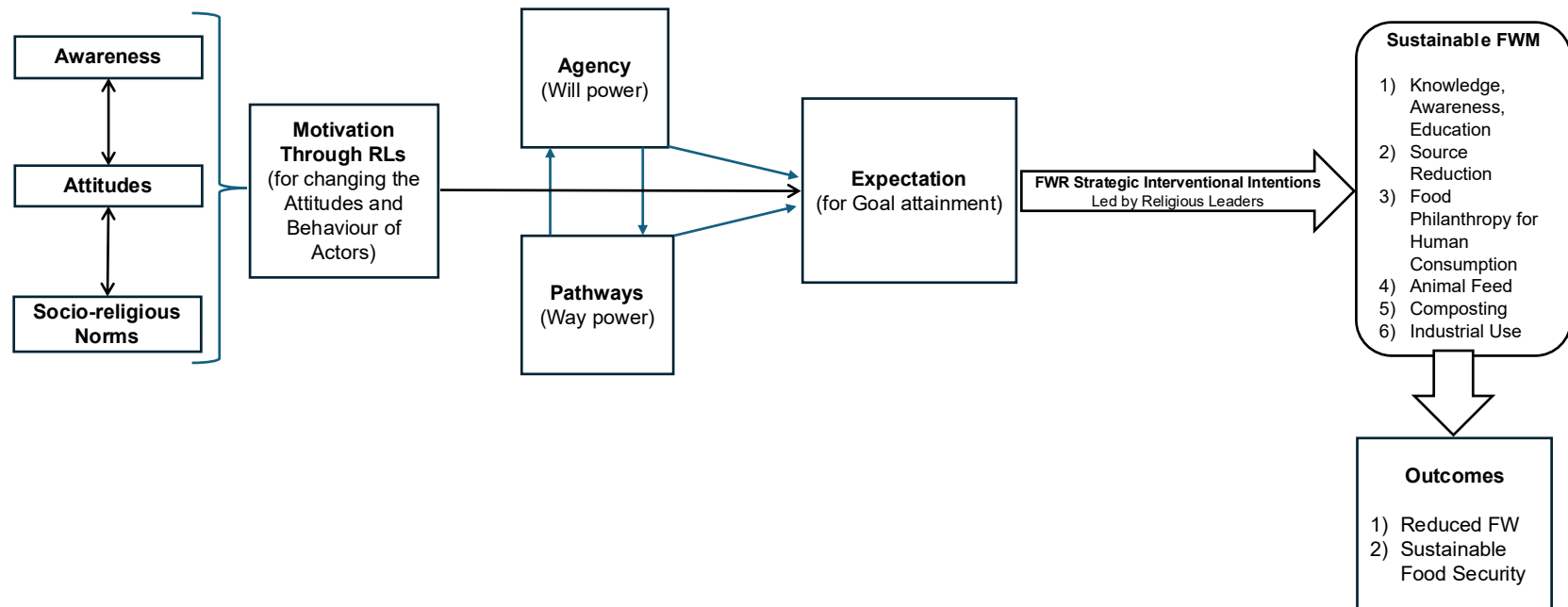


Figure 1: Modified Hope Theory Framework (Adapted from Snyder, 2002).

1.7 The magnitude of food waste in South Africa

FW remains a potentially cardinal determinant in efforts to combat hunger and improve FS in developing or poor countries (Gustavsson *et al.*, 2011). According to the European Commission (EC), FW is composed of raw or cooked food materials and includes FW before, during and after meal preparation in the household; as well as FL in the process of food manufacturing, distribution, retail and food services activities (EC, 2010). Thus, AllAfrica (2010) revealed that SA has the largest proportion of FW in the continent, while Hosken (2013) indicated that each day countrywide, a population which goes to bed hungry is evaluated up to 12 million (24.5%); and in some of the poorest areas as around Cape Town and Msunduzi in KwaZulu Natal, 80% to 87% of the population go hungry daily (Ramukhwatho *et al.* 2014). Furthermore, it has been propounded by research carried out by (Nahman & De Lange, 2013; Oelofse & Nahman, 2013) on food wastage in South Africa that on an annual basis between 9 and 10 million tonnes of FW is induced and this is an approximate equivalent of 30% of the local agricultural production countrywide. Adding to this Oelofse and Nahman (2013) opine that the bulk of this FW is occasioned in the pre-consumer stages of the supply chain while only about 5% of it is generated during consumption. Yet, as focusing at the local level this study will quantify the food wasted during consumption stage in order to find out how FW threatens food security with local evidences.

Recently, the pre-COVID-19 estimates of FLW for South Africa based on the five-year average (2014-2018) of a study done by Oelofse *et al.* (2021) is at 10.3 million tonnes annually. These researchers opine that this estimate is in the same order of magnitude as the previous estimates of 2013, but the distribution of the losses and waste across of the value chain have changed. Most losses and waste (49%) occur at the processing and packaging stage in the value chain, whereas food waste at the consumption stage (18%) is more than three times higher than previous estimates for South Africa (Oelofse *et al.*, 2021). International trends submitted by the Institution of Mechanical Engineers (IME) indicated that food wastage moves up the FSC as the level of development in a country increase. Thus, SA is likely to experience similar trends in FW over time as a developing economy on the continent. Hence, changes in the SA food consumption patterns supported by a growing middle class, is already reported (IME, 2013). Also, the WWF SA has acknowledged that the shift is most evident in the decrease in the consumption of staple maize and bread to a more diverse diet. Understanding where in the supply chain the wastages occur, the value of food going to waste, and the associated water losses will provide a clear picture of where in the supply chain intervention is required and on which commodity groups' interventions should focus to reap the best results (WWF SA, 2010).

1.8 Operational Definitions of Key Terms and Concepts

For the purposes of this study, the following concepts or terms will be used widely as defined as follows below:

Food Waste refers to food appropriate for human consumption being discarded, whether after it is kept beyond its expiry date or left to spoil due to behavioural issues (Nunkoo *et al.*, 2021; Hanssen *et al.*, 2016; Bernstad, 2014; Stenmarck *et al.*, 2011). Also, according to Qian *et al.* (2022), it refers to the food quantity or quality decrease resulting from retailers, food service providers, and consumers' decisions and actions.

Food Loss on the other hand refers to a decrease in mass (dry matter) or nutritional value (quality) of food that was originally intended for human consumption.

Sustainable Consumption in this study refers to the moral and responsible use of food and its related products without jeopardising the needs of our fellow neighbours and future generations.

Sustainable Food security according to the High-Level Task Force on Global Food Security, achieving food and nutrition security involves (a) ensuring consistent availability and accessibility of sustainably produced, nutritious and safe food; and (b) reducing and/or eliminating losses and waste in food production, processing and consumption.

Reduction Strategies are mechanisms and solutions aiming at minimising the continuous occurrence of something.

Food Waste Reduction Strategies (FWRS) are perceived as key lever at achieving global food security (GFS) and to freeing up finite resources such as water, energy, and diminishing environmental risks as well as avoiding financial related losses (Quested *et al.*, 2013; Jörissen *et al.*, 2015). According to this study, FWRS refers to solution-driven mechanisms aiming at minimising the continuous occurrence of food wastage and achieving household food security through the influence of RLs.

Religious Leaders refers to a recognised person within the Christian and Muslim religions as having influential authority who formally and informally reach community members their diverse roles (leaders, gatekeepers, teachers, advocates, etc.).

1.9 Outline of the Thesis

In this thesis, we expect our readers to comprehend how FW affects countries to be sustainably desired food secured nations. The relevance of this study now of time is of great impact as all nations are looking towards the achievements of the SDGs by the year 2030. And for this study, the challenge remains the realization of the SDG 12.3 in SA and especially in VDM. Hence, the proposal is made up of three chapters which are structured as follows:

Chapter 1 provides the introductive background, statement of the research problem, justification of the study, research questions, the research objectives, the operational definition of key terms, and the outline of the thesis.

Chapter 2 gives an in-depth review of related literature on FW and reduction strategies as well sustainable food security. The researcher reviewed literature from both local and international journals, reports and publications. A conceptual framework is presented based on the reviewed literature the adoption of the Hope Theory has been chosen as a guiding theory.

Chapter 3 gives a clear picture of the methodologies that will be used and applied during this study including the summary of the research approach/activities to be undertaken by outlining the methods, material, techniques, and tools to be used during the study.

Chapter 4 deals with the exploration of the roles of RLs in imparting knowledge on FWR.

Chapter 5 focuses on the perceptions of RLs in the fight against FW.

Chapter 6 addresses factors influencing FW reduction behaviour at the household level.

Chapter 7 touches on a brief discussion, conclusion, and recommendations.

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CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1 Introduction.

This chapter unpacks literature related to the wastage of food, its religious and moral perspective, its diverse reduction strategies for sustainable food security. In addition, it includes the role of religion in food conservation and explores the roles of religious leaders for behaviour change in South Africa. This chapter covers as well some of the major drivers impacting food consumption (FC), and therefore associated potential for FLW generation in the country due to some irresponsible and unethical human behavioural manners. It is important to note that a responsible citizenship, a responsible and ethical eating behaviour including a positive attitude and influence be developed by all living in South Africa that will help minimize the wastage.

The chapter consists of a preliminary desk review of key literature on food waste and reduction strategies delineated in five sections with lens on key global, continental, regional, in-country then narrowed on the local level. This desk review of key related literature is done in order to establish the views of other scholars and researchers on food waste and reduction strategies for sustainable food security worldwide and particularly in SA. The researcher chose to focus more on religious leaders as custodians of ethics, values and morals as well as the most influential and revered leaders across all communities and sectors. A literature review is undertaken to examine the role of faith leaders in food waste reduction, take a fresh look at food wastage from a religious and moral perspective, behavioural attitude towards food wastage and inter-faith food waste reduction response in SA. In this chapter issues highlighted are on food waste, sustainable food security, food consumption and production, and therefore associated potential for food loss and waste generation in the country, the continent and across the world. Additionally, the conceptual framework, review of the methodological approach and summary of the reviewed related literature are outlined.

2.2 Overview of Literature review

On reviewing the literature, the researcher identified gaps, inconsistency and immorality in food waste behaviour and practices in South Africa. Literature review helped the researcher to gain a broader and deeper knowledge base of the concept of food waste and experiences faced. The review indicated the economic, moral, religious and sociological explanations for food wastage. In addition, it covered causes of wastage, its impacts and effects, sources, drivers and prevention of wastage for household members and cross-cultural and ethical adaptation were also outlined. Neuman (2014) states that literature review (LR) is the range of all available published and

unpublished documents on the topic, containing empirical evidence, information, ideas, data and observation from a particular standpoint to fulfill certain aims. He further argues that since it expresses certain views on the nature of the topic, it must be investigated and the effective evaluation being proposed. It also discloses the theoretical and conceptual models which are associated with FW and FW reduction strategies. Thus, in this chapter, the researcher discloses the LR and looks into relevant literatures underpinning the study.

Møller *et al.* (2013) highlight that there is a lack of available 'FW' data with regards to literature research conducted within FUSIONS. However, a global report from the FAO (2011) highlights that approximately one third of the total food produced for human intake end up being wasted. In South Africa, for example a report released by the World-Wide Fund, South Africa (WWF SA, 2017) indicate that of the 10 million tonnes of food that goes to waste every year nationwide, about 90% is discarded in landfill. Reducing FLW therefore is key in achieving sustainability in food supply versus the demand. Consequently, in response to the global call, the researcher chose to conduct this study on Food Waste Reduction Strategies for Sustainable Food Security in South Africa. In addition, a robust engagement with Religious Leaders in support of SDGs 12.3 is imperative to ensure effective food waste prevention (FWP), and reduction and awareness mechanisms among all stakeholders. This chapter covers some of the major drivers impacting food consumption (FC), and therefore associated potential for FLW generation in the country due to some irresponsible and unethical human behavioural manners. It is important to note that responsible citizenship, responsible and ethical eating behaviour including positive attitude and influence be developed by all living in South Africa. This could help minimize the wastage of food.

2.3 Effect of Religious Leaders on Food Waste Reduction

The reduction of food loss and waste (FLW) has been seen as a priority for many international organisations, including the European Parliament. Further, a numerous of institutions declared as well their intent to reduce food waste by the year 2030 (Koester, 2014). Although FW is ranked high on the agenda of many policy makers and academics, in South Africa there are few studies that highlight the role of RL in engaging into the reduction of FLW. Yet, a number of studies have been conducted mostly to highlight the magnitude of the problem, to initiate specific targets concerning the reduction of FLW, and to institute policies to meet the targets. Further, food has cultural and religious dimensions as it can define affiliation to groups of society or status (Schmied, 2019). To add on this, faith plays a crucial role in development (Hoffstaedter, 2011).

Grounded on the above backdrop, the researcher argues that food is among the most basic and important element of human society as it plays a central part in the social organisation of peoples throughout the world because without it no one can survive and have a healthy life. He further argues that faith does not only play a role in development but in science and life too. He elaborates that while doing science there is always a certain level of confidence, faith (trust) or high level of hope within the scientist in the laboratory conducting an experiment in trying to develop a vaccine or systematically reviewing empirical literature in order to publish scientific papers. Surely, the scientist possesses the virtues that are part of the positive psychology such as: hope and optimism in the quest to succeed his or her endeavor. Yet, even when one or two experiment fails, the scientist remains optimist and hopeful that by trying again things can happen. The researcher argument is supported by Kibby (2015) and Smith (2006) who confirm that these two concepts are strengths-based concept within the positive psychology field (Kibby, 2015 & Smith, 2006), as they help individuals direct their attention and effort towards productive activities; energising and stimulating action; encouraging them to persevere in their enterprises or whatever they are doing.

Furthermore, in its 15th edition, the New Encyclopaedia Britannica (NEB, 1989) highlights that faith (*pistis* in Greek and *fides* in Latin) is an inner attitude, conviction, or trust relating man to a supreme God or ultimate salvation. In Christianity the intellectual component of faith is stressed by many theologians of the Protestant movement but the researcher chooses to concur with Luther who stressed the element of trust, and the Letter to the Hebrews (11:1) defining faith (*pistis*) as 'the assurance of things hoped for, the conviction of things not seen', while Calvin emphasized faith as a gift freely bestowed by God (NEB, 1989).

In Islam, faith (*imān*) is what sets the believer apart from others; at the same time, it is ascertained that 'none can have faith except by the will of Allah' (Qur'ān 10:100). And notions of religious trust in India, China and Japan are as a rule different from the notion of faith in Christianity and Islam, as the 'trust' (Pāli *saddhā*, Sanskrit *śraddhā*) described in the Buddhist Eightfold Path is comparable to the confidence with which a sick person entrusts himself to a physician (NEB, 1989). So the researcher looks at faith in the angles alluding that faith is an inner attitude, conviction or trust relating man to a Supreme Being or power invisibly higher; the assurance of things hoped for (*pistis* according to the Greek) as well as the trust described in the Buddhist Eightfold Path. Gonzalez *et al.* (2018) report that engagement with local grassroots community members has been required by scientists in order to implement effective sustainable

development. Often, one of the most important actors with whom they must engage is that of the local religious leadership.

2.4 Consumer behaviour, attitudes, and perceptions in relation to FW reduction

Dasgupta & Ramanathan (2014) indicate that religion shapes public opinion and societal policy in communities where religion is important for the majority of people living in. Religion also influences food consumption behavior (D'Haene *et al.*, 2019). Diener *et al.*, (2011) reveal that approximately 68% of humans claim that religion is a central part of their lives; and Newman & Graham (2018), stipulate that religion plays a vital role in the lives of many people. Research conducted by (Pew Research Center, 2014; Schulz & Janson, 2016; D'Haene *et al.*, 2019) reveal that Christianity (63%) and Islam (30%) are the two dominant religious affiliations and are amongst the fastest growing religious faiths that have been co-existing for centuries in terms of faiths in Sub-Saharan Africa (SSA). According to a 2016 community survey (CS), in Limpopo, Christianity is dominant with approximately (74,1%) of the population. Islam, Hinduism, Buddhism, Bahaism, Judaism, Atheism and Agnosticism have less than one percent of the population of adherents (Stats SA, CS, 2018). Similarly, other research suggests that people who engage in religious activities report higher levels of well-being (Diener *et al.*, 2011; Oishi & Diener, 2014; Newman & Graham, 2018). Given the paramount role of religion in many people's lives, it is important to understand how religious leaders could contribute in individuals behaviour change in relation to food waste.

By distinction, the study stresses the importance of the reduction of wasted food. Changes in consumption patterns in SSA societies not only depend on changing income levels, but also reflect prolonged cultural processes that are influenced by deeply embedded religious traditions. As pointed out by Heiman *et al.*, (2019), up to date, consumption-oriented research has mostly disregarded the role of the diverse cultural and religious traditions in everyday life decisions.

2.5 Selected Studies on Food Waste Influenced Factors

Table 1: List of selected studies on Key factors influencing FW behaviours

Authors	Country	Key factors influencing FW behaviours	Corresponding proposed food management phrases
Stefan <i>et al.</i> , (2013)	Romania	Planning routines, shopping routines, intention not to waste food.	Food planning phase, food shopping phase, personal factors.
Marangon <i>et al.</i> , (2014)	Italy	Attitudes about food waste, age, income.	Personal factors.
Sinvennoinen <i>et al.</i> , (2014)	Finland	Household size, gender, attitudes about food waste, price sensitivity.	Personal factors.
Jorissen <i>et al.</i> , (2015)	Germany and Italy	Demographics (household size, age), shopping habits (shopping facility, shopping frequency).	Personal factors, food shopping phase.
Secondi <i>et al.</i> , (2015)	EU-27 countries	Living areas, education level, sorting practices, attitudes about food waste.	Personal factors.
Chakona and Shackleton (2017)	South Africa	Behaviors (food preparation, food storage, eating at home), demographics (household size, living areas).	Personal factors, food storing phase, food consumption phase.
De Hooge <i>et al.</i> , (2017)	Northern European countries	Demographics (nationality, age), environmental concern, perceived food waste, engaging in shopping and cooking.	Personal factors.
McCarthy and Liu (2017)	Australia	Lifestyle (value organic food and vegetarianism), eating out habit, knowledge on expiry dates.	Personal factors, food consumption phase.
Zepeda and Balaine (2017)	United States	Environmental concern, awareness of food waste.	Personal factors.
Diaz-Ruiz <i>et al.</i> , (2018)	Spain	Shopping behavior (using a shopping list), waste prevention habits (reuse, repair, use own bag), environmental concern.	Food planning phase, personal factors phase.
Aschemann-Witzel <i>et al.</i> , (2018)	Uruguay	Gender, age, price-orientation, convenience-orientation.	Personal factors, food shopping phase.
Bravi <i>et al.</i> , (2020)	UK, Spain, Italy	In-store behavior, use of leftover, food management at home, planning and checking behaviour, eating out habit.	Food planning phase, food shopping phase, food consumption phase, food storing phase, personal factors.
Attiq <i>et al.</i> , (2021)	United States	Anticipated guilt, habit and purchasing concern.	Personal factors and food consuming phase.

2.6 Influence of Religious Leaders in Imparting Knowledge on FW Reduction

According to Northouse (2016), many leadership scholars settled on one thing after decades of dissension that it is not simple to come up with a common definition of leadership. Despite the statement above from Northouse (2016), within the literature, numerous components are found as essential to the phenomena of leadership. These components define leadership as a process, involves influence, occurs in groups, and involves common goals. It is however beyond the scope of this study to review all the literature on leadership. Rather, this section of the literature review will focus on the role of faith leaders in food waste reduction and empirical research that conforms to the ideas and principles found in social and behaviour change theory. As such, this section presents salient research on the historical influence of the faith leaders, adaptive, innovative leadership and shared vision, including social and behaviour change.

2.6.1 Impacts of food waste

The first study report on the analysis of the environmental impacts of FW which was published by the FAO indicated that the environmental footprint of global food wastage is assessed through carbon footprint; water footprint; land occupation/degradation impact; and potential biodiversity impact (FAO, 2013). The general approach to the assessment is based on multiplications of activity data such as food wastage volumes and specific factors such as carbon, water and land impact factor (FAO, 2013). Since the environmental impacts relate to the entire product and not only the edible portion, the general approach is to use the food wastage volumes of edible and non-edible parts in the footprint calculations (FAO, 2013).

According to Oelofse and Nahman (2013) FW has a triple negative impact: environmental impacts of food waste disposed at landfill and consequent pollution; socio-economic impacts associated with FI and atmospheric emissions derived during food production; processing and distribution to consumers contributing to climate change (CC). The accumulated effect of these food wastages from different sources threatens FS of the country. Environmental impacts associated with FW are caused by the anaerobic decomposition of FW that emits the greenhouse gas emissions (GHG) methane and carbon dioxide (CO₂); and also causes leachate with the potential to pollute water resources (Ramukhwatho *et al.*, 2014). Methane is a GHG which is 25 times more powerful than CO₂ (Kevin, 2009) and contributes towards global warming (GW) and CC.

Hence, for the purpose of this study, the reduction of wastage, will be post-harvest, in the distribution or processing stage of the food chain, or at the consumer level, it will often contribute to general food security through positive effects on the environment. However, if one aims to

improve access to food, in particular for the poor and over the short term, a more context specific and holistic value chain and food system approach is needed (Tielens & Candel, 2014).

2.6.2 Historical Influence of Faith Leaders

Religion is often an important part of the socio-cultural fabric of many communities and, as such, can influence decision making, ideologies, and moral and ethical behaviors (Adedini *et al.*, 2018). Eyber *et al.* (2018) elucidate that frequently, community-based strategies include engagement with local faith leaders. According to these authors, faith leaders can be effective community-based advocates, and strategies to engage with them need to reflect their widely varying status, resources and capacities. The United Nations Children's Fund Regional Office for South Asia (UNICEF), indicates that the influence of religion permeates daily life; and the role of religious leaders is particularly significant because of the respect they command and because the religious leadership represents the community in matters of faith and maintains a position of integrity and moral authority (UNICEF, 2020). Moreover, given the importance of South Asia as a centre of many of the world's major religions, including Buddhism, Christianity, Hinduism, Islam and Sikhism, there is a unique opportunity in the region to bring together diverse religious denominations around common values, in the best interests of all community members. Also, social values and the promotion of responsible behaviours that respect the dignity and value of all life are shaped by religious leaders (UNICEF, 2020).

Many religious leaders are skilled communicators able to reach out to their communities and promote numerous programmes such as education, child protection, child rights, health care, social justice, nutrition and water, sanitation and hygiene (WASH), social and behaviour change to end drug abuse, and to promote gender equity and positive WASH behaviours; maternal and child health, exclusive breastfeeding, early childhood care, family planning, social cohesion and other humanitarian responses. Additionally, the proactive engagement of religious leaders has reinforced the participation of adolescents and young people in contraceptive use, violence prevention, peace and reconciliation in both urban and rural settings (Anshel & Smith, 2014; Baruth *et al.*, 2015; Adedini *et al.*, 2018; UNICEF, 2020). In Ghana during one of the worst modern pandemics (COVID-19), religious leaders were sensitizing their members on health hygiene and COVID-19-related stigma because religion is a big part of Ghanaian life (Osei-Tutu *et al.*, 2021). They have high influence among the communities. In the U.S., Levitt and Ware (2006) reveal that religious leaders have been found to be among the first persons to whom marital abuse is reported, despite the fact that they are not often trained to address Intimate Partner Violence (IPV) or to intervene effectively.

Often, the role of religious leaders in facilitating behaviour change has been less well explored, especially with regard to the reduction of food waste at the household level. The next section looks at how adaptive and innovative religious leaders can be to facilitate social behaviour change. Although studies have assessed the role of religious beliefs in promoting health; there are gaps in evidence regarding the roles of religious leaders in influencing behaviour change for food waste reduction. To that end, given the implication of religious beliefs for food waste reduction, this study documents the role of religious leaders to influencing and imparting knowledge on indigenous food prevention for the promotion of zero food wastage at the household in South Africa and attempts to explore how RLs can influence food waste behaviour at the household. It is therefore relevant to explore the role that religious leaders may play as key role-players in the quest to reduce food wastage in Vhembe District. Thus, understanding their historical influence in facilitating behaviour change, this study attempts to conduct an exploration on the role that religious leaders could play in reducing food waste; and find out how adaptive and innovative their leadership could bring social behaviour change vis-à-vis food waste reduction.

2.6.3 Adaptive, Innovative Leadership and Social Behaviour Change

Adaptive leadership is the activity of mobilising people to tackle tough challenges and thrive (Heifetz and Linsky, 2011). Further, it is specifically about change than enabling the capacity to thrive revealed the authors. Therefore, in the context of this study, it becomes clear that the adaptive, innovative leadership and shared vision for an effective social and behaviour change requires a conscientious leadership, because conscience drives behaviour change. Moreover, Heifetz and Linsky (2011) state that for an effective adaptive leadership, there is a need first to define the challenges confronting the leadership, apply the adaptive leadership process, and then facilitate the process of implementing an intervention. Consequently, Takács & Abcouwer (2020) postulate that under predictable conditions, it is simple for organisations and leaders to operate, as knowledge and professional capacity to continuously meet people needs, know in advance what to do and what to expect become a requirement. Adding to this, confidence is fully required while preparing for changes. Also, it is easy to formulate a strategy with a set of actions when developments are predictable (Takács & Abcouwer, 2020).

In the same vein, new environments and new dreams demand new strategies and abilities including the leadership to mobilise them. As in evolution, these new combinations and variations help organisations and leaders thrive under challenging circumstances rather than perish, regress, or contract. Leadership, then, must wrestle with normative questions of value, purpose, and process (Heifetz and Linsky, 2011). Reason why Takács & Abcouwer (2020) confirm that the

ability to deal with disturbances is not only an internal characteristic of the organisation, but depends decidedly on the type of problem the organisation faces (Takács & Abcouwer, 2020). Here, RLs will make use of the FW reduction as intervention more effective through the ideation model. Thus, linking RLs, FW reduction and management with behavior change goals will demand an understanding of how to apply behavior-change theories and techniques to household members. Therefore, FW reduction outreach initiatives can only be truly successful if they change those characteristics of individuals or groups that are contributing to the FW problem. Then if our goal is to change human behaviors, there is a need to develop an understanding of the qualities and characteristics of the targeted individuals and communities, and how those characteristics might impact the situation. This is known as the social or human dimension of FW reduction and management (Bandura, 1997, 2002, 2018; Fishbein & Cappella, 2006).

2.7 Perception of RLs in the Fight against FW and how these Programmes can lead to FW Prevention

2.7.1 Problems associated with food waste

Food wastage continues to pose additional problems at landfill sites which result in economic and environmental cost. Preliminary research carried out by Allafrika (2010) found that most food waste in developed countries occurs in households and eating establishments, while in developing countries a greater proportion is lost on farms, during transportation and storage (Allafrika, 2010). For example it is estimated that yearly in South Africa about 10.2 million tonnes is wasted if imports and exports are added, costing the country's GDP approximately 2.1% per annum valued at R61.5 billion (Nahman and de Lange, 2013; Oelofse *et al.* 2021). Certainly there are still couples of problems associated to food waste; but the most three inter-related problems are related to food security, greenhouse gas emissions along the food supply chain and waste disposal as indicated by Oelofse & Nahman (2012). Yet, household food security is affected by the wastage of food. The following section highlights related problems to food security.

2.7.2 Problems relating to food security

A 2008 study revealed that 70% of poor urban households in South Africa live in conditions of 'significant' or 'severe' food insecurity (Frayne *et al.*, 2009). To meet the challenge of feeding growing populations and addressing food insecurity, massive reductions in the amount of food wasted after production are needed (Lungqvist *et al.* 2008). The FAO (2010) pinpointed that a total of 925 million people globally – almost one in seven people – are estimated to be undernourished. Developing countries account for 98 percent of the world's undernourished

people. Moreover, the State of Food and Nutrition Security in the World released by the FAO, IFAD, UNICEF, WFP and WHO (2018) reported that in 2017, the number of undernourished people is estimated to have reached 821 million. Undernourishment and severe food insecurity appear to be increasing in almost all African sub-regions and in South America, whereas the undernourishment situation is stable in most regions of Asia. In the year 2020, between 720 and 811 million people in the world faced hunger (FAO, IFAD, UNICEF, WFP and WHO. 2021).

Ben Simon, Co-Founder & CEO at Imperfect Foods argue that when food is wasted, there is a corresponding wastage in resources that went into growing it, backing up his argument by referring to by the Natural Resources Defense Council (NRDC) in the United States (Forbes, 2018). In addition, nearly a quarter of water supply in the form of uneaten food or over \$172 billion is wasted. Furthermore, each year, the United States not only spent over \$220 billion growing, transporting, and processing almost 70 million tonnes of food that ends up going to waste and using up to 21% of US freshwater, 19% of US fertilizer, 18% of US cropland, and 21% of US landfill volume (Forbes, 2018).

In addition to the above mentioned, other drivers to food insecurity include conflicts, wars, civil unrests, climate variability and extremes. The cumulative effect of changes in climate is undermining all dimensions of food security – food availability, access, utilisation and stability (FAO, IFAD, UNICEF, WFP and WHO, 2018). These highlighted problems need emerging and sustainable solutions in South Africa and across the planet. Yet, if we are able to change our eating behavior and truly analyse product loss, or shrink that can lead to big savings at the household and the country levels, then reduce the annual cost of R61.5 billion (Oelofse *et al.* 2021).

2.7.3 Factors relating to greenhouse gas emissions along the food supply chain

On average, greenhouse gas emissions throughout the food supply chain range between 2.8 and 4.14 tonnes of carbon dioxide equivalent (tCO₂e) per tonne of food; broken down as follows (Bakas, 2010). This includes manufacturing/processing (including agriculture), between 1.95 and 2.29 tCO₂e per tonne of food, distribution and retail, between 0.1 and 0.8 tCO₂e per tonne of food, consumption: between 0.3 and 0.6 tCO₂e per tonne of food, and end-of-life (landfill): 0.45 tCO₂e per tonne of food. Potential inefficiencies in the food value chain therefore have the potential to contribute up to 4.14 tCO₂e per tonne of food wasted, contributing a significant component of a country's emission footprint. While the disposal of organic waste (including food waste) according to the Department of Environmental Affairs (DEA) report that is estimated to contribute around

7% of the total national GHG emissions from the agriculture, forestry and other land use (AFOLU) sector (DEA, 2015; 2016).

2.8 Examination of factors influencing Household FW Human Behavior

2.8.1 Water footprint of food waste in South Africa

Classified as a water scarce country, SA records its overall water footprint for agricultural production approximately about 588 853 Mm³ and it should, therefore, ensure efficient and effective use of its water resources (Mekonnen & Hoekstra, 2011; Oelofse, 2016). Following the statement above, the relevance of food waste reduction (FWR) could therefore result in a significant saving of water due to the fact that the total water loss as a result of FW is in the order of 12 854 Mm³ or the equivalent of nearly 22% of the total water footprint of agricultural production in the country (Oelofse, 2016).

Consequently, when considering actions to reduce food wastage of certain commodity groups, one has to consider the volume of waste, the cost and the environmental impacts. The cost of food wastage to society is in the order of R61.5 billion per annum; equivalent to 2.1% of South Africa's gross domestic product (Nahman and de Lange, 2013). Albeit indicated by Nahman & de Lange (2013) and Oelofse, (2016), the cost impact of fruit and vegetables waste are the highest (42%) followed by meat (32%). Cereals are contributing the most to water loss (32%) followed by meat (26%). Accordingly, it is conspicuous that efforts aiming at reducing cost vs water savings as a result of food waste should be earmarking different commodities. Further to this is energy as an additional significant resource used in the production and processing of food. Adding energy wasted as a result of food waste to this equation, will provide further guidance as to where interventions are most urgently required.

2.8.2 Solid waste management in South Africa

The South Africa State of Waste Report released in 2018 reveal that 55 million tonnes of general waste was generated in 2017, with only 11% being diverted from landfill; compared to an estimation of about 108 million tonnes of waste was generated in 2011 (DEA, 2018, 2012). South Africa has recognised waste management improvement and waste diversion away from the landfill as key priorities (Matinise, 2019). However, the globally accepted and adopted waste management hierarchy acknowledges waste avoidance as the most favoured and important approach towards sustainable waste management. It is in this view that the hierarchy

recommends that where waste cannot be avoided; waste reduction, re-use, recycling and recovery as the best options followed by landfilling as the last option to apply. In the same vein, the waste diversion from landfill through minimisation, re-use, recycling and recovery has been promoted by the National Waste Management strategy of the Department of Environmental Affairs (DEA, 2012).

Despite having a good policy, landfilling continues to be the common practice of waste management in South Africa. The latest baseline study shows that approximately 90% of total waste generated in South Africa was landfilled in 2011, with only 10% was diverted away from the landfill through recycling (DEA, 2012). Yet, landfilling means also that resources that could have been otherwise recovered and returned to the value chain, are lost. Rahman, Shams and Mahmud (2010) indicate that landfilling is one of the contributors of climate change. The DEA (2012) indicates that non-recyclable municipal waste (35%), construction and demolition waste (20%) followed by mainline recyclables (including paper, plastics, glass and tyres) (19%), organic waste (13%) and metals (13%) form the entire bulk of generated waste countrywide. In South Africa, Oelofse & Nahman (2013) revealed that disposal of organic waste (including FW) contribute approximately 4.3% to greenhouse gas emissions. This is because FW disposed at the landfills decomposes and releases methane gas thereby contributes to climate change.

2.8.3 Problem related to waste disposal and climate change

Landfilling is generally considered the most practical and cheapest waste management method in South Africa. However, the scarcity of available land in close proximity to areas of waste generation, as well as emissions of landfill gas (with high concentrations of methane), have made landfilling a less attractive management option (Hartmann & Ahring, 2006). Food waste represents soil degradation, lost energy and water resources and a burden to our landfills and wastewater treatment systems (Raftery & Miner, 2012). Quested *et al.* (2013) postulate that several treatment methods of food waste have been widely applied in developed countries including animal feeding, composting, anaerobic digestion, incineration, and landfills. The common treatment of food waste in developing countries is dumping or landfills; making about 95% of food waste converted into methane and other greenhouse gasses that affect climate change.

Karim-Ghani *et al.* (2013) pinpoint that the wasted food sent to landfills release methane as a potent greenhouse gas that degrades in anaerobic conditions. Adding to this, a methane gas that results in 25 times greater impact on global warming than carbon dioxide (CO₂) is produced from landfilled FW. Likewise, according to Aleluia and Ferrão (2016), the waste management sector

as a contributor to the anthropogenic emission of methane that is a powerful greenhouse gas (GHG) with a global warming effect about 25 times higher than carbon dioxide (CO₂). This remains a central aspect related to the impacts of Municipal Solid Waste Management (MSWM). Therefore, reducing food waste contributes to abating interlinked sustainability challenges including food waste and food safety, climate change and stress to natural resources (Karim-Ghani *et al.* 2013; Aleluia & Ferrão, 2016; Nordin *et al.*, 2020). Hence, the GHG emissions baseline for the agriculture, forestry and other land use (AFOLU) sector in South Africa is estimated to contribute around 7% of the total national GHG emissions (DEA, 2015; 2016).

Introducing alternative end-of-life treatment technologies for food waste could therefore reduce the greenhouse gas emissions from food waste and should therefore be considered. Indeed, disposal of organic waste (including food waste) to landfill is outlawed in many countries (DEA, 2010) including Germany, Sweden, Canada; and the phasing out of these practices is now also a priority in South Africa (DEA, 2011). Municipalities have to take responsibility for diverting organic waste to composting or biogas digesters (DEA, 2011). Waste from food processing could also be a source of valuable, functional compounds such as antioxidants (Schieber *et al.*, 2001). Cheap, renewable and abundant sources of antioxidant compounds are in high demand (Moure *et al.* 2001). Continued research in this field is therefore essential, but requires fairly accurate data on waste quantities and composition at the different stages in the food supply chain. Furthermore, accurate estimates of food waste would assist municipalities to meet their obligations in terms of national priorities.

2.8.4 Household food wastage between countries

Parfitt *et al.* (2010) in a study carried out on comparing data on post-consumer food waste between countries found it a bit problematic due to different methods and definitions applied to the measurement of food waste and as well some methods do not provide robust estimates owing to small samples. Hence, it has been reported by Gunders (2012) that American families in the U.S. approximately dispose 25% of all food and beverages purchased while nearly 20% of the food bought by UK households ends up being waste (Bond *et al.*, 2013). Then, according to the Ministry of Economic Affairs (2014), Dutch households are reported to waste 13.6% of their edible food. This really shows how households have a big role to play in reducing the amount of food wastage. Thus, the findings of the study conducted by Smuts (2012) on a waste characterisation in five African cities established that on average, food waste contributed 10% to the household waste stream in the wet season in as compared to 3 % on average in the dry season; and those

selected cities are Cairo (Egypt), Harare (Zimbabwe), Monrovia (Liberia), Abidjan (Ivory Coast) and Sekondi -Takoradi (Ghana) respectively. Nevertheless, regarding household food wastage, available data exist especially in developed countries, while in some developing countries data is limited. And in Africa, the biggest quantity of food wastage is attributed to South Africa (Allafrica, 2010; Oelofse *et al.*, 2018).

2.8.5 Food consumption management

Gustavsson *et al.* (2011) emphasis that in the most food supply chains of developing and developed economies, it is observed that the highest amount of food wasted and lost is the product of consumers. Hence, food consumption referring to how much we eat (e.g., half a bowl or a whole bowl); food consumption and engagement in physical activity are considered economic decisions in that consumers balance the immediate and future utility and disutility that result from current eating and exercise choices (Fan & Jin, 2014). Moreover, the researcher hope to bring awareness among consumers' purchasing and eating behaviours and engage with them in order to change their attitudes towards food consumption, their demographic characteristics and the factors affecting them to shopping unnecessarily and waste food.

Martindale & Schiebel (2017) imply that consumer food waste was acknowledged at a latest pan-European food waste programme as a major challenge. In order to addressing the issue of continuous volume of consumer food waste produced, the COST Network, EU network on food waste valorization indicated that it can be effective through technological and policy interventions (Privett *et al.*, 2016; Morone *et al.*, 2017). It is then evident that reducing all food losses will result in a more secure global food system and it is significant for us to show how consumers can reduce food waste in households. This is where food preservation has an important role in facilitating this waste reducing action because it improves the utilisation of food (Martindale & Schiebel, 2017). The development of waste reduction strategies to be used for different foods and preservation methods is of importance as food wasted by consumers during meal occasions (Martindale, 2014).

This requires a revolution because revolution shapes people's thinking and behavior. So because the behavior at the moment is wastage of food, this study opts to shape people's behavior in order to be able to achieve food security for at least every living person in the country and world. Hence, a well consumption management means a minimization of the quantity of food we usually consume on a daily basis as well as being consciously aware of our daily food intake should be an act of responsibility while thinking of others. That would certainly assist in having a sustained food secured households and communities wherever we live. Therefore, a well-managed food

consumption or food intake to avoid unnecessary wastage requires the following: responsible food choice, social and behaviour change at the family (household) level, and food security aspects.

2.8.6 Responsible food choice

Food choice decisions determine what we eat (e.g., noodles or rice). It goes beyond simple biological needs; it is intensely cultural, as appropriate food choices are socially constructed (Martin, 2014). As Delormier *et al.* (2009) describes the “act of swallowing”, it is divided by two cultures, “the post swallowing world of biology, physiology, biochemistry, and pathology, and the pre-swallowing domain of behavior, culture, society, and experience.” As eaters with the right to choose what to eat, it is important to be decisive before engaging in the act of swallowing. Meaning an ethical behavior is significant in this stage then we can decide what to swallow and what not to. So, it will help sharing the available food with others rather than to waste it intentionally. In addition, as consumers we can still choose to conserve food but not to waste food. Paraphrasing Ben Simon, the moment the available food is wasted, it means that we are busy wasting the available resources that went into the whole process of producing that food e.g. water footprint, time, money, seeds, fertilizers, etc. (Forbes, 2018).

Increases in the cost of food often lead to changes in the quantity and type of food that is purchased. This may result in a reduction in the quantity of food consumed and/or the substitution of higher priced food for less expensive food which is often less nutritious and of lesser quality. Over a prolonged period, such changes may have negative consequences for nutrition, both through the quantity of food consumed for maintaining energy balance and for the quality of food consumed for maintaining sufficient intakes of proteins, fats and micronutrients such as vitamins, minerals and trace elements (Thompson, 2012; Theodoridou *et al.* 2017).

2.8.7 Social and Behaviour Change at the Family (Household) Level

Schmied (2019) pinpointed that Behaviour Change Communication (BCC) emerged as a more strategic use of communication with an explicit focus on behaviour change (i.e. not just, for example, on increasing people’s awareness). While this was not a common practice, at least some of the BCC interventions made the effort to employ a more systematic process, beginning with defining the desired behaviours and the people who should practice them, formative research identifying the key barriers to practicing these behaviours, development of the key messages, and subsequent communication planning, implementation, monitoring and evaluation. They also took greater advantage of behaviour change theories that were built across disciplines over decades,

including marketing, economics, public health, behavioural science, behavioural economics, psychology, medicine, and anthropology.

As indicated by Martin (2014) that as an agent of socialisation, families critically play a primary role in determining how children learn and make choices about food. Food providers make choices based on their own tastes as well as nutritional considerations, and therefore instill these taste and nutrition habits in their children. Food is a vehicle for passing down cultural traditions and unique family dishes and recipes. Food choice is part of the everyday routines and rituals that serve to enact the family; the negotiations and bargaining about food are essential to the active process of enacting family (Phillips, 2008). Mothers, fathers, and children all play a role in enacting the family, especially through food negotiation. Children complicate these interactions, as food situates the child as both subject and object – as a person or being with likes and dislikes, yet as a thing to be nourished (Cook, 2009). Wrapping up about social and behaviour change; it is clearly sure that this should start at home where the family lives, then evidence will be visible of the reduction of FW at the household level.

2.9 Sustainable Food Management and Food Security

2.9.1 Sustainable Management of Food

The United States Environmental Protection Agency (EPA) (2019) indicated that in the United States alone about 22 percent of food has been discarded into the municipal solid waste. This was as a result of an estimation confirming that more food reaches landfills and incinerators than any other single material in our everyday trash. The estimation showed that more than 39 million tons of wasted food was generated with only 5.3 percent diverted from landfills and incinerators for composting. Further, the U.S. Department of Agriculture (USDA) (2010) estimates that 31 percent or 133 billion pounds of the 430 billion pounds of food produced was not available for human consumption at the retail and consumer levels (i.e., one-third of the food available was not eaten) in the year 2010. At the same time worldwide, one-third of all quantity of food produced for human intake has been wasted according to the estimation given by the Food and Agriculture Organization of the United Nations (FAO) (2011). Therefore, taking simple steps in everyday life can make a difference in addressing this issue in modern society and an untapped opportunity. Hence, reducing wasted food will have a triple win: for the economy, for communities, and for the environment. Also, looking at the challenges facing South Africa such as higher unemployment and inequality. This supports the view of the World Resources Institute (WRI) indicating that

reducing food loss and waste is part of creating a sustainable food future (Tielens & Candel, 2014).

2.9.2 Food conservation

As identified by Gustavsson *et al.* (2011), consumers are the greatest producers of the large quantity of food waste and loss in the food supply chains especially the household where they live. Hence, due to the fact that foods are for the most part composed of “edible biochemicals”, it has then been acknowledged that all foods are virtually derived from living cells of animal and plant origin and in some cases from some microorganisms by biotechnology methods (Prokopov & Tanchev, 2006). Thus, food preservation as an action or method designed to maintain foods at a desired level of quality is advised to avoid unnecessary wastage. A number of new preservation techniques are being developed to satisfy current trends of demands of economic preservation and consumer satisfaction in safety, nutritional and sensory aspects (Potter & Hotchkiss, 1995) such as canning, pickling, drying and freeze-drying, irradiation, pasteurization, smoking, and the addition of chemical additives. In the proposed study the researcher will also engage the community and religious leaders in applying the Indigenous Knowledge Systems (IKS) in finding some indigenous ways of preserving household food. An integrated food preservation made of ancient and modern conservation methods will pave ways to a better managed and sustainable household food conservation.

As we all are fundamentally food consumers and surely all should give priority to the need for high foods quality, safety and conservation. This is because food quality and safety has become a major concern to governments, industry and consumers (McElhatton & Marshall, 2007). So, reducing all food losses will result in a more secure global food system and it is relevant for us to show how consumers can reduce food waste in households. This is where food preservation has an important role in facilitating this waste reduction action because it improves the utilisation of food. It has also been identified that understanding why consumers waste food during meal occasions assist to develop waste reduction strategies that could be used for different foods and preservation methods (Martindale, 2014).

2.9.3 Food waste, food insecurity and food security

Food insecurity remains a leading health and nutrition issue (Gundersen & Ziliak, 2015). Realising food security in Africa is still one of the most pressing and challenging issues affecting its people and the continent as a whole. However, a major problem for many households and governments in Africa is the attainment of food security. Alusala (2009) elucidate that crucial concerns such as

the impact of environmental degradation and climate change on food production, rising food prices as a result of reduced production, a shift of focus from growing food crops for food to provide bio-fuels, the global economic recession being faced by the global market, and the traditional challenges of inequitable access to factors of production by men and women have worsened this situation. To add on this is the current issue of food wastage as discussed earlier in this study.

The FAO (2018) observed that the failure to reduce world hunger is closely associated with the increase in conflict and violence in several parts of the world, and that efforts to fight hunger must go hand in hand with those to sustain peace. In 2017, the number of undernourished people was estimated to have reached 821 million – around one person out of every nine in the world. Undernourishment and severe food insecurity appear to be increasing in almost all African sub-regions, as well as in South America, whereas the undernourishment situation is stable in most regions of Asia (FAO, 2018).

The World Wildlife Fund South Africa (WWFSA) (2017) opined that the food waste and loss, and the associated environmental, social and economic implications, have become a topic of increasing global concern. Yet the current level of food waste and loss remain unsustainable. So understanding the scope of the problem will guide actions to reduce the wastage of food and ultimately improve food security. While remarkably receiving renewal attention in both international and national policy agendas; food security and nutrition are still the joint product of private and public action. However, food security has played a central role in policies that have shaped the history of South Africa from the 17th century despite the development of the term in the 1970s (Hendriks, 2014).

According to Hendriks (2014), the Integrated Food Security Strategy (IFSS) initiated in 2002 was seen as a tool for inter-sectoral action and coordination of food security interventions and information systems. The strategy purportedly adopted a broad developmental approach to food security, rather than focusing only on agriculture and food stocks. Its vision was “to attain universal physical, social and economic access to sufficient, safe and nutritious food by all South African at all times to meet their dietary and food preferences for an active and healthy life” (NDA, 2002). Following the above mentioned, the researcher is of the view that if the produced food is wasted, it means that the vision of the IFSS will never be attained and food insecurity will affect the country negatively because all the food produced in the orchards, fields, pastures, greenhouses, feedlots and fisheries of the world is ultimately intended for consumption and not for wastage (WWFSA, 2017).

2.10 Towards Achieving Sustainable Development Goals: Effective Strategies for FW Reduction

Attempting towards achieving Sustainable Development Goals (SDGs) in a linear succession is challenging, and Fu *et al.* (2019) postulate that it might be impossible. According to Buczacki *et al.* (2021), new approaches that explain their interrelationships while also accounting for both their complexity and their sometimes mutually reinforcing or conflicting objectives should be considered urgently. This is due to the continuous slow progress towards the targets of the 17 Sustainable Development Goals (SDGs) proclaimed by the UN. Thus, it is imperative to develop a plan of action to enable the full agenda (Gao and Bryan, 2017; Fu *et al.*, 2019), with only the remaining 8 years until the 2030 deadline. So, that plan of action once realised, it will set a way towards a coordinated achievement of SDGs globally. However, in the early 1910s, the main focus was on waste disposal according to (Brown, 1918; Lau, 1983; Youngs *et al.*, 1983) with the interest in FW was targeting reduction, recycling and prevention from developed countries (USA and Europe). Further, the awareness of the importance of FW prevention and reduction arose again from the 1980s.

Therefore, while an estimation of 720 to 811 million people still hungry worldwide, and the COVID-19 pandemic that has hit the planet worsened this situation at one hand (FAO, 2021; Cahyani *et al.*, 2022). In the other hand, one third of edible food produced globally is wasted (Gustavsson *et al.*, 2013). This implies that SDG 12 has a target that addresses the given statistics, namely, 12.3, stating that per capita global food waste at retail and consumer levels should be halved and food losses along production and supply chains, including post-harvest losses by the year 2030 be reduced (UN, 2020). Yet the goal 12 has interlinkages with other SDGs such as 1 on no poverty, 2 on zero hunger, 3 on good health and well-being, 4 on quality education, 8 on decent work and economic growth, 9 on industry innovation and infrastructure, 13 on climate action, 14 on life below water and 15 on life on land. Achieving the desired SDGs by 2030 requires effective strategies for food waste reduction at all levels of food supply chain. In the context of this study, the target SDGs is 12 which address the issue of ensuring sustainable consumption and production patterns in order to achieve food security at the household level.

Hence, piles of decisions that influence the food nutrition and security of our family members, friends, colleagues, communities, countries and our own are taken daily. These decisions depend on the determinants for good nutrition of the UNICEF Framework and the four dimensions of Food and Nutrition Security: availability, access, use/utilization and stability. According to Cahyani *et al.* (2022), these strategies require a change the mindset in managing food and its waste. Food

waste management by managing food as needed, it is hoped to be a way that can support food security and environmental sustainability. Adding to this, it will manage waste from food such as packaging that can be recycled or reused. Sustainable management by paying attention to social, economic and environmental aspects will contribute to the achievement of the SDGs, especially in the goal of zero hunger which will support other connected goals (Cahyani *et al.*, 2022). However, in the context of this study, social and behaviour change is the best strategy to reduce food waste in order to achieve sustainable food security. Also, there is a need to have educational awareness programmes in place such as good food eating habits, food handlings awareness and others. These reduction strategies challenge us all to take action at home and all areas of food supply chain to support the goals set out in the United Nations' 2030 Agenda for Sustainable Development. By doing so, we will then become food security ambassadors who help make South Africa and the world a free food waste and better place for everyone through our joints efforts and sacrifices in achieving the SDG 12.3.

2.10.1 Food Sustainability: Key to Reach Sustainable Development Goals

The UN's 2030 Agenda for Sustainable Development incorporates a number of far-reaching goals, including an end to poverty and hunger, improvements in health and the protection of the environment. Concurring with the Barilla Center for Food & Nutrition (BCFN, 2018), food and nutrition are relevant for achieving all sustainable development goals (SDGs). They represent a common thread linking the 17 SDGs adopted by UN member states in 2015, given the interconnected economic, social and environmental dimensions of food systems. Developed by the Economist Intelligence Unit of the UNDP with the Barilla Center for Food & Nutrition; the Food Sustainability Index (FSI) includes three pillars: food loss and waste; sustainable agriculture; and nutritional challenges. The FSI is a model designed to assess the sustainability of national food systems in a qualitative and quantitative manner. The FSI aims to highlight best practices among different countries, establish a comparable benchmark and measure progress over time (BCFN, 2018).

Hence, from the Intergovernmental Panel on Climate Change report of the UN issued in October 2018, the world will feel the effects of climate change far sooner than was once thought, and in order to limit global warming and avoid its negative effects, there is need for “rapid far-reaching and unprecedented changes in all aspects of society”. This alarming news issued in October 2018 cannot be under-estimated as the effects of climate change are really felt globally. This has been again confirmed by the UN in 2019 when indicating that the Southern Africa is facing the worst drought in a century affecting 45 million people. Further, Zimbabwe’s Matabeleland has suffered

from shortage of food due to lack of rain and drought (UN, 2019). In addition to this, continuous drought, water shortage and lack of rain are badly affecting South Africa (Department of Water and Sanitation, 2019). This drought has been caused by *El Niño*, human action and climate change. The present drought in many parts of the Southern African region has been caused by extremely poor rainfall in recent months, with the result that the water supplies are under enormous pressure due to global warming caused by human activities. Local grain plantings for the new season and the disastrous impact of *El Niño* weather in summer rainfall areas might have an impact on food inflation later during the year (Agri SA, 2019). With estimates that agricultural activities account for up to 30% of global greenhouse gas (GHG) emissions, the actions needed include addressing the sustainability of the global food system. This must be done while feeding an increasingly hungry world. While progress has been made in recent years on combating extreme hunger, a growing global population will mean meeting rising demand for food. And as emerging markets become more affluent, demand for higher-quality, resource-intensive foods is increasing too. Meanwhile, nutritional challenges range from tackling obesity to reducing malnutrition and poor access to vitamins and minerals (BCFN, 2018).

Following the above mentioned, locally-based actions are needed to engage household members and residents in reducing food waste for effective sustainable food security in South Africa. These actions could be rolled-out effectively at the grassroots level by religious leaders as the majority community-led leaders working daily with the people. Furthermore, looking at the scope of this study, the researcher focuses more on the first pillar of the FSI as the main pillar to address in order to reach food sustainability because the index has three key performance indicators (KPIs) namely environmental, societal and economic respectively. Also, reducing food waste is a solid strike against poverty, inequality and household food insecurity. These three KPIs are always interconnected as dealing with the first pillar of the FSI. The infographic below Figure 2 depicts the economic, social and environmental dimensions of the key food-system indicators included in the FSI. This can highlight the impact of food systems on the 2030 agenda to meet the SDGs.

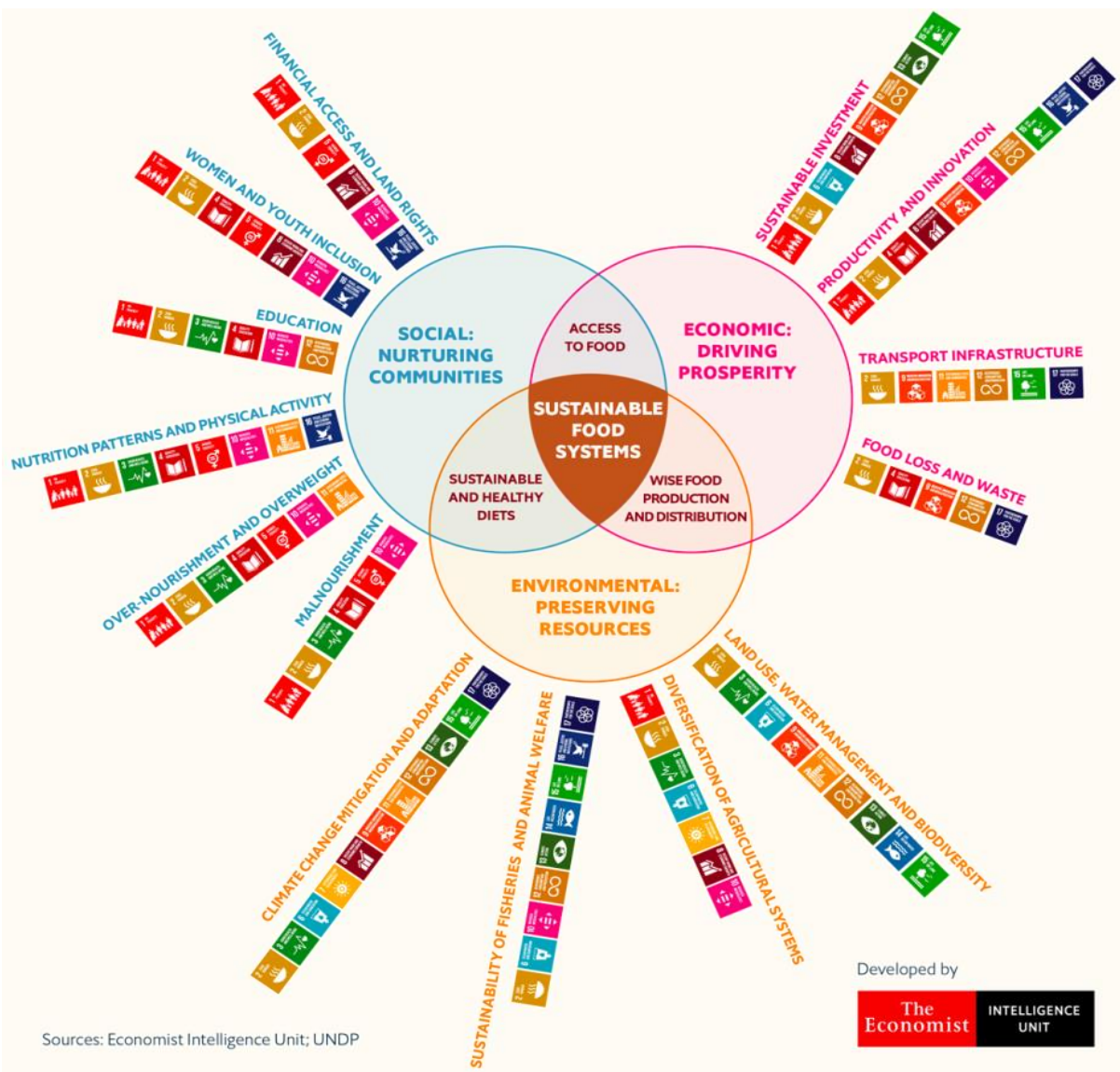


Figure 2.1: The infographic depicting the economic, social and environmental dimensions of the key food-system indicators included in the FSI.

2.10.2 Water conservation: A critical option for food sustainability

Although unevenly distributed geographically, a large part of water remains not easily accessible (FAO, 2014). The AQUASTAT report prepared by the FAO's global water information system (FAO, 2014) stipulates that water conservation is also a critical option for the sustainability of food systems since agriculture is responsible for 70% of global freshwater withdrawals. An indication made by Mekonnen & Hoekstra (2011) highlights that in accordance with the water footprint of crop and livestock metric of the Food Sustainability Index (FSI), the world's driest countries such as Malta, Jordan, Israel and Lebanon including some countries also facing severe water scarcity are best examples of the smallest agricultural water footprint in the world and they have already implemented strict measures to lower their water footprint in order to reach their food sustainability.

2.11 Alignment to National, Regional and Global Strategies/Imperatives

Before addressing the section, it is important to remind the readers that worldwide, sustainable development (SD) has become a rising concern. Through the report of the World Commission on Environment and Development: Our Common Future known as the Brundtland Report of 1987, SD has been accepted universally as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987). Hence, the agricultural sector has been accepted widely as a key contributor to sustainable socio-economic growth, development and poverty alleviation as well as a major user of energy and natural resources. Further, a third of the Gross Domestic Product (GDP) of many countries since 1970 was contributed by the agriculture sector because agriculture has been acknowledged to be a potent economic growth driver of any national economy (FAO, 2002; Ugwu *et al.*, 2013; Department of Agriculture, Forestry and Fisheries (DAFF), 2017). Thus, agriculture is seen as a vital sector for driving the green economy in many developing countries, including South Africa, and the value of primary agricultural production in South Africa was R263,2 billion in 2016, while its contribution to the GDP was estimated at R72,2 billion in 2015 (Musvoto *et al.*, 2015; DAFF, 2017). Adding to this, over the past 10 years, the South African agricultural sector's contribution to the Gross Domestic Product (GDP) has declined gradually. However, despite agriculture's reduced contribution to the country's GDP, the sector remains enormously significant to the South African economy (SEDA, 2012).

Therefore, according to the Brundtland Report (1987), 'a global agenda for change' is what the World Commission on Environment and Development was asked to formulate. It was an urgent

call by the General Assembly of the United Nations to propose long-term strategies for achieving sustainable development by the year 2000 and beyond. This gave birth to many global, regional, national, provincial and local imperatives in order to meet the desired sustainable global development where by the humanity will have the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs as well. Globally, a universal set of goals and targets agreed by 194 UN member states through Heads of State and Government and High Representatives to guide their development policies and initiatives over the next 15 years known as the SDGs were adopted at the United Nations Headquarters in New York from 25-27 September 2015 agreed a new 2030 Agenda for Sustainable Development, built around 17 goals and 169 targets (UN, 2015).

The FAO (2017) indicates that the 2030 Agenda focuses on the elimination of hunger and reduction of poverty and inequality (opportunity, resource access, gender, and youth) in all their forms recognising the need not just for innovation and business development but also social protection. It seeks to reduce the pressure of human economic activity on the natural environment by stressing the need not just for habitat and ecosystem protection, but also increased resource use efficiency, and sustainable production and consumption – thereby spreading responsibility for delivering sustainability across all economic players. The 2030 Agenda and its seventeen Sustainable Development Goals (SDGs) build on the Millennium Development Goals (MDGs) but are much broader in scope and ambition, encompassing the eradication of poverty and hunger and improved health and nutrition; reduction of inequality; the building of peaceful, just and inclusive societies; the protection of human rights; the promotion of gender equality and the empowerment of women and girls; and the lasting protection of the planet and its natural resources. Further, the United Nations Children's Fund (UNICEF, 2016) stress that the 2030 Agenda for Sustainable Development offers a historic opportunity to set a new course for the next era of global human development.

The Global Goals have set an ambitious new agenda for sustainable development. In response to the global goals, this study will provide reductive strategies for sustainable food security in South Africa that address the wastage of food for the next coming years which will then align to local, provincial, national, regional and global strategies in order to tackle the triple challenges facing the country by tackling as well the current issues we have of consumption habits, malnutrition, obesity and hunger. Therefore, according to Akanbi (2016), the 'triple challenges' often refer to the situation of high level of poverty, inequality and unemployment (non-inclusive

economic growth), which have been classified as the major features of many developing countries and especially sub-Saharan Africa. Hence, the more people are affected, the more they remain vulnerable of food insecurity due to food wastage habits.

Hence, looking at the extent of food security in South Africa, approximately 6, 8 million South Africans experienced hunger as reported by Stats SA (2019). Despite being food secure at national level, almost 21.3% of South African households had inadequate or severe inadequate access to food, and also about 1.7 million households experienced hunger in 2017. This research addresses the SDG 12 in a way that some strategies will be put in place to reduce the magnitude of food waste and proposing a responsible consumption based on some religious beliefs as previous research indicated that food consumption behaviors can be influenced by religion (D'Haene *et al.*, 2019). Thus, our view is that the food waste reduction and responsible consumption can be influenced effectively by religious leaders who could contribute in individuals' behaviour change. Further, religious innovation for sustainability in the current and post SDGs timeframe for effective sustainable consumption and ethical commitment to all will also be taken into consideration. The study will consider various aspects of the social impact of religious innovation as means to achieve sustainable consumption. Below on Figure 3 is the Triple Helix for Social and Grassroots Inclusive Innovation.

This triple helix depicts the intersection of the stakeholders (Civil Society, Government, Universities and Private Sector) that key in achieving social innovation, transformation and sustainable change of communities. Universities are seen as institutions that housed intellectual people able to think and generate knowledge that brings solutions, inform government for policy development. The civil society (CS) involves a spectrum of actors with a wide range of purposes. Among the actors, the most influential are religious leaders. According to Cooper (2018), CS has created positive social change in numerous places globally. Created to by dedicated individuals or groups outside the state to advance shared interests and social actions; CS is viewed widely as the arena, outside the family, market and state (CIVICUS, 2012; WEF, 2013; Cooper, 2018). In the context of this study, a generation of new knowledge that brings solutions to reduce household FW will take place in collaboration with RLs.

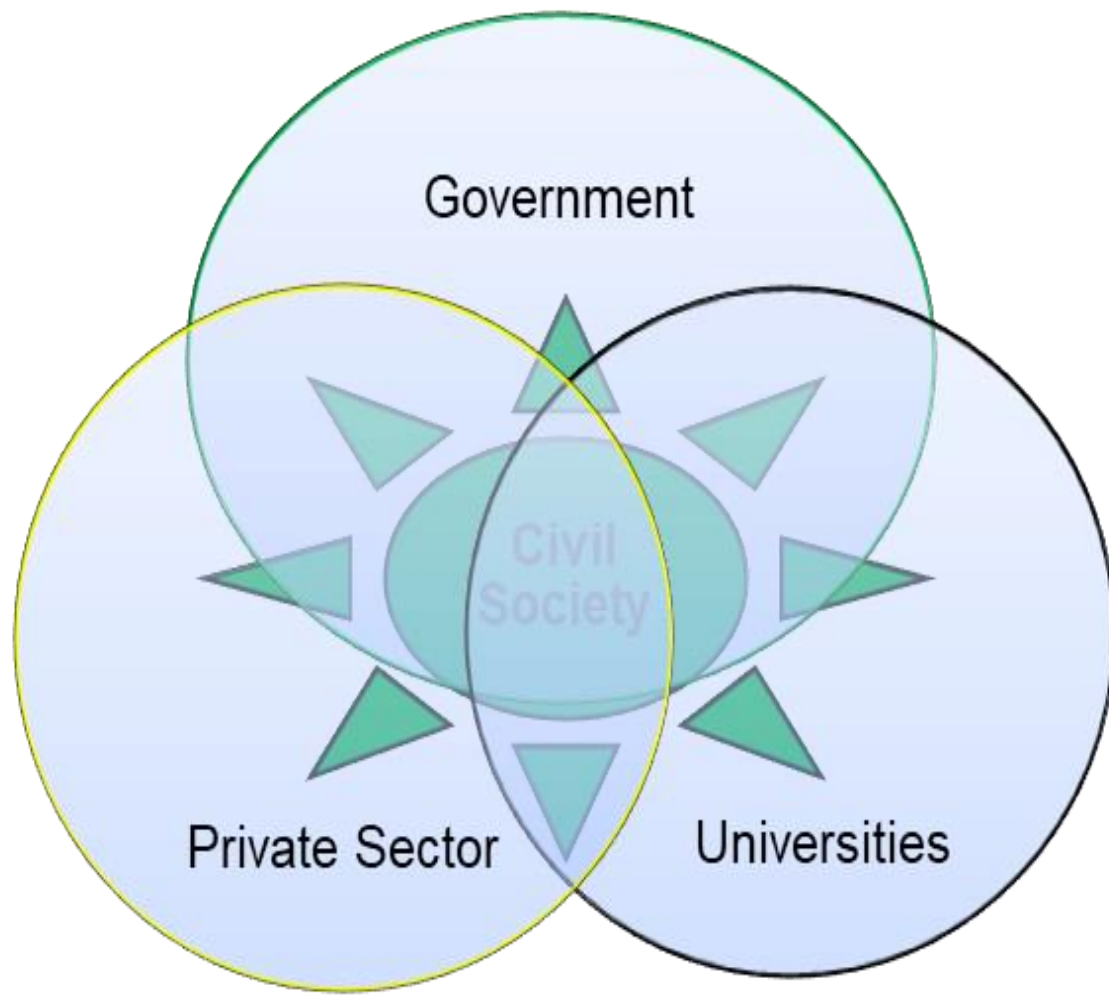


Figure 2.2: Triple Helix for Social and Grassroots Inclusive Innovation adapted from Etzkowitz (2008)

2.12 Conclusion

A review of literature around the implementation of FWL reduction strategies in South Africa with lessons drawn from other countries to give a broader understanding of the implementation of the strategies was done. Of course, the wastage of food has multiple implications to the society, governments and world. Although pictured in this chapter, the magnitude of food waste in South Africa continue to increase and pose problems while millions of South Africans experience hunger. Aligned to national, regional and global imperatives; locally-based actions are needed to engage household members and residents in FW reduction for effective sustainable food security. These actions should be rolled-out effectively at the grassroots level by religious leaders as the majority community-led leaders working daily with the people. Moreover, strategies to reduce the magnitude of food waste at household level are proposed through a responsible consumption behaviours based on religious beliefs influenced by religious leaders. Religious leaders are in a critical position to influence FW reduction at the household level and to contribute by 2030 towards achieving the SDG 12.3. It is noted that regarding household food wastage, available data exist especially in developed countries, while in some developing countries data is limited. And in Africa, the biggest quantity of food wastage is attributed to South Africa.

Hence, Abiad and Meho (2018) recognise FLW as a serious threat to food security, the economy, and the environment; confirming almost the same amount of FLW in developed and developing countries, amounting to 670 and 630 million tons respectively (Vilariño *et al.*, 2017; FAO, 2015). However, they differ on a per capita basis: 257 kg/year for countries in developed countries compared to 157 kg/year in developing countries, on a weigh basis (Gustavsson *et al.*, 2011). Therefore, ethically, it is improper to waste food that could be used to feed people (Thyberg and Tonjes, 2016), because food waste reduction is a solid strike against poverty, inequality and household food insecurity. While no existing FWR policy is in place, this study has no doubt to come up with a novel insight on policy formulation to reduce household food waste. So, to achieving sustainable food security, social and behaviour change is the best strategy to reduce household food waste. The expected strategies will be developed in collaboration with most influential actors within the civil society. The next chapter is dedicated to the research methodology of the study.

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CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

An in-depth review of the literature which framed the theoretical context of the study in the previous chapter was highlighted. An orientation to the theory and various related published work as they pertain thereto is provided. The scope of this study is delineated in two main ways; food waste, and on a particular district municipality within a country case. The South African case study is based on a preliminary desk review of key literature on food waste and reduction strategies delineated in five sections with lens on key global, continental, regional, in-country then narrowed onto the local level as well as qualitative interviews with key global and in-country stakeholders while looking at the role that religious leaders can play in reducing food waste in South Africa as this study will take a fresh look at food wastage from a religious and moral perspective.

The purpose of this chapter is to describe and discuss the methodology for the proposed study. Kothari (2004) and Kumar (2014) state that the way in which a research problem is systematically answered, and the various steps adopted alongside the logic for their adoption is called a research methodology. Walliman (2011) states that a research methodology of a study specifies the tools and techniques that should be utilised to conduct a study. Further, research is a term used for any kind of exploration to discover significant or new realities (Walliman, 2011).

3.2 Description of the Study Area

This study was conducted at three selected areas (Thohoyandou, Muledane, and Shayandima) under Thulamela Municipality in Vhembe District Municipality (VDM), which is in Limpopo Province. The district faces multiple challenges such as droughts, poor generation of own revenue, etc. (VDM, 2018). Although located between the three Southern African Development Community (SADC) neighbouring countries namely Mozambique to the east, Zimbabwe to the north and Botswana to the north-west, VDM is still plagued with high unemployment and poverty rate (SALGA, 2011). Further, it is the gateway to the Kruger National Park, which is the second largest national park in the world. Below in **Figure 3.1** depicts the map of the study area.

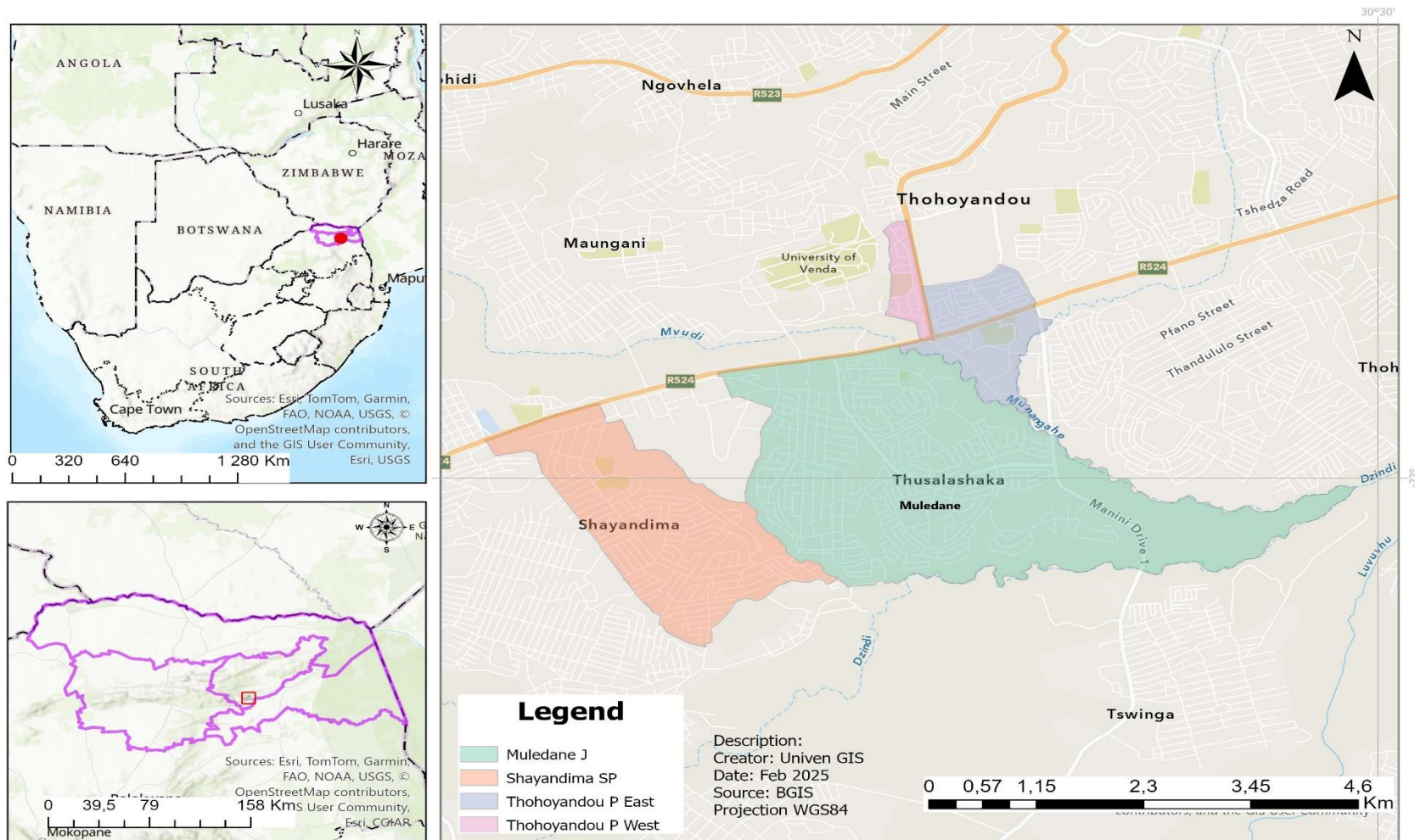


Figure 2.1: Map of Vhembe District Municipality showing where the study was conducted.

3.3 Research Design

This study employed an exploratory sequential mixed methods design in the quest to generate a better understanding of the present state of knowledge, and perspectives of several stakeholders regarding food wastage reduction at the household level. Thus, this exploration will be empirical in nature. Dan (2017) articulates that empirical research involves the use of data that is directly gathered by researchers based on real life experiences, phenomena or observations, and is usually used in research and science to prove a theory or to conclude a study. The aim of this kind of empirical research was to gain knowledge by means of direct and indirect observation or experience and to provide contextually valid descriptions and interpretations of human actions and views towards FW practices. The latter will be based on an insider's perspective of people and their world.

The plan for addressing a research question, including specifications for enhancing the integrity of a study is known as a research design (Polit & Beck 2017). Kothari (2004) specifies that it sets the route for the required data, the methods to be applied to collect and analyse such data, and how all of it will culminate to answer the research question. Furthermore, Pandey (2015) stipulates that it is the theoretical structure within which research is conducted and creates the plan for the collection, measurement, and analysis of data. Noting that a mixed method is the combination of qualitative and quantitative approach to collect and analyse empirical data. According to Bryman (2006), the integration of both qualitative and quantitative methods has become common in several research conducted because mixed method design has the potential to provide in-depth and comprehensive data to achieve the research objectives and answer the research questions.

The aim of this study was to determine to what extent interventions to reduce food wastage can contribute to food security, and the implications of religious leaders as key players within the civil society sector. Creswell (2014) enumerates the three most common research approaches namely: qualitative, quantitative, and mixed methods. From the three research approaches indicated above, within the mixed method research approach, there are also four types of mixed method research designs as indicated by Teddlie & Tashakkori (2009), namely: the exploratory, explanatory, embedded and triangulation.

As indicated by Pandey (2015), an exploratory design is often a kind of research conducted concerning a challenge that has not been studied intensively. Also, it is the most appropriate research design for research projects that address a subject about which there are high levels of uncertainty and/or ignorance (Pandey, 2015). Accordingly, the exploratory model will be

employed, which firstly contains qualitative data collection (Phase 1), followed by quantitative data collection (Phase 2) as the most suitable research design to answer the research questions such as: What role can religious leaders play in the fight against food waste in South Africa and what factors and behaviours influence the generation of household food waste in the study area? This method was used to explore the current phenomenon in question because Cress and Clark (2011) indicate that exploratory sequential mixed methods research design allows firstly the collection and analysis of qualitative data while exploring the phenomenon. Then, secondly, a quantitative instrument was developed to explore further the research problem through established themes. Thus, this helped to obtain a clearer picture from the qualitative data, and then to use the quantitative data to provide better understanding and exploration of the study in question. This is because exploratory study is often characterised by its flexibility and adaptability to change. Adding to this, it does not intend to offer final and conclusive solutions to existing problems, but only explores the research questions. Besides, it aims to articulate challenges more precisely, clarify concepts, gather explanations, gain insight, and form hypotheses (Moore, 2016).

Moreover, the qualitative approach was considered due to the fact that Klenke (2008); Flick (2009); and Merriam (2009) opine that it helped to have an in-depth understanding of such human behaviour and reasons that control it. Further, an understanding of what drives human behavior into food wastage in South Africa is expected as outcome of this study. Polit and Beck (2017) articulate that a study uses a qualitative approach because of the investigation of phenomena, typically in an in-depth and holistic manner, through the collection of rich narrative materials using a flexible research design. Thereafter, a quantitative research was done using closed-ended questions to explain the relationship in the qualitative data. Yin (2009) advanced three conditions for use of a case study: the purpose must be to answer “how” or “why” questions, investigator must have little control over events, and the focus of the research must be on a contemporary phenomenon within a real-life context, especially when boundaries between the phenomenon and context may not be clearly evident. According to Creswell (2013), the investigator explores a “real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information”.

Therefore, speaking about bounded systems is referring to a case being bound by time and place. As the study focuses on food waste reduction strategies for sustainable food security; the phenomenon is the wastage of food by household members, with a real-life contemporary bounded system which is household members wasting food. Since the household is too general,

it was decided to look at selected households within Vhembe District and their food waste behaviours.

Further, Yin (2014) postulated three types of case studies: exploratory, explanatory, and descriptive. There are also variations in terms of single case studies and multiple case studies. In addition, there are comparative case studies. Stake (2005) included intrinsic, instrumental, and collective research case studies as well. However, each type of case study is unique, and used for different purposes and to answer different questions. Adding to this, exploratory study was applied because it is used when there is no pre-determined outcome. According to Yin (2014), exploratory studies are appropriate when asking “how,” “why,” “what,” and “who” questions.

It is worth noting that, other qualitative designs would not be appropriate for this study due to the reasons given above about the exploratory design. Furthermore, the study aimed to explore the factors influencing household food waste by gaining extensive and in-depth description of a social phenomenon namely food waste. The decision tree in Table 3.2 below helps to indicate why the exploratory study was appropriate for the current study and few examples are provided to highlight how other researchers used each type of case study for their research. Also, Figure 3.2 depicts the schematic representation of the research design flow using the exploratory sequential mixed methods. The diagram summarises the research design to be employed in the study. It is designed by the author highlighting phases to be used, how they will connect, and procedures to follow in order to collect and analyse data, as well the integration and interpretation of analyses and results of the study. Adding to this, the study was cross-sectional in nature, meaning that the data was collected from a specific population at a particular point in time.

Table 2.2: Representation Table for choosing the right case study

Type of case study	Questions answered	When used	Example
Exploratory	How, what?	Used when there is no single set of outcomes.	Seaton & Schwier (2014).
Explanatory	How, why?	Used to explain presumed causal links that are too complex for surveys or experimentation (Yin, 2014).	Chong, Wong & Wang (2014).
Comparative	How are cases alike? How are cases different?	Used to compare two or more cases. Sometimes referred to as multiple case study because there is more than one case. But focus is on the comparison of the cases.	Rialp <i>et al.</i> , (2005).
Intrinsic	Can answer all above questions but focus is very specific.	Used to better understand a specific case.	Hellström, Nolan & Lundh (2005).
Instrumental	N/A	Used to provide insight into an issue or help refine a theory. The case plays a supportive role, helping us to understand something else. The case may or may not be seen as typical of other cases.	Luck, Jackson & Usher (2007).
Collective	N/A	Similar to multiple case studies.	Scheib (2003).

3.4 Population and Sampling Procedures

Often it is practically impossible to cover the whole population of interest when conducting research. As a result, researchers have a task of identifying a sub-set of the population that represents the wider population of interest. Onwuegbuzie and Collin (2007) define sample as a mere portion, piece, or segment that is representative of a whole. In agreement with Matinise (2019), sampling depends mainly on the research questions, research design and also on the time, money and other available resources to conduct a particular study. Therefore, good sampling strengthens a study while saving time, money and available resources allocated to the researcher (Shorten & Moorley, 2014). The sample size was determined so that the dataset achieves saturation for the first phase. Most participants' opinions were covered, there were emerging patterns in data and there was considerable diversity within the sample itself (Morse, 2015; Saunders *et al.*, 2018).

The population in this study included RLs, household heads responsible for food purchasing and other stakeholders working closely within the supply chain of the food industry sector including those identified as household consumers. As there is no sampling frame, convenience and chain referral or snowball sampling was used whereby community members living in the study area and household heads responsible for purchasing food were chosen as the target population. After being informed by what came from community members; an interview guide was developed to interview key informants who are the religious leaders. The survey sample comprised of 198 households from the selected areas namely Thohoyandou, Shayandima, and Muledane in Thulamela Municipality under the Vhembe District Municipality, making it 66 households per geographical location.

Randomised probability sampling was used because the household is the actual unit of analysis in this study. Whereas some consumers below the age of 18 do participate actively in food preparation and wastage at home; they were excluded since they are minors. Hence, both female and male consumers were chosen on the premise that they are above 18 years, and also responsible for food purchasing and preparation in their respective households. Adding to this, they are regarded as responsible for managing the groceries and having the required knowledge of all the consumed and unconsumed food within the household. They should be residing in the area for more than a year and representing the South African population with regard to age and educational level.

Purposive sampling technique was also used to select locations within the municipality. This sampling technique was appropriate because it helped to focus on particular characteristics of a population that are of interest to answer the stipulated research questions. Furthermore, the study locations (villages) were also selected purposefully based on constituting the high concentration points of religious communities and of food purchasing and preparation. Similarly, a purposive sampling technique was employed to select 22 RLs who participated in the first phase of the study. This technique according to Etikan *et al.* (2015) is often used to recruit participants through the means of referrals. So, to find research participants in this study, snowballing sampling technique was employed. Adding to this, in the qualitative phase, the sample was designed to be representative, but to ensure that participants came from as wide a range of backgrounds as possible so that a diverse range of views and opinions be captured. Other participants were recruited to participate in the second phase of the quantitative data collection of this study.

3.5 Data Collection Methods and Techniques

In this study, data collection was executed in two phases. Both qualitative and quantitative data were gathered through the two sequential phases. The data collection methods and techniques are highlighted in the next section commencing with the qualitative one firstly then followed by the quantitative one. The questionnaires were administered to participants with the assistance of four research assistants. Research assistants were students from the University of Venda. They were chosen based on ability to speak both good English and the most spoken local languages in the study area (TshiVenda and Xitsonga). Research assistants were trained before undertaking the data collection process. A short assessment was done after the training to select them and priority was given to those with good interviewing skills, listening skills, skillful in personal interaction and with basic experience in community engagement work. The training focused on how to use individual interviews for the Phase 1 then the questionnaire for Phase 2 to gather relevant data from all participants and respondents.

3.5.1 Phase 1 of the research: Qualitative data collection methods and techniques

The main reason for selecting small sample sizes in qualitative research is because qualitative research aims for in-depth understanding of phenomena (Anderson, 2010). To curb or minimize this phenomenon, the interviews and focus and visual group discussions were meant to help understand and get to the bottom of factors associated with FW at the consumption stage (household). The use of individual in-depth and key informant interviews, focus and visual group discussions, and direct observation served to gather qualitative data in this study. Thirty RLs and

stakeholders were expected to participate in both individual in-depth and key informant interviews. However, due to the unavailability of RLs and other stakeholders, only 22 RLs were able to participate in this study. Observations were also done during the interviews to observe their food waste practices and write down some notes to enhance the studied matter without prior warning. During individual in-depth and key informant interviews, participants were observed on their actions, facial expressions and unspoken words.

3.5.2 Phase 2 of the research: Quantitative data collection methods and techniques

A well-structured questionnaire was developed, divided into different sections according to the stated objectives and used to collect data. It consisted of nominal, ordinal, binary, open-ended questions, and close-ended questions. Oral interviews were also used to complement the questionnaire. Both open-ended and close-ended questions were used on both individual and household levels, requiring responses on different Likert type scales. For the purpose of measuring the items, participants were requested to mark their level of agreement on a five-point Likert scale (from “Strongly Disagree” to “Strongly Agree”). The Likert scale used “Strongly Disagree” at the level 1 of the scale and “Strongly Agree” at the level 5 of the scale. Then, a pre-testing of the questionnaire with 5 participants was conducted. Afterward, the original questionnaire was revised based on the participants’ questions, comments, and feedback. The researcher administered the questionnaire face-to-face with the help of trained research assistants. Some respondents requested to answer the questionnaire later, so the researcher handed over some questionnaires to them and the questionnaires were collected back on the given date. The obtained data were analysed through two data reduction techniques, i.e., descriptive statistics, and exploratory factor analysis.

3.6 Data Analysis

This section explains the method that elucidates how the qualitative data obtained will be analysed and interpreted. The type of data analysis that will be used in this study is content analysis. Analysis based on data gleaned from interviews, observation, and the transcripts of focus and visual group discussions. Figure 8.3 below shows the three steps of qualitative research analysis.

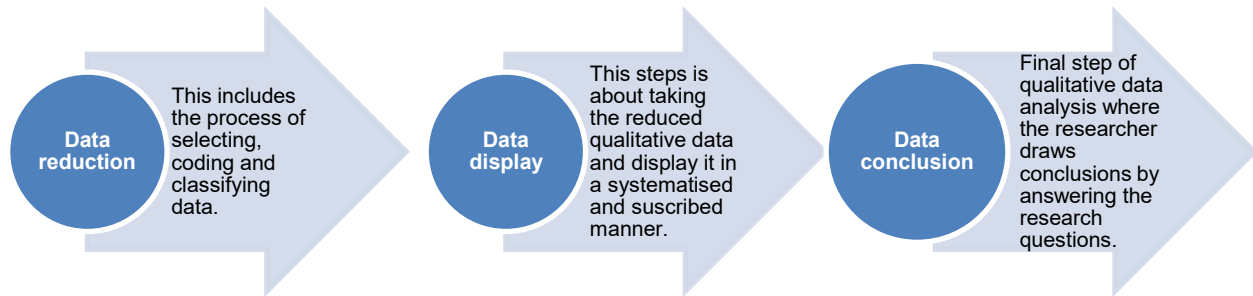


Figure 3.3: Three steps of qualitative research analysis (Adapted from Sekeran, 2010).

Additionally, the Statistical Package for Social Sciences (SPSS) version 27.0 was used to analyse quantitative data. Descriptive and frequency statistics, and factor analysis were conducted on the data to find out if the means from households are significantly different from each other; to estimate the effect of some explanatory variables on the dependent variables; and to determine the significance and relationships between variables. Data analysis procedures included descriptive statistics, calculations of frequencies and percentages of participant demographic data. The data collected was analysed using descriptive statistics such as mean and standard deviations, percentages, and frequency distribution.

Coding and cleaning of the data were executed. In addition, stepwise deletion was used to deal with missing values and exclude all the missing values. The reason is that the method is less biased when comparing with estimated missing values, including those substituted by mean or others (Lin *et al.*, 2020). Prior to conduct the analysis, screening of all the respondents was done and regard the items that were left blank as missing data.

3.7 Ethical Considerations

The study was carried out after obtaining the Ethical Clearance Certificate from the University of Venda Research Ethics Committee (UREC). Permission to interview RLs, household members, and other stakeholders was sought from the Tribal Council within the boundary of the study area, Thulamela Municipality, Vhembe District Municipality to facilitate community entry. Further, all informed consents and the right to participate in this study were fully adhered to while every participant voluntarily agreed to participate actively. They were also assured that all the collected information would be confidential and used only for the sole purpose of this study. Recorders were used, and photographs were taken during the collection processes. Yet, participants consented before being recorded and photographed and the POPI Act was adhered to. Adding

to this, anyone feeling uncomfortable was free to withdraw from the study prior to the commencement of any activity mentioned above. Additionally, participants' economic status, gender, cultural, moral, and religious values as well as spirituality towards food was highly respected as this study focuses on FW Reduction.

3.8 Overview of Qualitative Dataset

In this study, the entire qualitative addressed the following research questions: '*What is the role of religious leaders in reducing food waste?*' '*What are RLs perceptions on the fight against food waste?*'. However, for this chapter, the research question to address is on '*What is the role of religious leaders in reducing food waste?*'.

In-depth face-to-face Interviews with key informants

Semi-structured questions in an interview guide were administered to key informants to collect data. Described as primary sources of information that know well their community, key informants provided expert opinion and technical knowledge to lay out their understanding of food waste; their role in food waste reduction and their perceptions on the fight against food waste to provide their potential contributions. According to Taylor *et al.* (2015), this group often influences participants to actively participate in the study while also introducing the researchers to community members. In this case, some community members were congregants under the leadership of the key informants.

3.9 Preparing the Dataset

After the collection of data, the data was prepared, involving among other things, assigning pseudonyms to the participants involved in the study to protect their identities and ensure confidentiality. Thus, the participants were named P1, P2, P3, ... P22. The data was captured and cleaned. A few audio-recorded interviews were transcribed and captured as well. After transcribing the few audio-recorded interviews, the identification of all segments of the transcripts that were transcribed verbatim in the participants' language and translated to English. A thorough checking of transcripts was done accurately by listening to and comparing audio recordings with the transcriptions for ensuring clarity. Additionally, a careful selection of essential field notes taken during the data collection process were typed and saved together with the relevant dataset to be analysed. Thus, the purpose of collecting the data depends on why we need it and what we need to do with it.

This was done to align with Creswell (2014) who states that for qualitative research it is essential to have field notes because data analysis proceeds hand-in-hand with data collection. This is the

first step for doing analysis according to (Romagnano, 1991; LeCompte, 2000; Cristancho *et al.*, 2021) called 'tidying up'. As a certainly necessary first step to coding and analysing data, it involves the following: (a) Making copies of all data; (b) Putting all field notes and interviews into a file in order of their dates of creation, and (c) Creating other files based on type of data. Further, a suggestion to researchers is that whenever possible during this process, a review of research questions can also be done to compare them against the collected data, identify any missing data, and return to the field if necessary (LeCompte, 2000). In our case, the data collected was viewed as suitable to address the research objectives of the study. Following the tidying up of the data, the data was added in the Software to begin reading through the data (transcripts) multiple times to familiarise myself with the data and then started the coding.

3.10 Data integration

Data was gathered in two phases using different methods and tools; thus, it was imperative to integrate these two phases of data collection and analysis. According to Creswell *et al.* (2011), data integration connects data collection methods and analysis. In the context of this study, qualitative results built the foundation upon which the second phase was premised. Creswell *et al.* (2011) define "building" as when results from one data collection procedure inform the other procedure's collection approach. In the context of this thesis, qualitative data obtained from the first phase built the foundation upon which the cross-sectional survey was laid, i.e., the emergent themes from the qualitative phase were used to formulate the questionnaire for the second quantitative phase.

3.11 Conclusion

This chapter described, discussed, and explained the methods and procedures that were used in this study. A description of the study area was provided, research design explained, population and sampling technique, sample size, data collection methods, data processing and analysis, the ethical considerations issues including the expected outcomes/ anticipated outputs were described. An exploratory sequential mixed methods approach was here selected to combine the advantages of both the qualitative and the quantitative research approaches. This required one to be very observant, detail-oriented, and analytical to produce useful and quality data and scientific documents. Issues related to the potential impact of the study to the society and the economy are also highlighted. A brief conclusion closed this chapter related to the methodology applied in this present study.

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CHAPTER 4: EXPLORATION OF THE ROLE OF RELIGIOUS LEADERS IN IMPARTING KNOWLEDGE ON FOOD WASTE REDUCTION

Abstract

Regardless of the increasing global efforts to address food insecurity and hunger, irresponsible consumption and selfish behaviours are still key drivers for food waste worldwide, making billion of people unable to afford and access basic food. The lack of specific documented RLs roles and practices that promote FWR at the grassroots level to advance sustainable food security poses a challenge to its effective participation in rural development. Despite their contribution to other important sectors of life and crucial role in achieving the SDGs by 2030, this study explored the identified roles perceived to influence and impart knowledge towards FWR positively. An explorative study was conducted in the Vhembe district in Limpopo province, South Africa, to collect qualitative data using interviews with key informants. The data was collected from RLs (N=22). A thematic analysis aided with Atlas Ti version 8 recognised four factors of the roles perceived to influence FWR among community members, namely “the role of understanding factors contributing to FW”; “influencing roles”; “challenges affecting RLs in playing their roles”, and “interventions to reduce FW”. The results suggested that these factors were also related to some extent. Implications for multi-disciplinary stakeholder collaborations (interprofessional and interfaith) and FWR education training for religious leaders in South Africa are addressed. It is also recommended that national multi-faith FWR strategies be considered for development to achieve the SDGs. Thus, it is recommended that the roles of RLs in FWR strategies be studied further for sustainable food security and rural development.

Keywords: Food security, food waste, religion, religious leaders, religious leaders’ roles, sustainable rural development.

4.1 Introduction

This chapter presents the result of a qualitative study phase on the explorative interviews on the perceived role of religious leaders towards food waste reduction. It followed the third chapter on the research methodology. This chapter presents the result of a qualitative study phase on the explorative interviews on the perceived role of religious leaders towards food waste reduction. As indicated by Mattimoe *et al.* (2021), the most intellectually challenging phase in qualitative research is the data analysis phase. For Phase 1 of this study, in-depth one-on-one and key informant interviews guided by a structured interview guide were used to collect data.

The collected data was transcribed utilizing Microsoft Word and Excel and then analysed using thematic framework analysis aided by ATLAS.Ti version 8. RLs were purposively sampled. The Atlas.TI was used to execute the thematic content analysis of the data collected qualitatively. The codes were grouped into code groups to generate emerging categories then the themes were extrapolated from the categories. The themes relevant to the objective 1 were grouped together; forming categories according to the study's objectives (Polit and Beck, 2004). Results are presented in accordance with the responses obtained from the semi-structured interviews conducted with the RLs from the Thulamela Municipality within Vhembe District, Limpopo Province of South Africa. RLs were observed to be predicting their role in imparting knowledge for the reduction of food waste at the household level. Where applicable, the data analysis and findings are presented in networks, narratives, and quotes for further clarity.

4.2 Background

Food is a critical basic need for humanity and very important for the survival and performance of all living beings. This very important essence of survival gets the unfortunate fate of being wasted more than any other resource in the world (Jarjusey & Chamhuri, 2017). Whether poor or rich, citizen or foreigner, employed or unemployed, Christian or Muslim, food is part of our daily life as a necessity. It impacts our health, environment, culture, religion, and social status. Still, FAO (2018) reports that millions of people are battling to afford this basic necessity, and they still go to bed hungry. Meantime, across the planet, food insecurity, hunger and poverty are still pervasive problems in all countries (Ivanova, 2022; Obuobi *et al.*, 2024).

According to the 2030 Agenda for the United Nations SDGs, its twelfth goal seeks to ensure sustainable consumption and production patterns. The third target under this goal (Target 12.3) calls for cutting in half per capita global food waste at the retail and consumer levels; while its

second goal set is to work towards zero hunger (United Nations, 2015). Further, a 50% reduction of the global per capita FW is advocated by the Target 12.3 of the SDGs (UNEP, 2021). With the Agenda 2030 for Sustainable Development, the international community has committed to effectively combat hunger and malnutrition (SDG 2) by reducing FLW (Delgado *et al.*, 2017; Thünen Institute, 2020). The food that is wasted according to Parfitt *et al.* (2010) could be used to combat hunger or malnutrition. Adding to this, current empirical and social scientific research has documented that food waste has significant environmental, economic, and social costs (Geislar, 2018). Thus, recent studies have been conducted empirically to understand how religious dynamics and the role of faith communities and actors are crucial for sustainable development (Tomalin *et al.*, 2019).

In Africa, while religion is widespread, malnutrition, hunger, and food insecurity are among the most important challenges facing our nations today (Sanniti *et al.*, 2024). Additionally, this phenomenon affects highly the poor that are becoming progressively sensitive to food insecurity fears as food prices continue to rise (Rutten, 2013; Ivanova, 2022). Although about 30 percent of food produced globally is lost or wasted, many in Africa face food insecurity (Sanniti *et al.*, 2024). Further, current statistics reveal that Africa has the highest numbers of Christians, ahead of Latin America, Europe, and Asia (Johnson *et al.*, 2018; Oladipo, 2016) and in South Africa Christianity remains the largest religion (Stats SA, 2001). As the SDGs target to eradicate hunger and reduce food waste, more reduction efforts need to be made by all stakeholders that will help reduce the magnitude of FW.

According to (FAO, 2011; Koester, 2012), the FAO, the EU Commission, governments, and numerous NGOs regard the reduction of FW as a major issue to be addressed. Wimby (2020) confirms that a reduction in FW will have triple benefits namely economic, environmental, and social. Emphasizing on FWR, Soorani & Ahmadvand (2019) elaborate that it is significant to measures outlined to cater for a potential global population of 9 billion. Consequently, reducing food waste in one hand could achieve other SDG targets by improving food security and nutrition (Annunziata *et al.*, 2022). On the other hand, the UN (2015) cements that FWR contributes towards environmental sustainability; and is also a vital way to increase the overall efficiency of the food system (FAO, 2019). Adding to this, Jones-Garcia *et al.* (2022) point out that research into the main drivers of food waste and potential strategies for limiting it has grown considerably.

This study came into existence against the backdrop of persistent magnitude of “food waste” (Oelofse, 2018) hindering the sustainable desired wish of food and nutrition security from all societal levels. Drawing from the objective of this study, the aim of this chapter is two-fold; first,

to explore the role of RLs in imparting the knowledge that emerges between different strands of food waste research; second, in light of this literature, to demonstrate the value of using them as agents of change to achieve the intended reduction desired within the community. Given the cogent and influential role of RLs at the community and national level in South Africa, this role can be leveraged on as a catalyst of change in their societies. Leveraging on this role should be conditioned by understanding the knowledge of RLs (Jailobaeva *et al.*, 2021), stances and views on FW and by effective communication between them, the community and other stakeholders to ensure they serve as effective advocates, moral guiders and educators.

But in Vhembe District, there is no study that focuses on food waste reduction strategies. Furthermore, the role of religious leaders in the literature has received little attention. This is because of a rising mounting concern to a move toward greater environmental sustainability bring food consumption and dietary habits to the fore (Jones-Garcia *et al.*, 2022). Yet, this is no surprise considering the wealth of understanding on how to deal with food waste, both in research and in practice. Religious leaders play important roles among their followers in communities around South Africa. They are held in high esteem among their followers and can assist in shaping behaviours (Walsh *et al.*, 2018). Adding to this, they establish and maintain norms and cultural values within their societies. Hence, context is pertinent in addressing FW challenges facing households in diverse rural settings.

However, there is a paucity of data concerning specific roles of religious leaders on FWR. This study was conducted to find out about the roles of religious leaders on household FWR strategies and how they influence waste behaviour change. Such an analysis is likely to shed more light on how RLs could play a significant role in the reduction of FW. Furthermore, conducted in South Africa, this study will be the first on its own to be converted into a sustainable project from Africa to the world in order to stop FW behaviour in our communities by offering smartly sustainable solutions simultaneous from their perspective.

4.3 Materials and Methods

Qualitative data was collected from 22 face-to-face semi-structured interviews with RLs. Other relevant information on detailed materials and methods refer to Chapter 3.

4.3.1 Study design and setting

An exploratory qualitative study was conducted in Thohoyandou within Vhembe District Municipality, South Africa. VDM is in Limpopo Province. It borders Zimbabwe in the north,

Botswana in the west and Mozambique in the eastern part. The study area is largely rural and semi-urban with more households. Most of the people survive on government grants while some are government workers (teachers, nurses, police and traffic officers, social workers, university staff, etc.). Two methods were expected to be used namely, In-depth face-to-face Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) in order to increase the credibility and validity of the results. In addition, the methods were chosen to get an in-depth and broader understanding of the roles of the religious leaders on FWR. However, due to heavy schedules and difficulty to come together in the proposed set time, it was not possible to conduct the FGDs as planned. Thus, we relied only on the data from the in-depth face-to-face key informant interviews.

4.4 Presentation and description of Results

In this study the researcher used the Thematic Data Analysis as outlined in Creswell (2003) and Atlas Ti version 8. The participants were asked the following central question: 'What is the roles of religious leaders in reducing food waste?' Probing questions were asked as a follow up on the answers given by the participants. An interview guide was used to guide the researchers during data collection. Table 4.1 below depicts the demographic characteristics of participants in the first phase of data collection. The results revealed nine roles of RLs that are important to impart knowledge for influencing FWR. They were categorised into four themes as described in Table 4.2 and discussed below. The themes relate to the role religious leaders can play regarding imparting knowledge to influence FWR.

The following Table 4.2 outlines the summary of the findings of the in-depth interview with the participants. Below presented are the main and sub-themes that emerged during data analysis using the content thematic analysis. Table 4.2 presents also the true reflection of participants' views as were requested to express themselves freely in order for the researcher to explore more this under-researched aspect of social life which is food waste and become able to describe richly the phenomenon. However, the themes relate to the role religious leaders play when they interact with the community in general despite limited knowledge and them not directly interacting about FW. Specifically, they address how they perceive their role and the helping methods they employ in helping people; with the hope in this case to start engaging on FWR.

4.4.1 Demographic Representation of Participants

During the first phase of the data collection process, a total of 22 participants made of RLs were interviewed out of the expected number of 30 participants in this study. Let us note that RLs are

amongst the hardest to reach group. Despite being hard to reach, a slight saturation was reached following the 22nd interview. Due to their positions and responsibilities, it was even difficult to bring them together. And for this study, the religious leaders who took part belong to Christianity. A large majority of participants belong to black ethnic group and were male (73%). Noticeably, 77% of these males were married, followed by the widows/widowers 13% and single 10% only. The following information on the demographic representation of participants derives from the statistical data about the characteristics of the research participants within the first phase of the study, which includes gender, age, marital status, title, level of education and area of residence within the sampled population as depicted on Table 4.1 below. For this study the three areas of residence are identified as follow according to the researcher:

- Muledane is classified as rural township because it is a village.
- Shayandima is classified as semi-urban because it is a township.
- Thohoyandou is classified as urban because it is a town.

The thematic analysis revealed four themes and fourteen categories. Notably, the perceived roles included the role of understanding factors contributing to FW; influencing roles; challenges affecting RLs in playing their roles, and interventions to reduce FW. Below in Table 4.2 is the representation of the emerged themes and associated codes during the data analysis process.

Table 4.3: Demographic characteristics of participants in the first phase of data collection

		*Thohoyandou (n=10)		**Muledane (n=6)		***Shayandima (n=6)		Total Frequency (n=22)	Overall Percent (%)
<i>Characteristic</i>		Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
Gender	Female	2	20	1	16.7	3	50	6	27.0
	Male	8	80	5	83.3	3	50	16	73.0
Total		10	100	6	100	6	100	22	100
Age	25 - 34 years	0	0	2	33.3	0	0	2	10.0
	35 - 44 years	2	20	1	16.7	3	50	6	27.0
	45 - 60 years	6	60	2	33.3	2	33.3	10	45.0
	61 years and above	2	20	1	16.7	1	16.7	4	18.0
Total		10	100	6	100	6	100	22	100
Marital Status	Married	9	90	5	83.3	3	50	17	77.0
	Single	1	10	1	16.7	0	0	2	10.0
	Widow	0	0	0	0	3	50	3	13.0
Total		10	100	6	100	6	100	22	100
Title	Apostle	0	0	1	16.7	0	0	1	4.0
	Doctor	1	10	1	16.7	0	0	2	10.0
	Evangelist	0	0	0	0	1	16.7	1	4.0
	Pastor	7	70	2	33.3	2	33.3	11	50.0
	Rev	2	20	2	33.3	3	50	7	32.0
Total		10	100	6	100	6	100	22	100
Level of Education	Secondary School	1	10	0	0	2	33.3	3	13.0
	Tertiary - Diploma	0	0	3	50	0	0	3	13.0
	Tertiary - Degree	1	10	1	16.7	2	33.3	4	18.0
	Tertiary - Honours	3	30	1	16.7	1	16.7	5	23.0
	Tertiary - Masters	2	20	0	0	0	0	2	10.0
	Tertiary - PhD	3	30	1	16.7	1	16.7	5	23.0
Total		10	100	6	100	6	100	22	100

*Not Poor Area (NPA) - **Vey Poor Area (VPA) - ***Poor Area (PA).

Table 4.2: Emerged themes and associated codes during the data analysis process

EmergEd Themes and sub-themes
1. The role of understanding factors contributing to FW
• People disposing food deliberately • Food not consumed intentionally and got spoiled • Careless behaviour leading to waste • Disposed unpreserved food
2. Influencing roles
• Moral and spiritual guiders • Teachers of light and good manners • Change agents and influencers • Ubuntu and food security educators • Behaviour changers and illuminators • Voice amplifiers
3. Challenges affecting RLs in playing their roles
• Lack of leadership influencing role • Lack of awareness creation and education on FWR
4. Interventions to reduce FW
• Education and awareness creation • Behaviour changes for FWR

4.5 The role of understanding factors contributing to FW

Results found that the majority of RLs possess an adequate understanding of factors contributing to FW. They also indicated that they have a role in understanding what makes people waste food unnecessarily within their communities. Therefore, it is only through understanding various factors (values, behaviour, community dynamics, systemic challenges, etc.) that contribute to FWR that RLs can effectively guide their congregations and the community in making meaningful, lasting changes. A male RL vividly narrated his understanding in the following manner:

“It is like any food which is not well conserved and preserved that we supposed to eat for our health” (P5).

Surprisingly, a sad statement from a female participant (P20):

” My understanding is that it is all the food we are refusing to eat because it is no longer nice for our health, nutrition and well-being. Furthermore, it is our negligence or a wrong conservation method that led to the wastage” (P20).

This claim confirms how negligence and poor conservation methods contribute to food waste at the household level. Additionally, throughout the coding process, we wanted to know after probing what some RLs understood about FW instead of searching for interpretative meanings. Figure 4.5 below shows a network of categories and statements on understanding and knowledge of FW.

4.5.1 People disposing of food deliberately

Food disposal, according to the findings of the study is often deliberate. According to most participants, people tend to waste food in Venda because of the culture and availability of food from their plots, including the supermarkets. Food affordability is also one of the elements leading to food waste at home. Two participants expressed the following views:

“Around here, a lot of food is wasted by people. Also the load shedding contributed a lot. We can see in the dust bins, on the roads, people throwing food”. “I think they are wasting because they can afford”.

Participants 12 and 18 mentioned:

“Food waste to me is the one we decide to throw in the bin without eating it. I am aware that food has been deliberately wasted within our different communities every day”.

As emphasized by the participants above, this stipulated that nowadays, people waste food deliberately because of their financial affordability, the heat caused by climate change that compromises food quality, and plenty of food such as maize, vegetables, fruits, and meats. This is due to the availability of food produced by farmers in the country.

4.5.2 Food not consumed intentionally and got spoiled

The analysis also revealed that negative attitude and intention were causing continuous wastage. This was seen in all participating leaders as these two among them said, *“It is the food we are supposed to eat but end up not eating it because it is spoiled or damaged”* (P10) and *“To me, I can say that this refers to the food which myself or someone else decides not to consume due to diverse reasons such as spoilage, quality not good enough anymore that can affect our health”* (P18). This explains why most people find it difficult and challenging to avoid wasting food. Emerging reasons were food spoilage or being rotten and sometimes attitude toward food they did not conserve properly. Figure 4.1 shows a network diagram of interview results with selected quotations that supported the views of participants derived from verbatim.

4.5.3 Careless behaviour leading to waste

According to some participants, careless behaviour and negligence present a critical challenge within the wastage process. It looks like society has lost the meaning and importance of food. Our observation during the interviews reveals that waste, which is seen often, is ‘food’, compared to other items from the household. One of the participants, on one hand declared: *“The simple understanding is that edible food which is not eaten at all due to negligence or being careless”* (P9) makes it worse to notice that people are being negligent and careless towards food. At the same time, their fellows lack enough to eat. On the other hand, participant 13 said: *“Food waste is the spoiled food that people purchased but could not consume it because of lack of good conservation or negligence”*. Results revealed also that dishing up a huge quantities of food, many meat portions, lack of sound conservation and over-cooking fall as well under the careless behaviours contributing to the waste.

4.5.4 Disposed unpreserved food

Religious leaders also reported that people have developed this throwing habit because they believe that food is always available at any time and it is part of our daily life: *“I can see that here in Thohoyandou, we are wasting food too much because we have plenty food, even in the shops”* (P19) and (P20), *“As a pastor and a mother, I witness this habit every day and in all our areas be*

it in villages, locations or town. Thohoyandou is smelling bad because we are throwing away food”.

A similar view was also held by (P8), who noted: *“I think my understanding is about the food that we did not conserve well and we throw it away after being spoiled”*. Moreover, (P12), *“Food waste to me is the one we decide to throw in the bin without eating it”*. Some also added out of their comfort zones, assuming that they understood much of what was discussed, especially when the dumping site in Muledane was temporarily closed, and it smelled all over because of the rotten food on the streets. Such a view was expressed by P10 who stated: *“This is simple to notice with our naked eyes. Not so long the dumping site in Muledane was closed temporarily and it was smelling all over because of the rotten food”*. The rotten food is the unpreserved food being disposed by community members. Figure 4.1 below depicts the network diagram on the role of understanding factors contributing to FW in Vhembe District. As illustrated in Figure 4.1, eight sub-themes were revealed by key informants in the selected areas. These sub-themes form part of the understanding role of RLs toward contributing factors to FW.

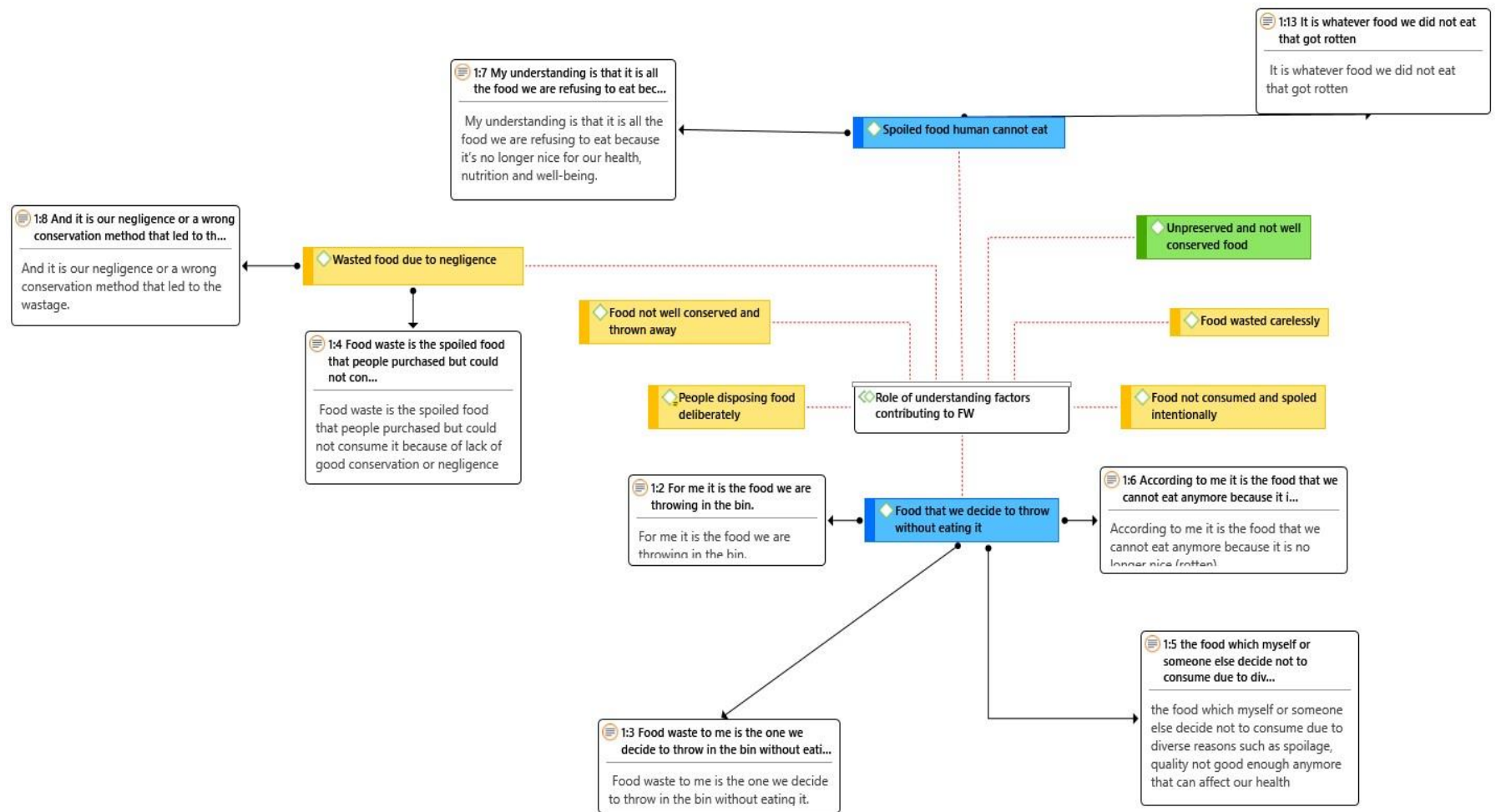


Figure 4.1: ATLAS TI Network diagram on the role of understanding factors contributing to FW in Vhembe District

4.6 Influencing roles

Despite playing different roles within the community, information obtained during interviews pointed out that some RLs do not know what kind of role they currently play towards FWR. The results revealed that RLs in Vhembe District are not doing anything in the fight against FW. Thus, most claim that they never thought FW was a serious problem they could address during their ministries. However, they hope they can play influencing roles and will take this issue seriously because it affects everyone. Furthermore, it is for the first time in the district that a researcher is conducting this kind of study, engaging them as pastors. However, to fulfill the roles in the future, among the perceived roles mentioned includes: *moral and spiritual guides, teachers of light and good manners, change agents and influencers, ubuntu and food security educators, behaviour changes and illuminators, voice amplifiers, and lack of leadership influencing role* (Figure 4.2). The results are discussed below thematically in chronological sequence.

4.6.1 Moral and spiritual guides

Moral and spiritual guides emerged as a perceived influencing role for the reduction of FW. Results revealed that RLs possess spiritual power and abilities to guide people differently in matters affecting their social lives. As moral and spiritual guides, they have the potential to instill ethical, moral, and spiritual values to drive behavioural changes. RLs noted that their moral authority or guidance can influence the community toward FW. A female RL explained the impact of this: *“I can say that RLs can influence decisions using their spiritual and moral power. ... We can use our moral authority by demonstrating our commitment to the reduction of food waste”* (P7). This sentiment was also suggested by a male counterpart who said, *“Yes, we as RLs can use various approaches that leverage our spiritual/moral authority in curbing food waste for the safety of the community to deal with hunger”* (P9). However, the moral imperative of feeding the hungry and caring for the poor lies at the heart of the world’s major religions. We share a common focus on and concern about the 800 million hungry people in the world.

4.6.2 Teachers of light and good manners

The results show that given their persuasive and weighty role, RLs perceived themselves as light and good manners teachers. Teaching light and good manners is ethically induced due to their religious responsibilities embedded in the holy scriptures. Adding to this, they hold a profound influence in shaping the moral fabric of society. Their role goes far beyond preaching religious principles; they guide their followers towards ethical living, fostering social harmony, and nurturing

a sense of responsibility towards others. A vivid narration from two RLs regarding this role explains the following: “As we say in Tshivenda ‘Ipfi la Mudzimu ndi shed’ which means ‘the Word of God is light to us.’ So, here I want to illustrate that as pastors, we are like the light to our people in transmitting knowledge which is light: the knowledge about food and its value, so we must not waste it. Also, we as RLs can even start educating the people to stop this habit because long ago, there were rules in some households where everyone was obliged to finish the food, and no one was allowed to leave food on the plate. Maybe those rules can help if we play our part” (P8). “Our role might also be instilling some religious norms to discourage some wasteful behaviours among the people” (P10).

4.6.3 Change agents and influencers

The RLs explained that they influence people on different matters while encouraging them to change. This means that through their influence, RLs have the potential to empower and inspire many people to change. “I am sure RLs can still influence decisions of community members about food waste reduction, just the same way we influence in other different social matters affecting our societies” (P13). Participant 18 also mentioned that: “Using our teachings on the pulpit and during home visits, pastors can influence and inspire the community to change because food waste contributes also to the degradation of our environment, pollution of public health, etc.” (P18). Here, RLs have the responsibility to influence change because most of the wasted food goes to the landfill. So, the landfill could be expected to run out of space due to the large amount of waste accumulated there. This was also one of the problems faced around the Muledane area, where residents were fighting for the closure of the landfill site, which smelled of rotten food.

4.6.4 Ubuntu and food security educators

Looking at the educating role, RLs do teach their respective congregants about several issues impacting society such as ubuntu, food security, and so on. Adding to this, they perceive themselves also as *Ubuntu advocate* and *promoter of a sharing community*. If they are capacitated, they will be able to provide training and spread knowledge on responsible food consumption for sustainable food security. Participant One emphasized that: “RLs are not taught, and also when they were trained, issues of FW never been in the curriculum. RLs need to be taught about FW because it concerns *us all for food security*” (P1). Furthermore, the results reveal that the majority of RLs advocate for the community, while a limited number promote a sharing community. “Our role is of a guide, influencer, and change actor in a way that we stop people from wasting food, especially in our rural areas, hoping that we will make things happen. We can

even think how to stop this behaviour from the people by teaching models that can stop food waste” (P9). Taking advantage of their influence and moral authority, RLs have that unique ability to serve as both Ubuntu and food security educators to promote sustainable practices and collective responsibility.

4.6.5 Behaviour changers and illuminators

The findings revealed that through their beliefs and principles, RLs have the potential to influence the behaviours of most people. Once capacitated on the FW issue, they will be able to address the issue of food waste in rural communities. Further, their respective communities could benefit informal education that will illuminate them and change their behaviours on the environmental and social consequences of FW and provide practical solutions needed. Interestingly, some pastors indicated the issue of hope by highlighting that:

“In my opinion, we do it through sermons, community gatherings, or other events. On this, I hope that we will do it to make people change their behaviours” (P2).

“We can help reduce food waste by being the leaders who guide the people morally in order to change their behaviours through our education (teachings)” (P4).

“I believe that faith leaders still have the power to influence behaviour change through their moral authority. Even for food waste reduction, we can still use our moral authority” (P5).

“Beside teaching the Word of God, RLs raise also awareness on many other social issues. So, in this context, they can play a positive role of changing people’s attitudes and behaviours towards FW” (P6).

Moreover, the results from the interviews showed that RLs have the capability to be local “illuminators” (P9, P10, P12). This reflects how most of the participants mentioned that they can serve as behavior changers and illuminators in their rural communities concerning FWR. Thus, the result further showed that RLs hope to play this role by changing behaviours and being illuminators in influencing the change regarding FW.

4.6.6 Voice amplifiers

Although they had not considered their role as voice amplifiers on FWR within the community; RLs acknowledged that such an undertaking would benefit their church members and their entire

community. Their voices could instill responsible consumption. Participants provided varied responses during interviews. One male research participant alluded:

“With their moral authority, RLs can amplify their voices together to curb food waste within their communities” (P8).

Others acknowledged the importance of collaborative work by highlighting that they can impact the community of Vhembe District by amplifying their voices in unison.

“Here, my view is that if we are working together across religious boundaries, we can amplify our voices that will then influence the people and change their behaviours by making good decisions” (P10).

“We can influence decisions via one-on-one counselling, outreach sessions, and sermons” (P7).

“If we amplify our voices in community radios and civic meetings, I am sure we will influence community decision on food waste reduction” (P6).

RLs expressed their views by stating they have influential voices to speak out against socio-ecological and economic injustice. Thus, they can also amplify their voices in the fight against food waste even though there is no initiative to fight food waste in the district. Through their leaders, churches have a significant role and moral voice in society to shift public opinion on positive behaviour for sustainable development. Some quotes linked to the influencing roles of RLs in FWR are shown in Figure 4.2.

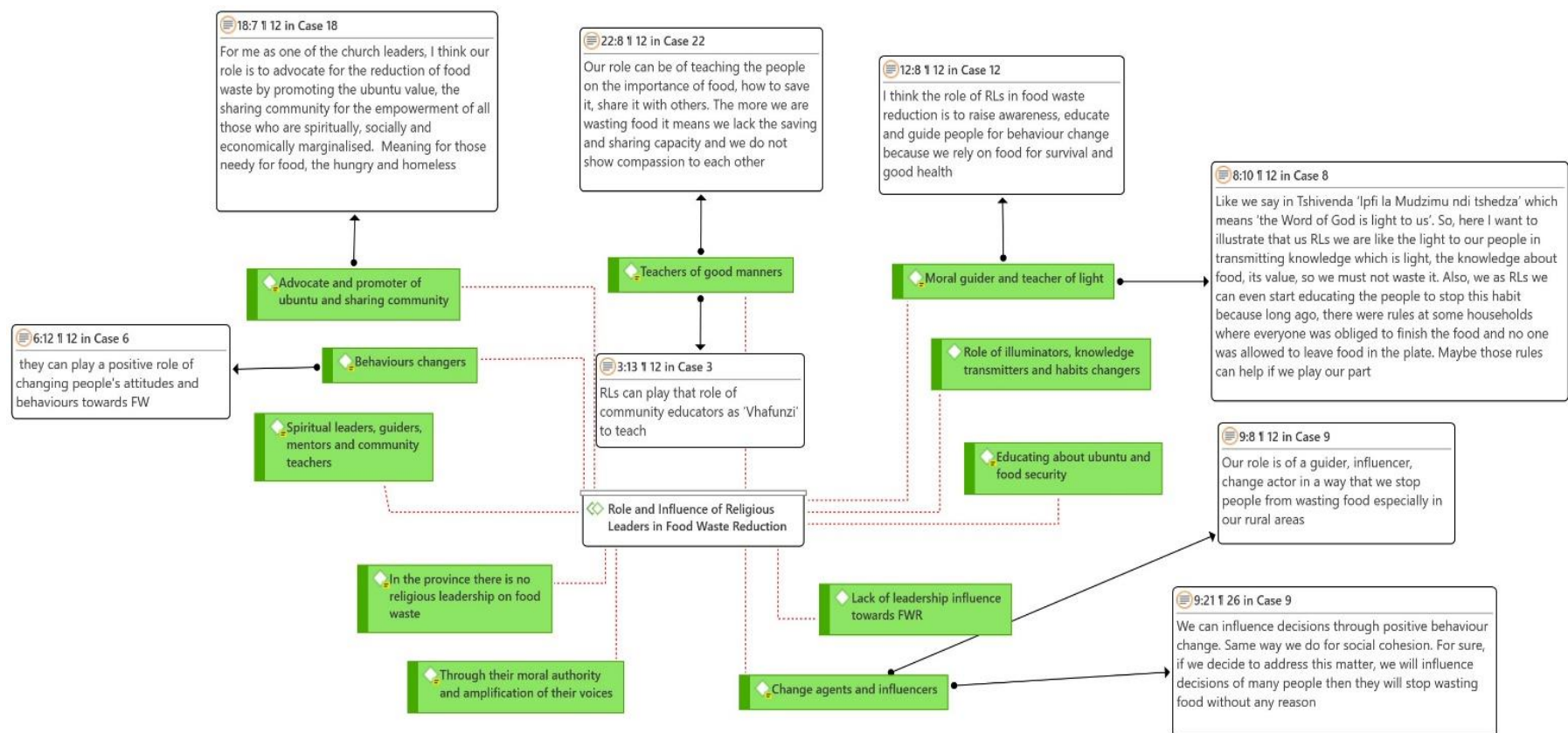


Figure 4.2: ATLAS TI Network diagram on Influencing roles of RLs in FWR

4.7 Challenges of RLs in imparting knowledge

Representing different communities, RLs explained their commitment by pointing out that FW is a serious and urgent problem in need of addressing within Vhembe District. The results of participants were consistent in showing that they recognised the problem and were willing to act to educate people to reduce food waste, with some interviewees describing their commitment to the FWR as a necessity. Unpacking the challenges faced by RLs, we refer also to the results from a study undertaken by Hearn *et al.*, (2024) stipulating that religious actors engage in various activities. However, there are only a minority of RLs that are highly engaged in those different types of materialization activities due to several challenges. These results coincide with the results of our study as well. Though able to play that crucial role, a majority mentioned that they are facing multiple challenges when trying to impart knowledge and encourage action on food waste reduction within their respective areas. However, a lack of leadership influencing role and a lack of awareness creation and education on FWR are the most important mentioned by the participants during the interviews. Figures 4.3 and 4.4 show sub-themes with quotes describing factors that make it difficult for RLs to effectively impart knowledge within the community in promoting FWR. The figures exhibit results associated with identified themes in the study area.

4.7.1 Lack of leadership influencing role

It was reported that there was a lack of technical expertise to address FW within the community. Whilst the RLs state a general lack of leadership and influencing role in the fight against FW; a few mentioned that they hope to take that leadership role once trained. A female pastor who is also a psychologist mentioned that there is a lack of leadership to advocate for and influence the decisions of the community about FWR around Thohoyandou. *“It is difficult to say because we are not yet advocating about FWR around Thohoyandou. Honestly, we are not leading by example regarding FWR within the municipality or province”* (P20). *“We lead by example in whatever we do well. But when it comes to FW reduction, it is new to me even to my other colleague pastors. But I hope we can do something”* (P6).

When asked about the leading role of RLs in FWR, the following participants indicated that:

“From what I know, none of us as RLs in Vhembe District is leading in FW reduction, unless it’s GBV, Crime and Social Justice. We really need that platform to stand up and lead the way because food is very important to us all. So, if we start leading then we can think of some strategies to reduce food waste in our community” (P8).

“What I know is that in Germany, I saw some RLs leading on this, but for us here in Venda not yet. Hopefully, we will do it in the future to brainstorm and caucus with others to come up with techniques to reduce food waste in our communities” (P9).

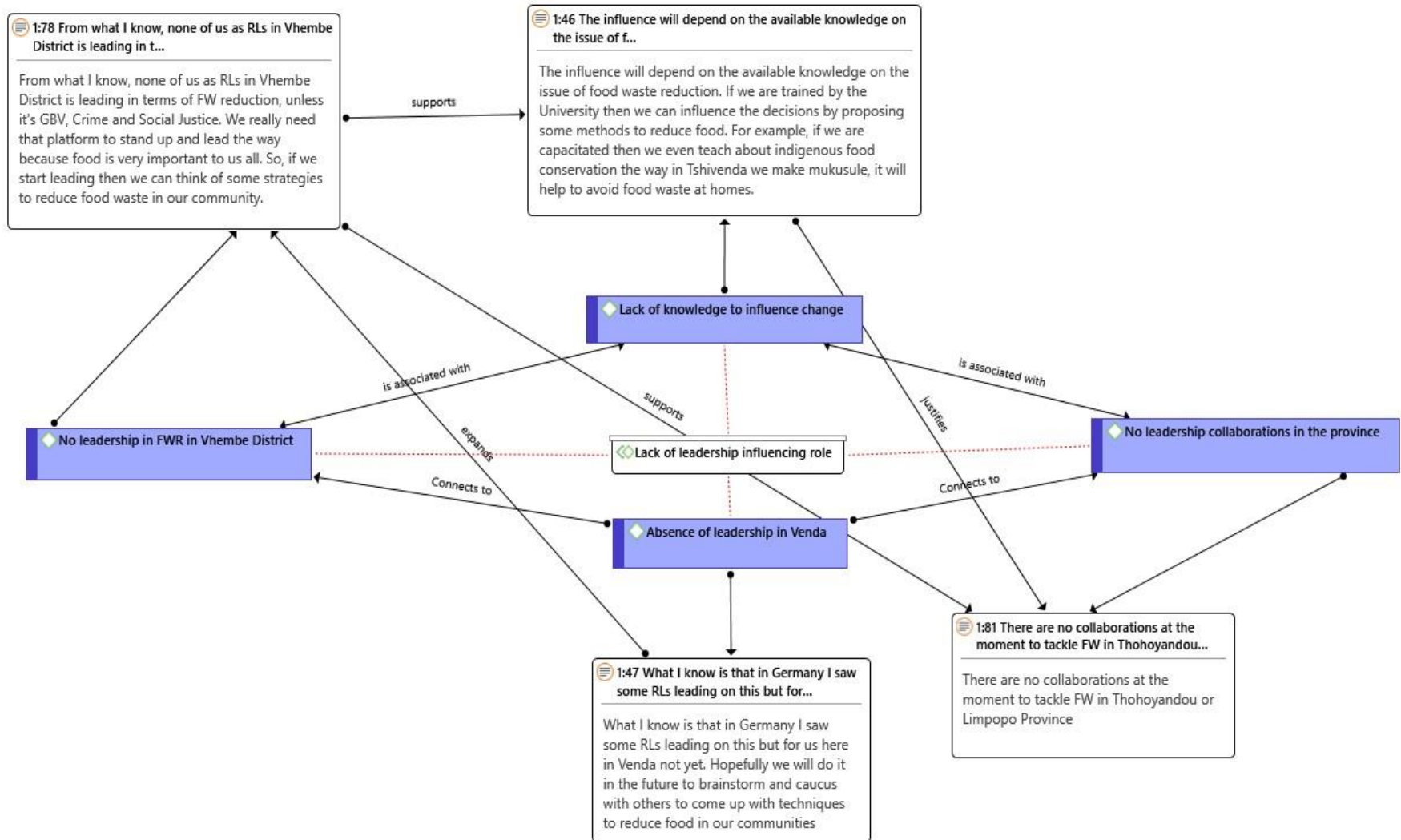


Figure 4.3: ATLAS TI Network diagram on Lack of leadership influencing role quotations

4.7.2 Lack of awareness creation and education on FWR

The study revealed that lack of awareness creation and education on FWR heavily impact RLs to play their influencing role. The majority of the RLs reported that they were not aware and lack proper information to empower people and communities with adequate knowledge and skills to participate in the wastage reduction process actively. This sub-theme had the most frequency of similar responses (16) from participants during the interviews. This was explained by the participant in the following manner.

Participants 6 and 7 said:

“I do not know how others are educating the people from their villages, but I am willing to be trained by you first to become an advocate to create more awareness. From our Thulamela Pastors Forum, we never advocated for FW reduction, but we can still do it if we are trained”.

As emphasized above by the two participants, this explained that the lack of awareness creation and education from RLs on FWR appears to be a meaningful challenge likely to prevent communities from understanding FW's ethical, environmental, and social implications. From our observation, whenever RLs begin to engage aggressively with the issue, they can inspire their congregations and other community members to take meaningful steps toward reducing FW, eventually contributing to the broader goals of food security, social justice, ubuntu as well as environmental sustainability. Accordingly, faith leaders can play a crucial role in raising awareness and promoting sustainable practices by addressing the knowledge gap, leveraging their influence, and integrating food waste reduction into their religious teachings and community programs. Figure 4.4 depicts a few quotes from participants on the network diagram on the lack of awareness creation and education.

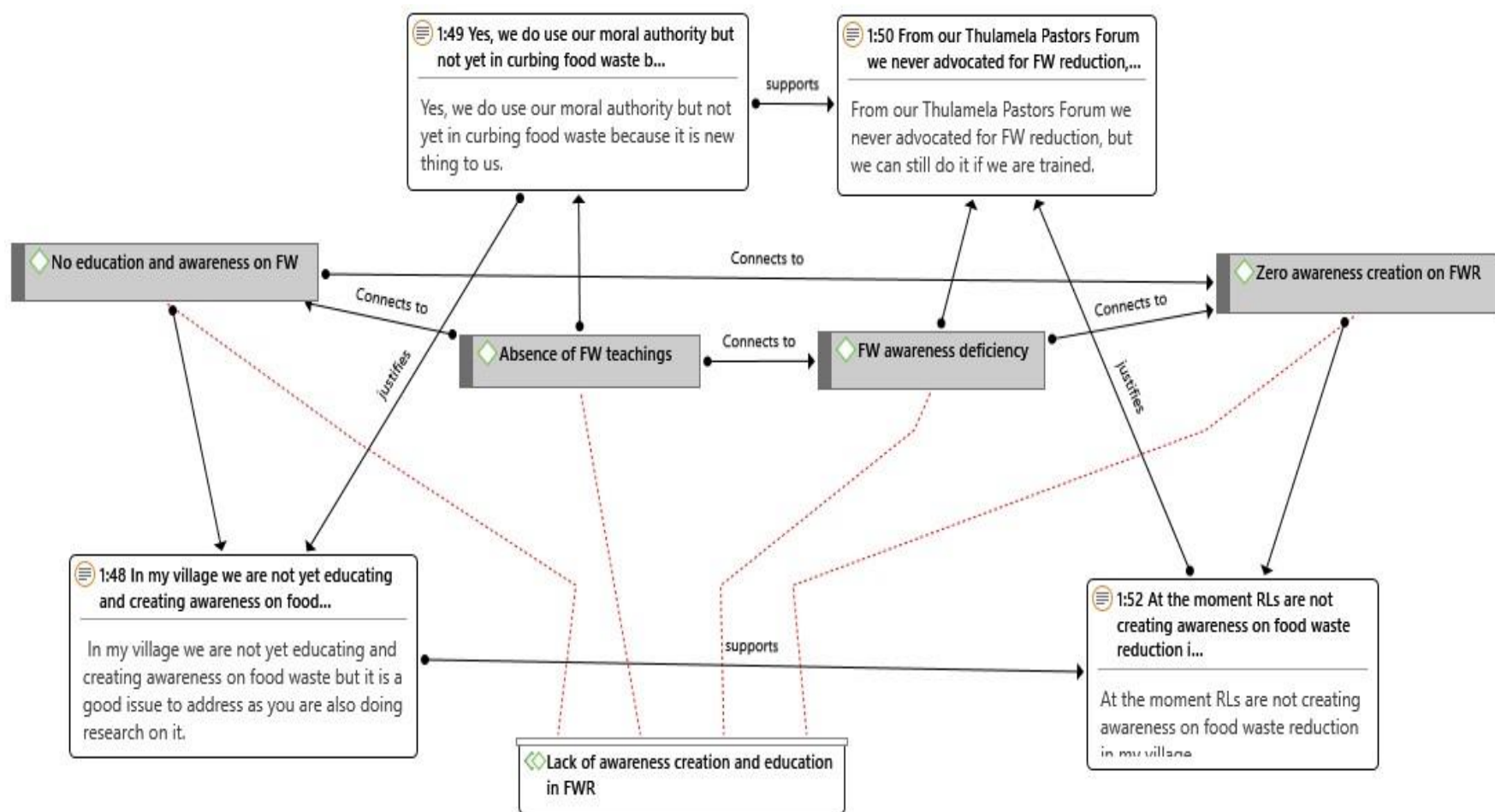


Figure 4.4: ATLAS TI Network diagram with quotes on Lack of awareness creation and education on FWR

4.8 Interventions to reduce FW

Results revealed the absence of proper education and awareness creation among RLs. Moreover, the results show a lack of awareness creation and education regarding FWR; while a future possibility to use different strategies and teaching behaviour change could increase awareness creation. This appears to hinge on the notion that education is key to empowerment, and thus, any circumstances that might empower them formally or informally will have the potential to accelerate the process within the community. Yet, FWR is societally relevant. For example, the following participants even stated, *"RLs are not taught, and also when they were trained, issues of FW never been in the curriculum. RLs need to be taught about FW ..."* (P1). *"Once we become organized with a structure that will focus on the issue of food waste, it will be relevant to partner with other stakeholders to get trained, capacitated, and become knowledgeable first then we can lead by example"* (P11). This could be the cause of the lack of awareness creation on FW issues in the district and the province. The network on education and awareness creation highlights some views of RLs during the interviews (Figure 4.5).

4.8.1 Education and awareness creation

Lack of awareness and education towards FWR is a catalyst for determining FW from household food consumption. For them to impart knowledge on FWR, they have to possess first enough knowledge on the issue. Thus, the study revealed that a majority of participants stressed that they require capacity building from the university so that they can be competent enough to create awareness and educate people. By empowering people and communities with knowledge, they will be capable of participating in the wastage reduction process for their communities' social safety and food security. Hence, a tailored-based solution to capacitate RLs is key to boosting the leadership influencing role to create awareness and education towards FWR. The following statement emanated from Participant 12 saying:

"I think the role of RLs in food waste reduction is to raise awareness, educate, and guide people for behaviour change because we rely on food for survival and good health. Religious leaders, in my humble opinion, can educate and create awareness on food waste reduction in front of the pulpit and other social events (Imbizo)".

A selection of quotes on awareness creation and education interventions is displayed in Figure 4.5.

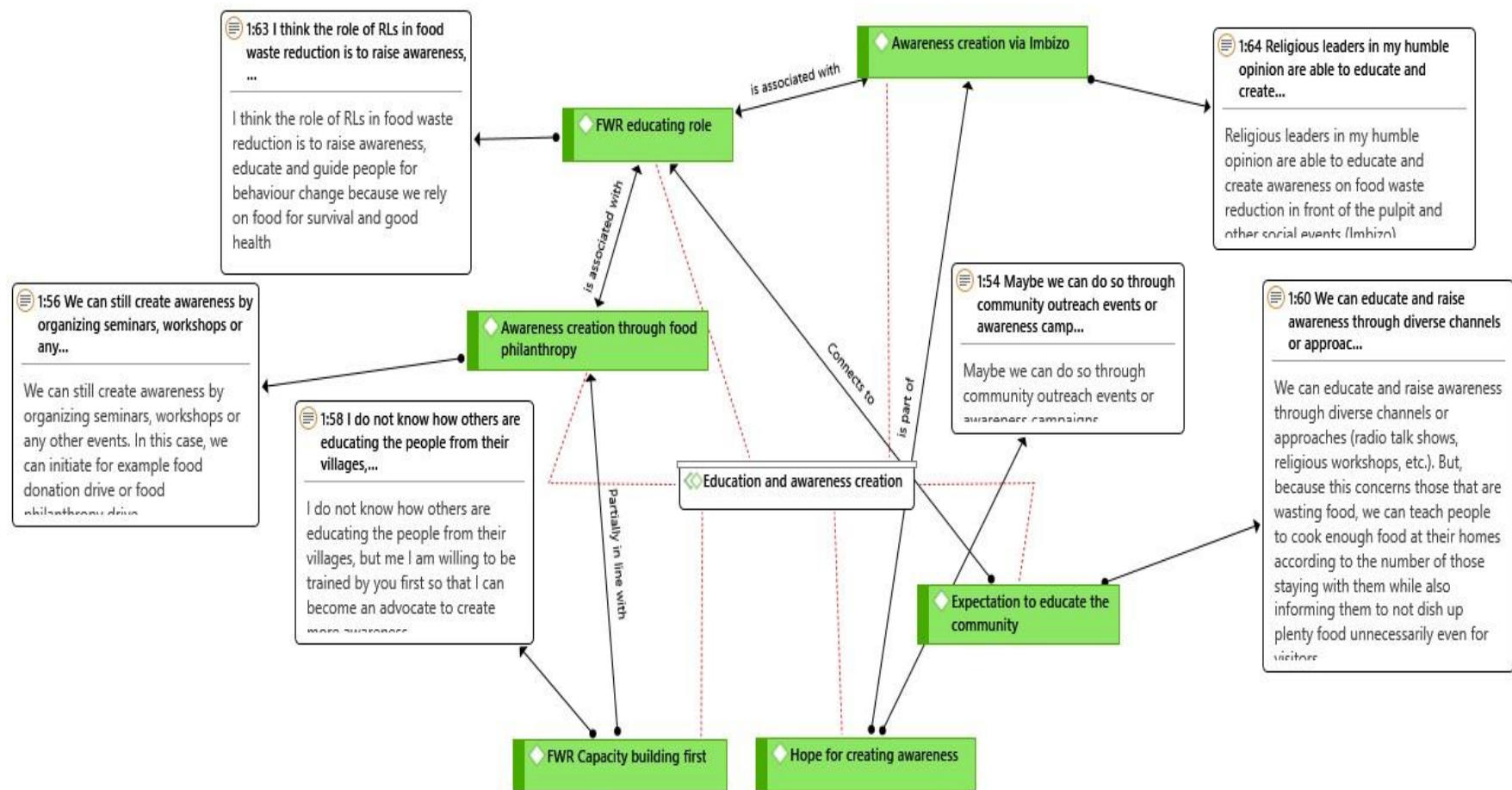


Figure 4.5: ATLAS TI Network diagram on awareness creation and education intervention

4.8.2 Behaviour changes for FWR

Behaviour changes for FWR also emerged as a determinant of interventions to reduce FW. Behaviour change influence, positive behaviour changes, and positive role for behaviour change were crucial factors pre-requisite to the interventions to reduce FW. In this study, most participants acknowledged their strong potential to drive change at the grassroots level through different faith-based initiatives. Tembo *et al.*, (2024) argued also that religion and culture play a substantial role in shaping the dietary preferences of rural Malawians. This means that RLs can change and shape the behaviours of the people for the reduction of FW using religious teachings. On the issue concerning behaviour changes for FWR, the following participants 6, 9,11,12 &14 pointed out that:

“I think the role of RLs in food waste reduction is to raise awareness, educate, and guide people for behaviour change because we rely on food for survival and good health. Yes, some of us do influence them in a good way by telling them to change behaviours. We can influence decisions through positive behaviour change. The same way we do for social cohesion. For sure, if we decide to address this matter, we will influence the decisions of many people, then they will stop wasting food without any reason”.

The network diagram on behaviour changes for FWR interventions is below represented in Figure 4.6.

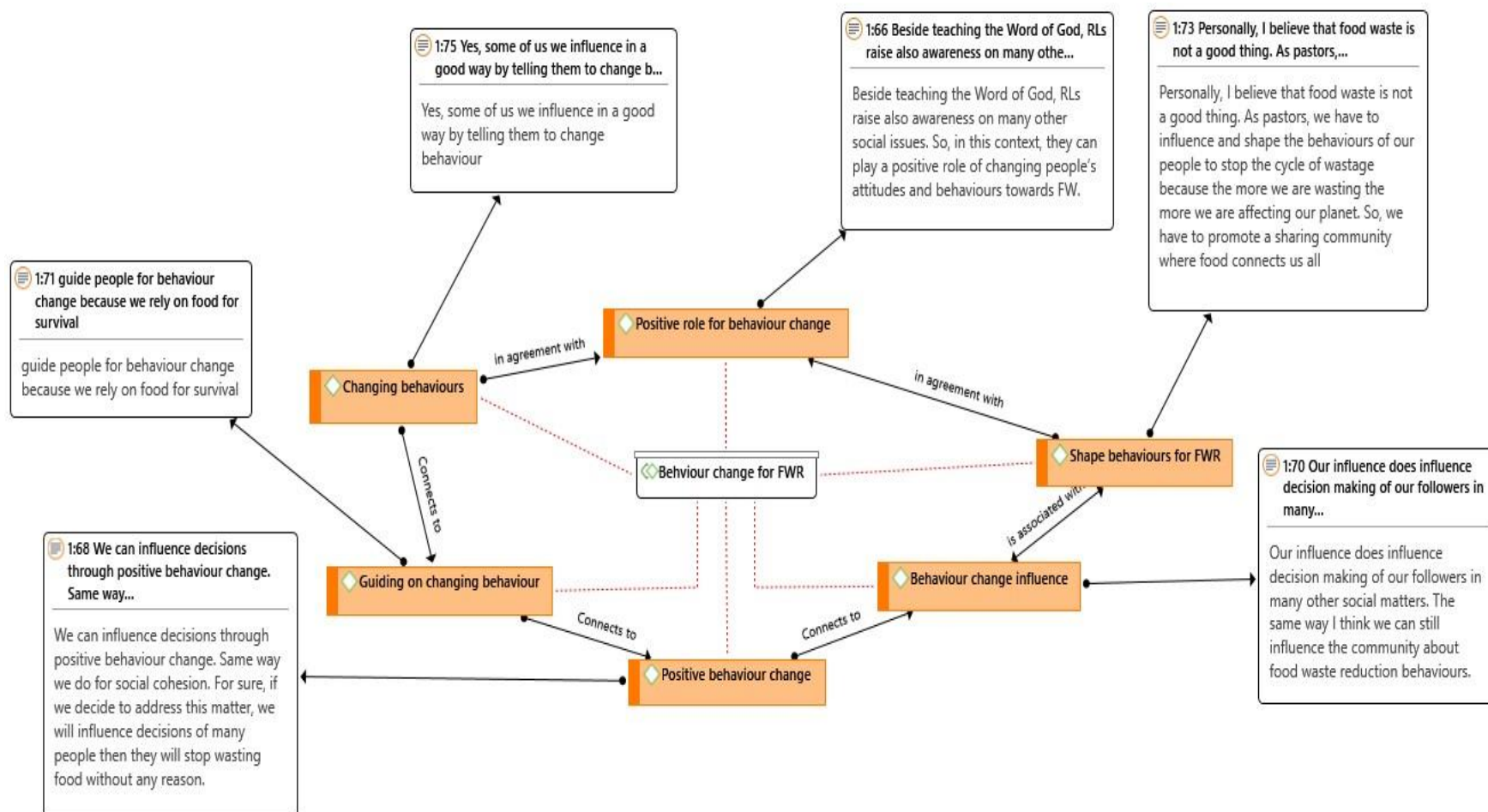


Figure 4.6: ATLAS TI Network diagram on Behaviour changes for FWR interventions

4.9 Discussion of Results

4.9.1 The role of understanding factors contributing to FW

Understanding factors contributing to household FW was significant to exploring the role of RLs in imparting knowledge on FWR because food should always be valued rather than wasted in South Africa. The study shows that there was a significant understanding of FW among RLs interviewed, echoing the notion of understanding factors contributing to FW. This was necessary as the role of religion in shaping different human consumption behaviors with the effect of religion and religiosity on food consumption depending on how believers tend to follow the teaching of the different types of religion have been studied (Bonne *et al.*, 2007; Siyavooshi *et al.*, 2019; Elhoushy & Jang, 2020; Hassan *et al.*, 2022). So, in this study, it was revealed that RLs had to understand FW, including the factors leading to FW, so that they can be able to convey messages as believers listen to them. This is because the behaviour of consumers is influenced, according to Cummins (2018), by values and beliefs, which in turn are shaped by their cultures.

Results found that the majority of RLs possess an adequate understanding of factors contributing to FW. An understanding of factors contributing to FW was required to change their FW behaviours and the factors that underpin these choices (Smith, 2020). They also indicated that they could play a role in understanding what makes people unnecessarily waste food within their communities. Therefore, it is only through understanding various factors (values, behaviour, community dynamics, systemic challenges, etc.) that contribute to FWR that RLs can effectively guide their congregations and the community in making meaningful, lasting changes. This was in line with findings by Siyavooshi *et al.* (2019) that RLs could activate and/or cultivate religious beliefs that motivate FWR. Distinctively, the current study established possession of adequate understanding as a foundational basis to apply the role of religiosity. This is because the role of religiosity in reducing FW could be used to develop awareness messages about FW that could be communicated in religious settings (Hassan *et al.*, 2022). Meantime, the country continues to waste about tonnes of food on a year-to-year basis due to careless behaviour and negligence.

Additionally, by acknowledging that religious and spiritual leaders have an enormous powerful impact on local communities as their statements touch on the beliefs of their followers often extracting examples from sacred books as opined by Abumoghli (2018); RLs should first make sure of playing that role of understanding factors contributing to FW then they can be able to tackle this phenomenon by engaging with those disposing food deliberately and carelessly. Results indicate that people dispose of food deliberately as confirmed by RLs. The results of this

study, as well as the Waste and Resources Action Programme (WRAP) (2018) and De Bruin *et al.* (2019) support the views of RLs that people are frequently disposing of food deliberately and carelessly. Thus, it is observed in this study that those who waste food lack compassion and empathy. This also explains the reason for the higher amount of FW in the district and it is one of the major challenges for household members.

The findings agree also with Jones-Garcia *et al.* (2022), who revealed that there is little useful knowledge about where FW occurs in the home, and few useful mitigation strategies beyond education and purchasing campaigns. At the same time, 59% of UK households claim that they throw away hardly any food according to recent surveys, indicating a disagreement: despite the large amount of food that is discarded (Cox & Downing, 2007; Quested and Luzecka, 2014). This study revealed that most people tend to waste food carelessly and deliberately at their homes, parties, Christmas, new year's, religious events, funerals, birthdays, as well as community gatherings. Therefore, behaviour change becomes difficult due to this gap between perception and reality, these figures from the UK and the views of RLs in South Africa highlight a gap between personal awareness and an acceptance of households' responsibilities on this issue.

4.9.2 Influencing roles

In this section, the aim was to identify the leading roles that RLs play in influencing FWR. Taken simultaneously, the results of this study reveal the perceived roles of RLs in imparting knowledge on FWR in Vhembe District. Participants interviewed agreed that they have various roles to play towards the promotion of FWR though not yet playing them. It has been demonstrated by the qualitative results of this chapter that RLs as important stakeholders in sustainable development, are not yet playing a significant role in promoting FWR due to some challenges identified within the communities where they operate.

The findings report that RLs are seen as *moral and spiritual guides, teachers of light and good manners, change agents and influencers, ubuntu and food security educators, behaviour changes and illuminators, as well as voice amplifiers*. Although faith prohibits FW, the odds of wasting food among respondents as Christians were still higher. In fact, Christians were asked not to waste any food, but to share it with those vulnerable, less fortunate, and poor. This is clarified in the following verses of the Holy Bible: *"When they were filled, He said unto His disciples, gather up the fragments that remain, that nothing be lost (John 6:12)"*. This was also backed up by Pope Francis who claimed in 2013 that *"throwing away food" is like "stealing from the table of those who are poor and hungry"* (Hassan *et al.*, 2022).

Research by Sanniti *et al.* (2024), reveal similar findings that a majority of FBOs are not presently engaged in explicit FWR programmes. Yet, the findings of a study conducted by Le Roux and Palm (2021) also reveal in contrary that working with faith-based actors for violence prevention has leveraged their unique spiritual capital in numerous ways by highlighting the value of dialogue that uses existing mechanisms such as mosques, churches, sermons, prayers and engage them in the initial diagnosis of issues and in the development of tailored materials for the intervention. So far in South Africa, there is no study reporting most RLs and FBOs having formal FWR programmes in place aiming to ensure food security. This is evidence established that through collaborative and partnership efforts as stipulated in SDG 17, RLs can play that expected important role in helping the community (household) members secure food through the initiation of FWR programmes. However, the results showed that not all RLs were aware in some instances of the influencing roles they could play if engaged in the fight against FW.

4.9.3 Challenges of RLs in imparting knowledge

Lack of leadership influencing roles and a lack of awareness creation and education on FWR were identified as the top challenges facing RLs to impart knowledge for FW reduction in the study area. The discussion below elaborates on these findings. Interestingly the results of the study confirmed similar findings from Hearn *et al.*, (2024) stipulating that most religious actors in some areas of Germany and Switzerland are facing challenges of not engaging in similar environmental programmes such as climate change due to a lack of resources, both financial and human; but they consider it important to address. Related results from Yetkin Özbük and Coşkun (2020) identify also insufficient knowledge, skills, and awareness as underlying factors that can result in FW. These findings clarified some problems and challenges facing RLs and demonstrated that regardless of their strong potential for some faith-based initiatives to drive change in their operating areas, there are various multifaceted factors hindering the successful implementation of such programmes.

Other challenges that may affect and prevent the implementation of FW or environmental sustainability within developing countries are the lack/inexistence of finance to promote sustainability, the absence of trained personnel, and the nonexistence of knowledge, awareness, practice, and interest in sustainability to achieve overall sustainable development. This suggests that FWR or other environmental sustainability barriers can be overcome when governments and other agencies are able to financially support these projects (Debrah *et al.*, 2021) in rural areas,

train RLs to improve on FW and sustainability knowledge, and maintain strong partnerships. These are some of the similarities that validate the findings, while the differences show the importance of using different data collection techniques to answer an objective. This helps to obtain the depth of data that improves the reliability and validity of the study via the use of the triangulation method as explained by Hussein (2015). Therefore, the challenges of RLs may be common or similar because most of them are in the same geographical region or based in key remote areas.

4.9.4 Interventions to Reduce FW

This result aligns with Pillay (2012), who suggested that to shape South Africa, RLs require certain skills to make a more fruitful impact and make a significant difference. This call for pastors to be trained to address the needs within their respective communities demonstrates how best these leaders will play a crucial role in interventions to reduce FW in the light of the gospel. Adding to this, the findings of this study are in line with the findings of a study conducted by Le Roux and Palm (2021) that documented the critical role of equipping faith-based and traditional actors to first change their own mindsets and then be a part of challenging social norms. This could also explain why RLs have great potential to tackle FW and cannot be detached from this problem that affects not only South Africa but the entire planet. Adding to this, the findings from Botchway (2001) confirmed that education can only contribute to poverty reduction in a sustainable way if the dimensions of participation and empowerment are included in community development projects. Thus, knowledge, skills, and other supports can play a decisive role in reducing FW for RLs.

In line with Elhoushy and Jang's (2020) findings, awareness messages about FW could be useful to educate people on the consequences of FW in different religious settings (Weekly and Sunday sermons) in Vhembe District. Thus, there is hope that education and awareness creation, as well as behaviour changes for FWR, are key to FWR interventions. Pasha *et al.* (2020) lament the provision of education and awareness raising to communities regarding the impact of FW is helpful in reducing FW. In this case, they encourage instilling the spirit of Ubuntu in both the African and Western cultures and also encourage the eating of leftovers or sharing of food with the neighbours or the needy. The UNEP (2021) considers addressing FW as a priority issue for tackling hunger, environmental degradation, and climate change. Interestingly the results of the study confirmed the findings of Sanniti *et al.* (2024) that addressing FW is critical to food security, economic prosperity, and climate resilience, especially for African nations that lose their food supply annually. Behaviour change drive education, and awareness creation will enable RLs to

understand FW trajectories and intervene effectively. Thus, RLs in rural areas of Vhembe District may continue to fail in playing their perceived influencing roles if challenges are not addressed and other remedial measures that enable efficient and effective FWR are not sought. As explained by Sanniti *et al.* (2024), a validation with practical guidance on how FWR could become part of the overall goal of RLs, which will depend on cost-benefit analyses to identify when finance can be self-sustained and where grants would be necessary to bring about change is needed.

4.10 Conclusion

This study contributes to the literature on FW in South Africa and internationally. It might appear difficult, but not impossible. Furthermore, hope theory is the foundation that drives us, that it is possible to make things happen with RLs. However, while the influence of religious values on FW behaviours requires more clarity, this study is among the first of its kind to explore the potential and actual contributions of RLs to FW reduction in South Africa. By virtue of the assets they manage through interfaith collaborations, RLs hold significant potential to contribute to FW reduction. This is evidenced by the early examples of their previous implication in similar programmes.

Referring to the South African concept of Ubuntu, which is about the interconnectedness of humanity (I am because you are), this study, at some point, promotes the Ubuntu value in the quest to reduce and reduce FW. Thus, as Africans, we should be creating our own model of development, our own wisdom and our model of educating citizens to make informed FWR choices because there is no real level playing field in many countries. Adding to this, as the global statistics report that Africa is the continent with severe food insecurity, hunger, and malnutrition, we have to uphold our Afrocentric ethics and leadership for change.

In conclusion, the roles of RLs in imparting knowledge on FWR might differ depending on the position held and the religious community represented. Therefore, as FW is perceived as a form of social injustice due to its negative impact on food security (Dhir *et al.*, 2020; Sharma *et al.*, 2021); this study recommends that stakeholders involved in the fight against FW and hunger, advocacy and promotion of food security, FWR and rights to food should invest more on capacity building among the RLs in the study area, the Limpopo Province and across the entire South Africa. Further, there is a need for government involvement to train and mobilise RLs to use their influence towards FWR by 2030 to meet the Sustainable Development Goal (SDG) 12.3. Eventually, by fostering greater collaboration and addressing these recommendations, South Africa can immensely harness the full potential of its RLs to contribute significantly to the national goal of reducing FW, thereby advancing the country's goals for a sustainable food system transformation. The following chapter discusses the perceptions of religious leaders in the fight against food waste.

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CHAPTER 5: PERCEPTIONS OF RELIGIOUS LEADERS IN THE FIGHT AGAINST FOOD WASTE

Abstract

Religious leaders are respected and play a key role in influencing community decisions in different situations or crises. The influence of religiosity on environmental concern and intentions to reduce food waste in major religions such as Islam and Christianity have been widely examined. However, our understanding of why religious people wastes food remains limited. This opportune qualitative inquiry is the first to determine the perception of RLs in the fight against food waste in Vhembe District. It aims to uncover how religious leaders in the Vhembe District of South Africa perceive their role in the fight against food waste within their community. A semi-structured interview guide was used to gather data from 22 religious leaders. Using Atlas.TI, thematic analysis of the transcribed data was executed and showed that religious leaders perceive their role in the fight against food waste as *community influencers* with a caring obligation to help household members in rural areas because of the possible food insecurity and hunger associated with the wastage. It also revealed that RLs face barriers to promoting food waste reduction. The issue of the relationship between Religious Leaders and FWR is a crucial topic, not least because the influence of the former may be crucial in achieving the latter. This study highlights the important role that religion can play in reducing food waste to achieve the SDG 12 as well as some of the pitfalls. It combines social science, agriculture and theological approaches with 'spotlights' on particular topics from practitioners in the field to underscore the fact that religion matters for sustainable development and needs to be taken seriously. This study, therefore, brings a fresh approach for academics, policymakers, and practitioners interested in the relationships between religion and sustainable development.

Key Words: Food security, Food waste, Perception, Religion, Religious leaders, Rural sustainable development.

5.1 Introduction

This chapter focuses on the results which are based on the objective 2 of the study and its related questions. It follows on the previous chapter that focused on the “Exploration of the Role of Religious Leaders in Imparting Knowledge on Food Waste Reduction”. This chapter presents research results on the perceptions of Religious Leaders in the fight against food waste. This chapter will begin with a brief background, a description of the methods used, the data analysis, the presentation of the results, discussions, and a brief conclusion.

5.2 Background

The 2021 FW index report reveals that HFW accounts for up to 65% of food waste (UNEP, 2021), confirming that the amount of HFW is colossal (Ghaziani *et al.*, 2022). In the same perspective, Obuobi *et al.* (2024) stipulates that FW has societal repercussions that affect food security. Empirical and social scientific research has recently documented that food waste has significant environmental, economic, and social costs (Geislar, 2018). Up to now, FW has remained a complex issue with a socio-cultural and religious artifact. Thus, recent studies have been conducted empirically to understand how religious dynamics and the role of faith communities and actors are crucial for sustainable development (Tomalin *et al.*, 2019). Baig *et al.* (2022) stressed that in Saudi Arabia FW is one of the prime issues threatening food security. Moufakkir & Auzun (2024) revealed that FW is a major sin in Islam. The UNEP reported that in 2019, 61% of the FW generated came from households (UNEP, 2021). Yet, the food that is wasted could be used to combat hunger or malnutrition (Parfitt *et al.*, 2010).

As an essential human need, food is very important for our survival and performance as individuals (Jarjusey & Chamhuri, 2017). Lin *et al.* (2022) opined that it is an important commodity, as it is one of the major sources of our survival, hence factors like "food loss" or "food waste" should be brought under serious consideration and addressed to minimize their occurrence and the impact that they happen to incur on not just humans but the overall balance of the ecosystem and the environment. Food estimated globally at 1.6 billion tons is wasted annually (Zahra *et al.*, 2024), and more food approximately (222 million tons) has been wasted by individuals in developed countries. These individuals are wasting more than the entire food production in sub-Saharan Africa (230 million tons) (Gustavsson *et al.*, 2011; FAO, 2019a; Ishangulyyev *et al.*, 2019). This amount is estimated to rise to 2.1 billion tons by 2030 (Hegnsholt *et al.*, 2018). Conversely, in 2022, between 691 and 783 million individuals globally faced starvation or malnutrition because of inadequate or constrained food resources (WHO, 2023). Research

conducted by Yahia *et al.* (2019) revealed that food wastes could be solid, semi-solid, or in liquid forms; solid wastes mainly include the food items themselves, parts of the food items, or other parts or items associated with food items, which are usually rich in starch, cellulose, lignin, and monosaccharides.

Tomalin *et al.* (2019) stipulate that many religious leaders have been also involved in development policy, initially by adopting and heralding the Millennium Development Goals (MDGs), and more recently through a commitment to join the global collaboration around achieving the new Sustainable Development Goals (SDGs) (Tomalin *et al.*, 2019; Young, 2019). In general, studies into the role of RLs in FWR are extremely limited in literature. Even for cases where religion is recognised explicitly as an important factor influencing behaviour in waste management (Mohamad *et al.*, 2012), investigations were restricted to minor inclusion in survey questions, particularly for socio-demographic characterisation, and with no or limited analysis. In this study, the role of RLs is studied because the majority of FW occurs at the point of household consumption.

The role of religion and the religious community in food waste reduction is thus double-edged. This may be a major reason for the dearth of literature on religious resources and particularly the role of the religious community in food waste reduction. In Africa, according to Oladipo (2016) and Johnson *et al.* (2018), recent statistics reveal that religion is widespread in the continent making it having the highest numbers of Christians, ahead of Latin America, Europe, and Asia. In South Africa, Christianity remains the largest religion (Stats SA, 2023). Further to this, the country is one of the most religious nations on the continent (Gallup, 2012). Its public space is deeply suffused with religious activities. According to the G20 Interfaith Forum (IF20), religious voices and institutions hold distinctive power and influence, yet they are often absent, muffled, or polarized at policy tables where critical decisions affecting people and planet are made (IF20, 2024).

Few studies have examined the influence of religiosity on environmental concern and intentions to reduce food waste in Islam and Christianity. However, our understanding of why religious people wastes food remains limited (Moufakkir & Auzun, 2024). Against this background, this study seeks to determine the perceptions of RLs in the fight against food waste in Vhembe District, South Africa. The researcher through this study aims to address this gap by bringing positive ideas and experience to RLs through interfaith collaboration and partnerships. And also, by drawing particularly on perspectives that reflect the world's most vulnerable communities affected by hunger and food insecurity. This is because food security is imperative for human survival with dignity.

5.3 Materials and Methods

5.3.1 *Research Design, sampling, data collection tools and procedure*

Detailed information on materials and methods are given in Chapter 3. However, in this chapter, in-depth one-on-one interviews with key informants were used for the collection of data with 22 religious leaders from South Africa. To execute the analysis of the data collected qualitatively, the Thematic Content Data Analysis was used for this chapter. The objective related to the qualitative phase was to determine perceptions of RLs in the fight against food waste in Vhembe District.

5.4 Findings

5.4.1 *Data Presentation*

The analysis yielded two themes, and nine sub-themes related to the second objective of the study. Albeit there is also a small proportion of RLs who, despite the main barriers challenging them, commit themselves optimistically to be involved in the future in the fight for FWR. Specific information about the results on the demographic characteristics of participants is presented in Chapter 4. Table 5.1 below shows that there are two main themes and nine sub-themes that emerged from the data collection. The main themes include perceived barriers to the promotion of food waste reduction, and perceived strategic views to fight food waste. All themes and sub-themes are presented succinctly in the following section.

5.5 Perceived barriers to the promotion of food waste reduction

The exploration of roles, influence in the community, and views of RLs are required to determine the perceptions of RLs in the fight against food waste in Vhembe District. During the interviews, the researcher aimed at finding out to what extent RLs were involved in the fight against FW. The aim of this section was to identify the major perceived barriers to the promotion of FWR. Two main barriers were identified by most participants (17). Table 5.1 below shows a tabular representation of themes and sub-themes that emerged from key participants.

Table 5.1: Tabular representation of themes and sub-themes that emerged from key participants (Source: Author)

Main Themes	Sub-themes
Perceived Barriers to the promotion of food waste reduction	Lack of capacity
	Lack of community engagement
Perceived Strategic views to fight food waste	Perceived views to fighting FW
	Provide Food Waste Reduction Education
	Spirituality and Sustainable Development
	Showing direction to the people and leading on FW issues
	Hope induction
	Use of available networks
	Advocacy

5.5.1 *Lack of capacity*

Lack of capacity was one of the major barriers to the promotion of FWR by the participants. According to the participants, it is a challenge because up to so far, none of them have been capacitated on this issue. Most of them lack proper knowledge on food waste. RLs claimed that they lacked the capacity and financial resources to address and deliver on the issue of FWR initiatives. Although they acknowledged that wasting food is not good, many participants agreed that there is a lack of considerable capacity regarding the magnitude of food waste in their communities or the environmental and social implications. However, some are still influenced by their cultural attitudes and habits as well. This might translate that several causes or factors contribute to this lack of capacity among RLs across the country. Illustrative quotations on lack of capacity from participants are shown in Table 5.2.

Table 5.2: Lack of capacity by participants

Theme	Illustrative quotations	Frequencies by participants (N, %)
Lack of capacity	<i>“Religious leaders lack enough knowledge and experience with regard to food waste reduction” (Male participant).</i> <i>“If we are fully empowered and start using multifaith collaborations, this will make huge impact around Venda. We can create food depots where people will come to donate food to share with orphans and the poor” (Female participant).</i> <i>“In my opinion, we can only lead by example if we are capacitated about this matter. Once we become organized with a structure that will focus on issue of food waste, it will be relevant to partner with other stakeholders to get trained, capacitated and become knowledgeable first then we can lead by example” (Male participant).</i> <i>“From our Thulamela Pastors Forum we never advocated for FW reduction, but we can still do it if we are trained” (Female participant).</i> <i>“The influence will depend on the available knowledge on the issue of food waste reduction. If we are trained by the University then we can influence the decisions by proposing some methods to reduce food. For example, if we are capacitated then we even teach about indigenous food conservation the way in Tshivenda we make mukusule, it will help to avoid food waste at homes” (Male participant).</i>	5 (23%)

5.5.2 *Lack of community engagement*

Lack of community engagement in the fight against FW was identified as one of the barriers. The researcher is of the view that this lack of engagement with the community among RLs in the district can be attributed to a range of factors such as lack of appropriate knowledge on the issue, ignorance about FW, and no appropriate funding available to advocate against FW. Some participants said that addressing FWR could be done by advocating for the poor during community events as they often engage in spiritual matters, and other social issues affecting the community. The results of participants were consistent in showing that in the entire district, there has not been any kind of engagement with the community with regards to FW, though they acknowledged that FW is a serious issue that requires their implication as leaders of faith. Table 5.3 highlights illustrative quotations from some respondents on lack of community engagement.

Table 5.3: Lack of community engagement by participants

Theme	Illustrative quotations	Frequencies by participants (N, %)
Lack of community engagement	<i>“Around Thohoyandou, there are no religious leaders that are actually working on food waste reduction” (Female participant).</i> <i>“Religious leaders can engage with community through advocacy work or community Imbizo to address this issue. But so far we are not engaging the community about food waste” (Male participant).</i> <i>“So far, I did not hear about RLs that are engaging the community on food waste reduction. But if we are empowered to do so, it will impact the lives of many by breaking the cycle of hunger” (Female participant).</i> <i>“I am not aware of any existing engagement with the community on this issue. However, the municipality as local government can also organize such engagements and invite us RLs to speak. Also, during any engagement, we have to visualize food which is wasted to them so that they can see how serious this is about” (Male participant).</i>	4 (18%)

5.6 Perceived strategic views to fight FW

The participants of this study were asked to comment on their perceptions in the fight against food waste in Vhembe District. Their perceived strategic views were seen as motivation factors that can influence their abilities to provide effective leadership towards FWR. Various responses were given by the participants in this study. The following sub-themes outline various perceptions of RLs to fight FW.

5.6.1 *Perceived views to fighting FW* (Strategies to reduce FW)

Participants mentioned that their views highlighted are regarded as their perceived strategies to help reduce FW within the communities under their leadership because FW is truly a serious issue ignored by them and many other community leaders. As inspiring leaders, they believe that they can strive to reduce FW in homes, institutions, and communities using their blended spiritual teachings and instilling religious norms. It was clearly articulated during the interviews that the perceived views to fight FW meant simple methods to use in the quest to cut down the magnitude of FW often disposed deliberately and carelessly by concentrating on prevention, redistribution, and more efficient use of resources from the local level to the provincial and national level. These reduction methods will be religious-led initiatives in partnership with other relevant stakeholders. Some participants expressed the following views:

“Through active engaged leadership roles within their communities, RLs can develop strong interfaith collaborations and partnerships to address the food waste issue through networks that are beneficial for the community. This can help collect more food to be donated to others. RLs influence remain vital regarding the shaping of decisions on food waste reduction among community members while preaching”.

(Participant 8)

“What I know is that in Germany I saw some RLs leading on this but for us here in Venda not yet. Hopefully we will do it in the future to brainstorm and caucus with others to come up with techniques to reduce food waste in our communities. We can partner with other stakeholders to tackle food waste through initiatives such as food philanthropy to minimize the magnitude of waste. I hope food philanthropy will eliminate hunger and food insecurity”.

(Participant 9)

5.6.2 Provide Food Waste Reduction Education

Three of the participants indicated that the provision of FWR education is an essential element in the fight against FW. Participants viewed this as a strategy to combat FW; because the lack of education limits the capacity of individuals and communities to initiate and manage their own development. Adding to this, providing education is a good strategy that will create new diversified skills because RLs are often influential at community level, even though in some communities their influence has weakened due to some reasons. The provision of FWR education at the community level is illustrated by participant 5 who indicated that:

“I think we can influence and shape the decisions of the community if we follow a training or a FWR Curriculum that will empower us to be able to empower also the community. Through workshops, interfaith collaborations or setting up our own food gardens to teach them the value of food and the reasons for not wasting this valuable resource and gift from God. In our tradition, we dry some food (vegetables) called mukusule. We can teach this technique to conserve food at home”.

Furthermore, three participants mentioned that RLs are willing to play influential roles in the community by partnering with training institutions that can provide FWR training to them then they will be able to empower community members the same way they provide emotional, spiritual, and physical resources to people in the community. They also recognised that a poorly educated person or population cannot fully contribute to or drive development efforts whether in rural or urban areas. Teaching community members will shape negative social norms by allowing the emergence of religious norms and positive behaviours to reduce FW. Another key issue that emerged was the FWR curriculum that was never given to RLs to enable them to empower the community, this is seen as better than nothing. The provision of FWR education is further supported by the quotes below:

“In my view RLs can engage their rural villages on food waste issues by picturing different food being wasted through community networks, FW seminars, FW Advocacy Sessions, etc. By doing so, people will regain conscience to do the right thing rather than to waste because they spend money”.

(Participant 9)

“I am part of the Thohoyandou Victim Empowerment Programme (VEP) Forum because I promote the empowerment of victims of abuse. So, I wish I can partner

with you from the University of Venda through your research to promote food waste reduction”.

(Participant 6)

“I think it is the right time now that community FWR be taught in our churches, schools, and universities for early preparation of all our community members”.

(Participant 12)

5.6.3 Spirituality and Sustainable Development

Achieving the ambitious Agenda 2030 of the UN with all its 17 SDGs requires full consideration of religion in every aspect of development. Thus, globally, it is acknowledged that religion is embedded in every expression of human culture. Religion continues to be a major influence for the vast majority of people in the world today. So, it came to light during the interviews that if we are to achieve the ambition of the Agenda 2030 with the 17 SDGs, it is essential to consider religion and its actors in every aspect of development while also understanding that wasting food could be viewed as a spiritual issue. As custodians of spiritual teachings, they believe that they can encourage community members to live with mindfulness and gratitude for the abundance in their lives, and to be conscious of how their choices impact others, especially those poor and most less fortunate. It was also noted that spirituality is helpful to avoid wastage. Thus, abiding to daily spiritual practice might change people’s lifestyles and demonstrate their commitment to social justice, equity, and sustainability in Vhembe District. Spirituality and sustainable development among the participants are signaled mostly by words like ‘preaching to them’, ‘positive attitudes’, ‘spiritual teachings’, ‘spirituality’, and ‘sustainable lifestyles’. Perceived strategic views to fight FW by participants on spirituality and sustainable development are depicted in Table 5.5 below.

Table 5.5: Perceived strategic views to fight FW by participants on spirituality and sustainable development

Perceived strategic views to fight FW	Participants
<i>"We can influence their decisions by preaching to them about what they could do to reduce the amount of food wasted and showing them positive attitudes that will bring them to good senses of sharing".</i>	P16
<i>"By not wasting food myself and leading by example. Also, we can inspire the community with our spiritual teachings and authority to adopt some sustainable lifestyles that will help to reduce food waste at home".</i>	P17
<i>"Many of us never thought that it was a serious problem, but now, I am able to realise that we are not doing justice to the poor and those hungry. Christ our master recommends us to feed the hungry but we are busy wasting food, including the big supermarkets that sell food to us. I agree that it is a common challenge affecting us all, through interaction and partnerships, we can effectively work towards the reduction of this phenomenon using our spirituality. The Interfaith collaboration can make great impact in tackling this problem in order to reach also the SDGs and our National Development Plan by 2030".</i>	P18

5.6.4 Showing direction to the people and leading on FW issues

In addition to spirituality and sustainable development, another important element to ensure the effectiveness of their role is showing direction processes that allow the necessary adjustment of community members to increase the chances for reducing FW at home. Showing direction to the people falls as well within the responsibilities of RLs as they indicated the need to start leading on FW issues in the study area. So, they can promote ethical values and other positive values such as food sharing, food philanthropy, ubuntu, and other religious norms that can guide them to tackle FW issues within their communities.

“Our conduct must show the direction and advocating about it in the pulpit as pastors we should lead by example; even doing posters during the church conferences, etc.”.

(Participant 1)

“Definitely, if we use that authority, it will help guide the people and curb food waste in our respective communities. We can inspire action and positive changes to promote sustainability and food justice”.

(Participant 10)

“In my view RLs can engage their rural villages on food waste issues by picturing different food being wasted through community networks, FW seminars, FW Advocacy Sessions, etc. By doing so, people will regain conscience to do the right thing rather than to waste because they spend money”.

(Participant 9)

5.6.5 Hope induction

The RLs stated that inducing religious hope in FWR is helpful as a strategy to tackle this phenomenon. Their hope is based on future collaborations and engagements for the change they expect to see. Also, it is like a sort of encouragement to the community to be conscious of their acts and actions. Further, they must understand that God has placed us on this earth for a purpose of caring and helping one another to show that we have love. By doing this everything will go well, and we will be united as people of faith and foster social cohesion. Khalil *et al.* (2022) mentioned that hope is a determinant of reducing food waste. This is because RLs can influence the community and its social norms by using hope as an orientational motivator. Under this sub-

theme, hope induction among the participants is mostly indicated by words like ‘hope’, ‘hoping’ and ‘maybe in the future’, as they are the building blocks of optimism that lead to actions. Participant 22 highlighted that:

“I hope we can collaborate with different churches and other religions through ecumenical movements to tackle food waste around Thohoyandou”.

(Participant 22)

Another female participant (P21) indicated that she hopes they will start to engage the community to fight FW:

“This is not happening now but maybe in the future; we should start engaging with our community members on this issue while hoping that everything will go well”.

5.6.6 Use of available networks

The use of available networks is a very serious opportunity that RLs expect exploiting and most of participants mentioned during the interviews that they are willing to use; because they realised that reducing FLW is an important and urgent global issue for improving food security (Nicastro & Carillo, 2021). Results revealed that RLs have strong interfaith networks; and these interfaith networks can contribute to sustainable development like other social networks. Furthermore, another participant referred to the availability of networks as a great partnership feature. This normally unlocks potential for more project implementation. Yet, the study revealed also that RLs are more widely trusted compared to other leaders in the country. That makes it easy for them to network with other institutions for change and transformation.

The use of available networks is crucial as it will enable RLs to save more food that will feed the hungry. This was reiterated in 2016 by the Inter-religious engagement for Zero Hunger of the World Food Programme (WFP, 2016) claiming that the moral imperative of feeding the hungry and caring for the poor lies at the heart of the world’s major religions. The participant’s major strategic views are outlined in Table 5.6 below.

Table 5.6: Perceived strategic views to fight FW by participants on use of available networks

Perceived strategic views to fight FW	Participants
<i>“Partnership is essential for the sake of putting out available resources for the development of the people”.</i>	P7
<i>“Usually, we engage community members via different platforms such as khoror or any community gathering. So, even to address this issue, we can still engage them through the same channels”.</i>	P11
<i>“Interfaith collaboration is another way of partnering with others to address a problem in unison. As faith leaders, we can tackle this phenomenon through partnerships with other faith-based organisations and governments”.</i>	P10
<i>“To achieve sustainable development, people must partner. I am sure that through Interfaith collaborations, we can still do more to tackle this issue. If we partner with other faith networks, we can get more food to donate to poor people within our communities, even schools”.</i>	P9

5.6.7 Advocacy

Data from the interviews showed that RLs highlighted advocacy as one of the best methods to use because religious beliefs can affect FW. Advocacy can deepen understanding why faith-based actors and RLs are viewed as important to the FW research field, which requires a deeper understanding of the underlying belief systems. It was also pointed out that RLs were of the view that advocacy can be infused within their weekly teachings and sermons, and some were already having some experience in advocating for some other issues as activists within the community. Nine participants mentioned that they were experienced for years doing advocacy work on gender-based violence (GBV), crime, child protection, and family services. Food waste is a social issue requiring everybody to play a part in addressing it resolutely. RLs as part of the Civil Society can play their part in advocating for effective behaviour change for FWR within their based communities. Regarding the advocacy potential, two participants respectively said:

“We do influence decisions through advocacy work, door to door campaigns and facilitation programmes”.

(Participant 6)

“Yes, I think so. Myself, I am trusted as a female minister in my community, so I can advocate for FW reduction”.

(Participant 7)

In the same vein, participant 8 indicated that:

“RLs can engage with community through advocacy work or community Imbizo to address this issue. But so far, we are not engaging the community about food waste”.

Participants 11, 12, and 13 also said that:

“I think the role of RLs in food waste reduction is of an advocate, adviser and whistle blower. Their role is determinant to address this issue everywhere to deal with hunger and food insecurity. Yes, we are trusted compared to other community leaders. So, with our credibility we can advocate effectively for food waste reduction in our respective parishes and congregations. For me I think we can promote stewardship and the 3Rs to advocate for food waste reduction in our community”.

“Yes, I think so. We are trusted from our grassroots levels, when the people are

in trouble they come to us for spiritual guidance, because we believe in God as Africans. So, in the same way we should be able to make use of our positions to advocate for food sharing/donation and for the reduction of food waste”.

“Their role is to advocate, teach, and lead by example about the well strategies to reduce the wastage of food”.

Lastly, participant 18 illustrated the following:

“For me as one of the church leaders, I think our role is to advocate for the reduction of food waste by promoting the ubuntu value, the sharing community for the empowerment of all those who are spiritually, socially and economically marginalised. Meaning for those in needy for food, the hungry and homeless”.

The next section deals with the discussion of results succinctly from each theme and sub-theme that emerged from the findings.

5.7 Discussion of Results

5.7.1 Perceived Barriers to the promotion of food waste reduction

The results on the perception of RLs in the fight against FW in Vhembe District indicate that RLs perceive their potential role towards FWR despite some barriers. Further, it was also revealed that RLs in the study area are not doing anything so far in the fight against FW. The objective of this chapter was to determine the perception of RLs in the fight against food waste in Vhembe District. This study established how religious leaders in Vhembe District perceive their beliefs in the fight against food waste as well as the strategic help they can provide when engaging with the community, which is among the first of its kind. In line with these purposes, participants in this study perceived that they face barriers to promoting FWR. They proposed strategies to fight FW within the community where they operate. Conversely, there is room for government involvement to mobilise RLs to use their influence. Yet, RLs will require guidance and education on the messages to include in their sermons. This finding has not been emphasized in some studies which examined the role of religious leaders in various facets of household food waste reduction. Mohamad *et al.* (2012) highlight that; investigations into the role of religion in solid waste management (SWM) are extremely limited in the literature. Hence, a similar study in Rwanda was conducted by Sanniti *et al.* (2024) to explore the potential and actual contributions of faith-based organisations (FBOs) to food loss and waste (FLW) reduction.

The findings of the present study, similar to those of many previous studies (Kanagy and Nelsen, 1995; Forghani *et al.*, 2019; Baran *et al.*, 2024), confirm that an increase in the level of religiosity among consumers leads to a higher level of environmental kindness. Therefore, prioritizing FW prevention and reduction is critical to optimizing resources use, ensuring food security (FAO, 2022), and reducing hidden impacts such as climate change, eutrophication, water depletion, agricultural land occupation, land transformation fossil depletion, terrestrial acidification, photochemical oxidant and particulate production, and adverse health effects to humans (Skaf *et al.*, 2021; Zahra *et al.*, 2024). This will help also affect behaviour change from waste denial and disinformation. Lack of capacity as one of the perceived barriers is discussed below.

Lack of capacity

The lack of capacity on one hand is also in terms of resources, which is still a very big challenge for RLs to implement projects on the promotion of FWR and other environmental programmes. Capacitating RLs is a sort of a remedy to FW. On the other hand, it is the understanding of how to address this issue within their respective communities. Soma *et al.* (2021) also highlights that, the efficacy of understanding consumer food waste awareness campaigns in altering consumer

motivation, opportunity, and ability as well as to identifying the drivers and barriers that affect a consumer's capacity to reduce food waste, is vital if capacitated. This will allow RLs to be capacitated and learn new strategies to promote FWR.

Some of the RLs were of the opinion that FWR was never being included in their training curriculum, but it should be included in their education curriculum. This is the main reason for the lack of capacity among RLs in tackling FW as revealed by the results of this study. Makani (2017) confirmed that to reduce FW and increase profits to sustain the business in restaurants, there is a need for employee training. Employee training might draw awareness of the gravity of the problem, mobilize stakeholders to seek solutions. So, RLs suggested that training will assist them to know more about this issue and how they can promote it in the community as it will add value to engage community members in diverse ways that reduce FW. These findings are also supported by Yetkin Özbük and Coşkun (2020) mentioning that the identification of insufficient knowledge, skills, and awareness among organizational actors is key to understanding factors affecting food waste generation. Our findings corroborate previous evidence about limited skills and knowledge and a lack of specific concern identified as the top barriers to engaging FBOs in FLW reduction (Sanniti *et al.*, 2024). This is a clear indication that government investment in capacity building for the promotion of FWR as a learning process to help increase knowledge among RLs and awareness of FW across the country, thus, the example can be applied universally. The next section discusses the lack of community engagement.

Lack of community engagement

The majority of RLs stressed the issue of a lack of community engagement to address and deliver on the matter of food waste. United communities are powerful networks for sharing resources and solutions. Yet, without accurate information on FW, RLs may not be able to engage their respective communities effectively because of their traditional beliefs towards food. Lack of community engagement is a challenge for RLs. Contrary to this finding, UNFPA (2013) and Allison & Foulkes (2014) revealed that RLs often have the unique advantage of being able to reach both men and women in many communities. Adding to this, there is an urgency not to leave anyone behind to achieve the SDGs: 1, 10, 12 and 13. Because when communities come together under the influence of their faith leaders, they can pool their ideas, resources, and efforts to tackle FW. It was also revealed that the recognition of the significance of community engagement in rural regions to discover potential strategies for achieving rural development is crucial in Namibia (Shetunyenga, 2024). Hence, RLs have that responsibility to engage with the entire community because this call to action of the UN requires a deep commitment to justice, equity, and inclusivity.

In the context of this study, RLs should try harder to ensure that they can start initiatives that address the needs of the most vulnerable, empower marginalised groups, and create lasting solutions that benefit everyone regardless of their background, resources, or circumstances.

Hearn *et al.* (2024) concurrently discovered that despite financial burden to preaching environmentally friendly behaviour, there are other reasons for this lack of engagement in communicating environmentally friendly behaviour in the community. Consistently, as the UN believes, the researcher does as well that reducing FW is critical to achieving a sustainable world; through this study, RLs while engaging the community, will help them to promote a sharing community, and to look carefully at unsustainable practices that prevent them from promoting sustainable consumption. This was in line with findings by Sewak *et al.* (2021) revealing that understanding community perspectives on solid waste management services, outreach activities, and regulatory measures, and the barriers to sustainable practices, is crucial for designing effective waste management programmes to empower citizens. Hence, there is great potential here for more engagement (Haluza-DeLay, 2014; Grim and Tucker 2014; Koehrsen, 2015, 2018; Jenkins *et al.* 2018; Ives and Kidwell, 2019; Hearn *et al.*, 2024), but this has not been fully harnessed. This further strengthens previous research which indicates that although some action is taking place in addressing climate change, this is not currently the main concern of religious organisations and actors (Caldwell *et al.* 2022; Hearn *et al.*, 2024).

5.7.2 Perceived strategies to fight food waste

Most participants agreed that as RLs they are significantly trusted countrywide in the community. They were also aware of their role within society and what expectations they face regarding FWR as an emerging problem to them. Similarly, Howard (2020) in a survey of 34 African countries conducted between 2016 and 2018 noted similar results. This gives RLs a unique opportunity to leverage these trusted networks toward positive environmental and social change broadly and around food specifically to perceive sustainable strategies to fight FW. In the same vein, Schliesser (2023) and Le Roux and Palm (2021) confirmed also that religion and culture both have significant social capital that can be leveraged for preventive interventions.

Perceived views on fighting FW

The perceived views of RLs form part of the strategies to reduce FW in the study area. Most participants mentioned that RLs were of the view that engaging the community through multi-faith conversations or dialogues and interfaith collaborations could also be effective strategies as they will be linking the value of food with faith and giving with the intention to decrease FW. Similar results in the literature indicated that interfaith collaborations, advocacy, capacity building

(training), and available financial resources could accelerate RLs action on FW (Sanniti *et al.*, 2024). Some participants suggested also that composting could help reduce food waste. This has been recognised also by Lai *et al.* (2024) as an effective approach to waste treatment.

Provide food waste reduction education

Providing education is essential for human empowerment. Results revealed that providing FWR education will enable the creation of new beliefs in an individual to allow new behaviours to emerge as interventions that shift social norms. These findings corroborate with similar results from Heise & Manji (2016) and Le Roux and Palm (2021). RLs in Vhembe District also claimed that residents in Muledane were unaware of proper methods of FW disposal, indicating the need for FWR education programmes, especially in rural and peri-urban areas (Sewak *et al.*, 2021; Naidu, 2010). Accordingly, RLs could facilitate citizen empowerment to recycle or process their food waste to reduce FW at their respective local communities and promote mutual partnerships.

Correspondingly, a transformative and expansive impact that FWR education programmes can have within communities will take place, and ease environmental impacts for sustained collaborations between RLs and other stakeholders. Further, more participants will be equipped with the knowledge, they become FWR advocates, champions, leaders, and educators who promote positive behaviours throughout their communities. In the same vein, Annunziata *et al.* (2015); van der Werf *et al.* (2019) and Afrianto *et al.* (2021) add also that FW can be significantly decreased through the provision of education by public campaigns and action to change the behaviour of customers. Citizens must be involved and empowered in rural programmes in order to have the potential to boost their livelihoods and foster development (Shetunyenga, 2024). So, educating the wider populace about the impact of FWR in rural areas is significant to help adopt more sustainable practices. Thus, educational materials might be developed to assist religious communities.

Spirituality and sustainable development

Spirituality and sustainable development have been highlighted as a sub-theme during interviews with participants in order to provide guidance to the community to reduce FW in an efficient manner through sermons, religious norms teaching, and so on. It is important to understand that spirituality can exist outside of religion, but religiosity typically includes spiritual aspects within the context of any organised faith. Elhoushy and Jang (2021) confirm that religious teachings point out positive behavior toward the environment, nonetheless, participants emphasized during interviews that there is an abundance of food wasted in households in rural South Africa (Vhembe

District), which is a majority Christian population; this should result in further studies on household food waste prevention behavior in South Africa. This was in line with findings by Le Roux & Palm (2021) that it is significant to work also directly with a range of faith-based and traditional actors in their wider projects because of the impact of spiritual beliefs on certain harmful practices they may seek to address. Distinctively, the current study established that FW represents also a harmful practice to address using spirituality to achieve sustainable development. Also, participants noted that the level of spirituality may help people not to waste food as spirituality reflects 'the feelings, thoughts, experiences, and behaviours that arise from a search for the sacred (Kreitlow, 2015; The Lutheran World Federation and Islamic Relief Worldwide, 2018).

Similar results from Baran *et al.* (2024) demonstrate that Islamic religion significantly influences the characteristics of Muslim consumers regarding food waste, with some differences observed for Christians as well. The current study reveals that religiosity has an impact on the food waste reduction intention of Muslims, whereas no such effect was found for Christians (Baran *et al.*, 2024). These are in line with the findings by Baran *et al.* (2024) that revealed that attitude, knowledge, and value of religiosity are significant predictors in relation to pro-environmental consumer behavior, with religiosity playing a moderating role. Moreover, the results indicate that religiosity promotes FWR and is positively related to consumer attitudes, activism, personal norms, and subjective norms. This holds true for both Christians under the leadership of their faith leaders, who is the largest religious groups globally. Therefore, RLs recognised how important it is for all members of their communities to understand the realities of food wastage. With their spirituality and spiritual powers, they will be able to take the lead in organising open conversations and discussions by creating safe spaces for community members to ask questions, dispel myths and access accurate information about FW. They will push back against negative wasting behaviours and inspire more people to role model good food philanthropy and conservation practices.

Showing direction to the people and leading on FW issues

The RLs often guide the people in their respective communities be it spiritually, morally and physically. It was revealed that they can inspire actions such as food philanthropy, food sharing, and other positive changes to promote sustainability and food justice. This means they are capable to show the direction to the people. This correlates with the findings from Schanes & Stagl (2019) who indicated that several initiatives and start-ups are being developed across the globe that act upon increasing concerns around food waste. Thus, sharing food is nowadays

positioned at the nexus of various issues that are seen as critical for sustainability, such as waste reduction, social inclusion, food security, and community engagement (Schanes and Stagl, 2019).

Hope induction

Inducing religious hope in FWR is helpful as a strategy to tackle this phenomenon. Participants were hopeful that they would be able to address the issue of FW the same way they do with issues such as poverty. This is supported by Jensen and Pestana (2010) that RLs can address social issues at many levels and the churches hold great potential for addressing them. Moreover, participants were also optimistic that the teaching of their religious beliefs and norms will impact on the habits of the community members to become seriously concerned about this problem. Adding to this, RLs believed that individual concerns are also a motivating factor in reducing FW. While they understood that there was also a lack of engagement in FWR initiatives as indicated by the majority that despite the challenges faced; they hope that in the future they will engage in the fight against FW. Qian *et al.* (2022), Luo *et al.* (2021) and Abdelradi (2018) also indicated comparable findings that religious beliefs provide an ethical motive that strengthens FW prevention attitudes and is considered a critical motivator to avoid FW because it is found that religious households waste less food than those without religious beliefs. The intent to reduce FW is influenced by individual concerns about FW. In other words, consumers who understand and are concerned about the severity of the FW problem have lower FW and their FW reduction intention is also known to be larger (Ishangulyyev *et al.*, 2019; Melbye *et al.*, 2016; Principato *et al.*, 2015).

Use of available networks

Religious leaders have the potential to use available networks within their reach, especially in rural areas. Yet, rural development continues to be a pressing challenge that demands substantial improvement to bridge the gap in living standards between rural and urban areas (Shetunyenga, 2024). They lead FBOs that represent a range of resources available to individuals signifying their participation in social networks (Cloete, 2014). Similarly, from their interfaith network they can mobilise resources that arise from relationships and which could assist individuals and the collective to reach their goals in working towards the common good (Bartkus and Davis, 2009; Beukes, 2019;) because the Church is a network of social capitals. This finding is also supported by other social researchers who have long accepted congregations as the best producers of social capital (Twibell, 2022).

It is also argued that religious capital, specifically through congregations, could give an agency to social capital and cohesion (Beukes, 2019). Thus, the use of available networks will enable RLs

to raise enough resources for the full implementation of effective FWR initiatives as the government has committed to FLW reduction, aligning the country's national development plan vision 2030 with the SDG 1, 2, 8, 9, 10, 12 and 17. This was in line with findings by Jensen and Pestana (2010) that religious leaders have an extensive network, and they can reach the majority of the population both in terms of providing aid but also in terms of understanding the real needs of the people and channeling this information upwards to the government because religious institutions enjoy extensive credibility as the most trusted institutions in Angola.

To promote sustainable rural development amid rapid urbanisation and urban-rural linkages, policymakers must address key constraints to achieve the desired outcomes, focus on geographic targeting and appropriate institutional settings in urban centers, and promote rural-urban linkages for social interaction and can foster social cohesion within neighborhoods, and economic transformation. Such efforts with 'political will' can contribute to achieving multiple SDGs, including SDG1 on no poverty, SDG2, SDG8, SDG9, SDG11, and SDG12 on responsible consumption (Sakketa, 2023). This study steadily confirms that RLs can positively use their available networks to address FW in rural households in South Africa. The researcher believes in line with Qian *et al.* (2022) that religion may impact food waste through these channels: food has symbolic significance in each religion, and most religions are against food wastage, and saving food is a virtue or a measure of respect. Some religions even suggest that the waste of food is a blasphemy against the rule of God.

Advocacy

Advocating for policy formulation that supports FWR through RLs could be a good strategy to fight FW. They can advocate for the right to food in rural communities and not for wasting food. In partnering with other stakeholders namely governments, universities, environmental organisations, FBOs and NGOs; RLs can lobby for FWR strategies in South Africa. Effective advocacy can facilitate deeper understanding and unlearning internalisation of wasting beliefs. Furthermore, the promotion of religious values is a crucial area that needs more investment by all stakeholders involved in FW prevention. Advocacy manuals may be useful to assist RLs and other religious actors within the community. The findings revealed that advocacy is one of the best methods to address FW because religious beliefs can affect FW. With the evidence of excessive waste that millions of South Africans in both urban and rural areas are going to bed hungry; RLs will fit in as advocates for the right to food, the sharing of food, and help to come up with sustainable strategies for the reduction of FW.

5.8 Conclusion

This chapter has provided empirical-theoretical insights on the perception of RLs in the fight against FW in Vhembe District. Understand the RLs perspectives and identify potential areas where they can influence or lead efforts in reducing food waste in the study area. It was revealed that RLs in the study area are not doing anything so far in the fight against FW. Lack of capacity and lack of community engagement were revealed as barriers limiting RLs to be able to fight FW. This study finds also that religious beliefs affect food waste in rural households in Vhembe District as they are rooted in their culture.

To conclude, it was observed that the impact of religion and the role of RLs on FW appear to be non-existent or insignificant. Nevertheless, this study corroborates the existing literature, considering that religion is a significant construct with substantial implications regarding FW. The study found that spirituality can influence environmental concern among RLs, and this concern might boost their intention to advocate for the reduction of food waste. However, it was indicated also that advocacy, hope induction, provision of FWR education, use of available networks, spirituality, and showing direction to the people and leading on FW issues were among the perceived strategic views to fight FW highlighted from RLs.

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CHAPTER 6: FACTORS INFLUENCING HOUSEHOLD FOOD WASTE REDUCTION BEHAVIOUR

Abstract

Regardless of limited global resources, a large quantity of food produced is wasted annually. Universally, household food waste accounts for half of the food wasted and contributes extensively to environmental degradation, pollution, resource depletion, and social erosion by worsening food insecurity, inequality, and hunger. This phenomenon remains a serious dilemma for South Africa. Looking at the moral, cultural and social authority embedded in them, religious leaders can play a meaningful role in influencing household food waste reduction behavior in rural communities. This can be achieved through the theory of hope as it allows individuals, communities, and societies to flourish for sustainable food security. Therefore, the objective of this study was to investigate and identify through religious leaders the main factors influencing household FWR behaviours. A random sampling was applied to select randomly 66 households per location (Thohoyandou, Muledane and Shayandima). A questionnaire was distributed to collect quantitative data from household members (n=198). Data was analysed with the Statistical Package for Social Sciences version 26 using descriptive statistics, exploratory factor analysis, and reliability analysis. This study indicates that addressing food waste becomes a moral imperative to promote social cohesion, fairness, responsibility, and sustainability to enable building sustainable communities. Further, religious orientations through religious leaders have influence on household food waste reduction behaviour. Due to the limited use of religious leaders and the religion-based approach, the current study emphasized its value in guiding optimistic FWR strategic interventions. The results represent useful information for policymakers and stakeholders to outline specific and sustainable FWR programmes or strategies.

Key Words: Behaviour, food waste, religious leaders, responsible consumption, sustainable food security.

6.1 Introduction

This chapter presents the result of a quantitative phase of the study on examining factors influencing food waste (FW) reduction behaviour at the household level.

6.2 Background

Studies on FW in rural areas of the Limpopo Province are currently limited. FW persists as a critical subject within global academic debates, with consumption identified as the primary stage of loss across both affluent and developing nations (Wani *et al.*, 2024). According to Oelofse & Nahman (2013) and Cronjé *et al.* (2018), FW is related to three major global problems: food security, greenhouse gas emissions, and waste disposal respectively. Wasted food continues to exacerbate hunger, strain natural ecosystems and contribute to greenhouse gas (GHG) emissions (Edjabou *et al.*, 2016; Spang *et al.*, 2019; Nguyen *et al.*, 2023; Hermanussen and Loy, 2024; Etim *et al.*, 2024; van Rooijen *et al.*, 2024). Roughly one-quarter of all annual agricultural water is depleted due to all food harvested for human consumption but turned into waste (UNDP, 2019). It has an impact on the resources used in food production, has environmental impacts throughout the food supply chain, and generates about 8% of greenhouse gas (GHG) emissions (Oelofse, 2019; UNDP, 2019). Research conducted on FW by several scholars (Edjabou *et al.*, 2016; Spang *et al.*, 2019; Nguyen *et al.*, 2023; Hermanussen and Loy, 2024; Etim *et al.*, 2024; van Rooijen *et al.*, 2024), revealed that annually a large quantity of food produced is wasted regardless of limited global resources. Furthermore, it represents a significant issue either for the academic or the political and social agenda in developed, developing, emerging, and rural societies for its triple impacts namely: economic, social, and environmental (Gustavsson & Elander, 2016; Thyberg & Tonjes, 2016; Schanes *et al.*, 2018; Corrado *et al.*, 2019; Pilone *et al.*, 2023).

FW is also a global ethical issue (Chereji *et al.*, 2023) and can be a consequence of consumption habits (Gorgan *et al.*, 2022). Overall, the level of food wasted globally can be seen as a symptom that the current food system is unsustainable and must change in order to secure food security by 2050 for the forecasted 9 billion population (Lazell, 2016). Despite previous studies revealing that there is a huge difference between developed and developing countries regarding FW (Lipinski *et al.*, 2013; Chalak *et al.*, 2015), there is a great need to do more investigations especially in sub-Saharan Africa. While Porpino (2016) indicated that there is an increase in FW campaigns as more countries are taking action against household FW; in South Africa and the SADC region, the evidence is scant. Moreover, Florkowski *et al.* (2017) indicated that prevention

is the preferred strategy to eliminate most FW. Thus, rooting for success, this dream can be achieved when applying hope theory towards a goal-directed thinking channeled by RLs.

In 2017, the Worldwide Fund for Nature (WWF) reported that due to the global financial crisis, there is a decrease in food security in countries with no conflict in one hand, while in the other hand, there is a decline in food supply among countries with active conflicts (WWF, 2017). Adding to this, Gibson (2016) alluded that a variety of factors, including natural disasters, armed conflicts, population growth, and poverty are causing hunger and malnutrition.

Capitalising on the influence of RLs to mobilise the people for FWR, South Africa could be able to build sustainable communities in the collective consciousness. Pilone *et al.* (2023) cement that FWR is considered since 2015 an emergency and a priority for both local and national governments worldwide. That emergency and priority lie within all the 17 SDGs due to the profound FW impact on both social and environmental systems. The current study emphasized its significance in guiding optimistic FWR strategic interventions in rural South Africa, although the experienced limited use of RLs and the religion-based approach (Chapters 4 and 5) (Elhoushy & Jang, 2020; Zamri *et al.*, 2020).

6.3 Materials and Methods

The statistical analysis of data from the questionnaire was performed using the Statistical Package for Social Sciences (SPSS) version 27 to compute descriptive statistics, exploratory factor analysis, reliability analysis as well as the KMO and Bartlett's Test. This software, according to Stockemer (2019) works greatly with survey data analysis. A systematic random sampling was applied to select 66 households per location (Thohoyandou, Muledane and Shayandima). In this study, Thohoyandou is classified as an urban area, Shayandima as a semi-urban area, and Muledane as a rural township). The researcher conveniently chose every third house on every third street in the three locations until a sample size of 198 was reached. To facilitate the systematic random selection of households, 33 households were randomly selected per section or zone. To collect data from the selected households, the questionnaire was administered to any available person within the household using face-to-face interviews. For those who were not available, the research team handed over some questionnaires to other household members for self-administration after explaining to them the purpose of the study. The personal approach of the in-person survey carries the convincing element to successfully recruit participants, and surveys allow for inferences to be made about the general population. However, since a

substantial number of respondents feel comfortable in speaking their vernacular language, it was essential to use Tshivenda as the local language to clarify questions when needed. This process was facilitated and often clarified by the research assistants who could speak the local language well.

6.3.1 Study design and setting

The investigation of this study was carried out in three different areas: Thohoyandou, Muledane and Shayandima, within the Thulamela Municipality under Vhembe District Municipality, Limpopo Province of South Africa.

6.3.2 Overview of Quantitative Dataset

6.3.3 Data Preparation

Data analysis involves a range of processes such as preparing the data, accounting for the data, explaining the data, and most importantly, making sense of the data (Cohen *et al.*, 2011). Quantitative data analysis requires many crucial steps, including cleaning the data collected. This is where some returned questionnaires were excluded, mainly due to substantial amounts of data not being provided by the respondents. Another crucial step involved coding each questionnaire and capturing the responses in SPSS. Comprehensive guidance on the procedures for coding a questionnaire, loading the variables, and then inputting the values in SPSS has been supplied by several research textbooks from researchers such as Quinlan *et al.* (2015) and Stockemer (2019). Thus, after capturing all the survey data in SPSS, the next step was to conduct the analysis. Yet, information on the determination of the valid sample size for the study is discussed in Chapter 3.

6.4 Presentation and description of Results

The results of this study are presented below using descriptive statistics and an exploratory factor analysis (EFA). Data collected quantitatively are presented in the form of tables, figures, and graphs, and discussions thereof in the next section.

6.4.1 Demographic Attribute of Respondents

Each region's participants were profiled according to sex, race, age, education, monthly income, and the number of people living in their households. The majority of the respondents in this study were female (62.0%) and 38.0% being male. A large number was made of youth (58.1%), then followed by 33.3% of adults then 8.6% of elderly at last. Table 6.1 below shows that 72.7% of the

household respondents obtained tertiary qualification, while 44.9% had an average monthly household income of over R10 000 despite the majority being unemployed (49.0%). However, several respondents did not disclose their honest monthly income for many reasons such as confidentiality and personal security.

Table 6.1: Biographical attributes of survey respondents for the second phase (Source: Author)

Characteristics/Variable		Frequency (n=198)	Percentage (%)
Gender	<i>Female</i>	123	62.0
	<i>Male</i>	75	38.0
Age	<i>18-35 Years (Youth)</i>	115	58.1
	<i>36-59 Years (Adults)</i>	66	33.3
	<i>60+ Years (Elderly)</i>	17	8.6
Disability condition	<i>Yes</i>	9	4.5
	<i>No</i>	189	95.5
Employment status	<i>Employed</i>	57	28.8
	<i>Unemployed</i>	97	49.0
	<i>Self-employed</i>	26	13.1
	<i>Other</i>	18	9.1
Marital status	<i>Single</i>	145	73.2
	<i>Married</i>	46	23.2
	<i>Widow</i>	5	2.5
	<i>Widower</i>	2	1.0
Geographical location	<i>Urban</i>	66	33.3
	<i>Semi-Urban</i>	66	33.3
	<i>Rural Township</i>	66	33.3
Level of education	<i>Primary</i>	6	3.0
	<i>Secondary</i>	37	18.7
	<i>Vocational</i>	5	2.5
	<i>Adult literacy</i>	6	3.0
	<i>Tertiary</i>	144	72.7
Household source of Income	<i>Wage or Salary</i>	76	38.4
	<i>Investment (Business) Income</i>	9	4.5
	<i>Government grant</i>	53	26.8
	<i>Pension</i>	6	3.0
	<i>Other source of income</i>	54	27.3
Average household monthly income	<i>Less than R1000</i>	12	6.1
	<i>Between R1001 - R5000</i>	46	23.2
	<i>Between R5001 - R10 000</i>	51	25.8
	<i>Over R10 000</i>	89	44.9
Number of people in a household	<i>One</i>	7	3.5
	<i>Two</i>	6	3.0
	<i>Three</i>	26	13.1
	<i>Four</i>	50	25.3
	<i>Five</i>	62	31.3
	<i>Six and above</i>	47	23.7

6.4.2 Descriptive Statistics

An agreement score (AS) is presented in Table 6.2 below. It is calculated for the Likert scale questions, and other questions with scale. This is based on the mean response that falls between 3.40 and 4.19 which is 'agree or often' (see Tables 6.3, 6.4, and 6.5). The agreement score (AS) or mean score was calculated based on the Likert scale and multiple choice questions as for Likert scale where the range is $5 - 1 = 4$, then interval is $4/5 = 0,8$.

$$AS = \frac{4}{5} = 0,8$$

Table 6.2: Agreement score of the Likert scale and multiple-choice questions

Scale level	Agreement score
SA = 5	4.21 – 5
S = 4	3.41 – 4.20
N = 3	2.61 – 3.40
D = 2	1.81 – 2.60
SD = 1	1 – 1.80

6.4.2.1 Reliability Analysis of the questionnaire items

As presented in Table 6.3; the reliability analysis of the instrument based on the responses of respondents was performed. Approximately the reliability coefficient was well as the researcher checked if the respondents understood the item statements clearly prior to conducting the descriptive statistics. The reliability was run to find out whether the instrument was reliable and able to measure what the researcher intended to measure. So, this analysis helped to get an understanding of the consistency and effectiveness of RLs' involvement in reducing FW in a rural setting with particular attention at the household level. The results on Table 6.1 below revealed the mean and standard deviation for the reliability analysis.

Table 6.3: Reliability Analysis results for the questionnaire items

Reliability Analysis results for the questionnaire items			
Variable	N	Mean	Std. Deviation
How often does your household find itself throwing away food?	198	2.47	1.120
How often do people throw away uneaten food products?	198	3.87	1.814
What is the main reason for your household food waste?	198	3.31	1.291
Which types of food do your household waste most often?	198	4.19	1.780
Does your household keenly reduce food waste?	198	1.37	.579
Awareness of food waste	198	3.90	1.117
Environmental concerns	198	3.36	.933
Ethical and moral considerations (e.g, feeling of guilt)	198	3.35	.974
Influence of family and friends	198	3.20	1.021
Financial Savings	198	3.49	1.125
Religious norms and motivations	198	3.46	1.006
Social influence (e.g., family, friends)	197	3.39	.877
Other (religious songs, drama)	11	3.45	.934
How does RLs lead-awareness influence FW behaviour change at your household?	194	2.90	1.388
I do pay attention always to keep food in the fridge or freezer	198	3.60	1.195
I shop often for food without any reason	198	2.63	1.218
I throw away food without sharing it	198	2.81	1.215
I do not enjoy wasting food at home	198	3.66	1.193
I have many concerns and family problems regarding food waste	198	3.21	1.198
I think like we insult God when we are wasting food	198	3.47	1.195
Load shedding also contributes to food wastage	198	4.08	1.155
Having money makes me wasting food	198	3.00	1.286
My religious beliefs and norms influence my attitude and behaviours to not waste food	198	3.37	.987

I hope the issue of food waste can be addressed through RLs	198	3.80	.927
I value food waste as a precious resource and a gift from God	198	3.36	1.042
I reduce food waste to uphold my faith and showing love	198	3.31	1.028
I think lack of incentives promotes more food wastage	198	3.28	1.085
I think society does not care about food waste	198	3.43	1.049
My cultural or family traditions lead me to food waste	198	3.16	1.082
My estimated amount of food waste is a lot	198	3.36	1.080
Wasting food will tarnish my image in the community	198	2.84	.915
I have to educate household members, visitors and encourage everyone to be mindful about over-serving food	198	3.98	.878
If I am reducing wasting food, I contribute to develop my society and protect my environment	198	3.91	.788
I think I should control food portion and be mindful of food waste habits to reduce my wastage	198	4.03	.866
I think I must share surplus food with neighbours and participate in food-sharing initiatives at the community level	198	4.05	.763
Reducing food waste improves my social responsibility of donating food to others	198	3.91	.897
What can be done to reduce food waste?	198	2.41	1.363
Do you have a plan or strategy in place for reducing food waste in your household?	171	3.35	1.129
How often do you set specific goals related to reducing food waste?	183	2.68	1.326
Do you try to avoid wasting food in your daily life?	182	3.57	1.412
Meal Planning	198	3.55	1.211
Keeping a shopping list	198	3.56	1.223
Proper food storage	198	3.61	1.129
Food philanthropy (donation)	198	3.45	1.124
Using leftovers creatively	198	3.50	1.084
Composting food Scraps	198	3.11	1.103
Feeding pets	187	3.15	1.261

Other (Buying less perishable food, etc.)	2	4.50	.707
How effective do you believe your current methods are in reducing food waste?	164	2.92	1.233
Interfaith Educational materials	198	3.74	.849
Practical tools (e.g. Food storage containers)	197	3.59	1.097
Religious Workshops or training sessions	198	3.91	.823
Religious community programmes	198	3.88	.887
Online resources or food waste reduction apps or Artificial Intelligence Software	192	3.55	.996
Other (Food preservation and food philanthropy manuals)	14	4.57	.514
Valid N (listwise)	0		

Source: SPSS Analysis

6.5 Household FW Practices and frequencies

Household members are always confronted with certain behaviors, habits, and actions leading to food disposal that could otherwise have been consumed. During the collection of data for the phase 2 of this study, the researcher had to ask some questions to household members about their FW practices. Among the questions in the questionnaire (see appendix) were how often does your household find itself throwing away food, and does your household keen to reduce food waste? Below are the results in sequence, Households throwing away food per gender and per geographical location. The results on Figure 6.1 show that the majority of respondents find themselves throwing food. However, the overall responses from this question revealed that households find themselves throwing food often.

6.5.1 Frequency of households food disposal

In a nutshell, results revealed that (31.8%) of respondents indicated that they sometimes throw away food, followed by (25.3%) who rarely find themselves throwing away food, and (24.7%) claimed that they never throw away food, while (14.6%) agreed that they often throw away food, and lastly (3.5%) were brutally honest that they always throw away food at home (Figure 6.1). Thus, it is essential to note that the questionnaire was completed by the person responsible for buying food or contributing to buy food at home.

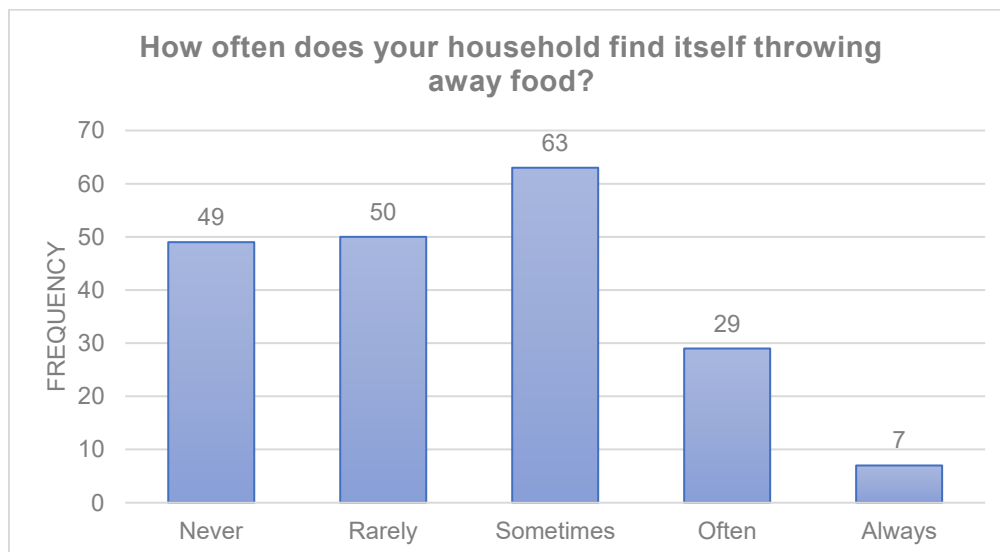


Figure 6.1: Frequency of households food disposal

6.5.2 Household food disposal frequency per gender

The UNDP (2015) reported that women are mostly those in charge of the household food supply and management. This was a prerequisite for their participation in the study, and the results revealed that females are the majority with 62.0% (see Table 6.1). Below is the graph showing the cross-tabulation findings from respondents present during the study (Figure 6.2). The cross-tabulation presents the findings on how household members find themselves throwing away food according to their gender. Results show that 13.6% (male) and 11.1% (female) never throw away food, 9.1% (male) and 16.2% (female) rarely throw away food, 11.6% (male) and 20.2% (female) sometimes throw away food, 3.0% (male) and 11.6% (female) often throw away food, then 0.5% (male) and 3.0% (female) find themselves throwing food always.

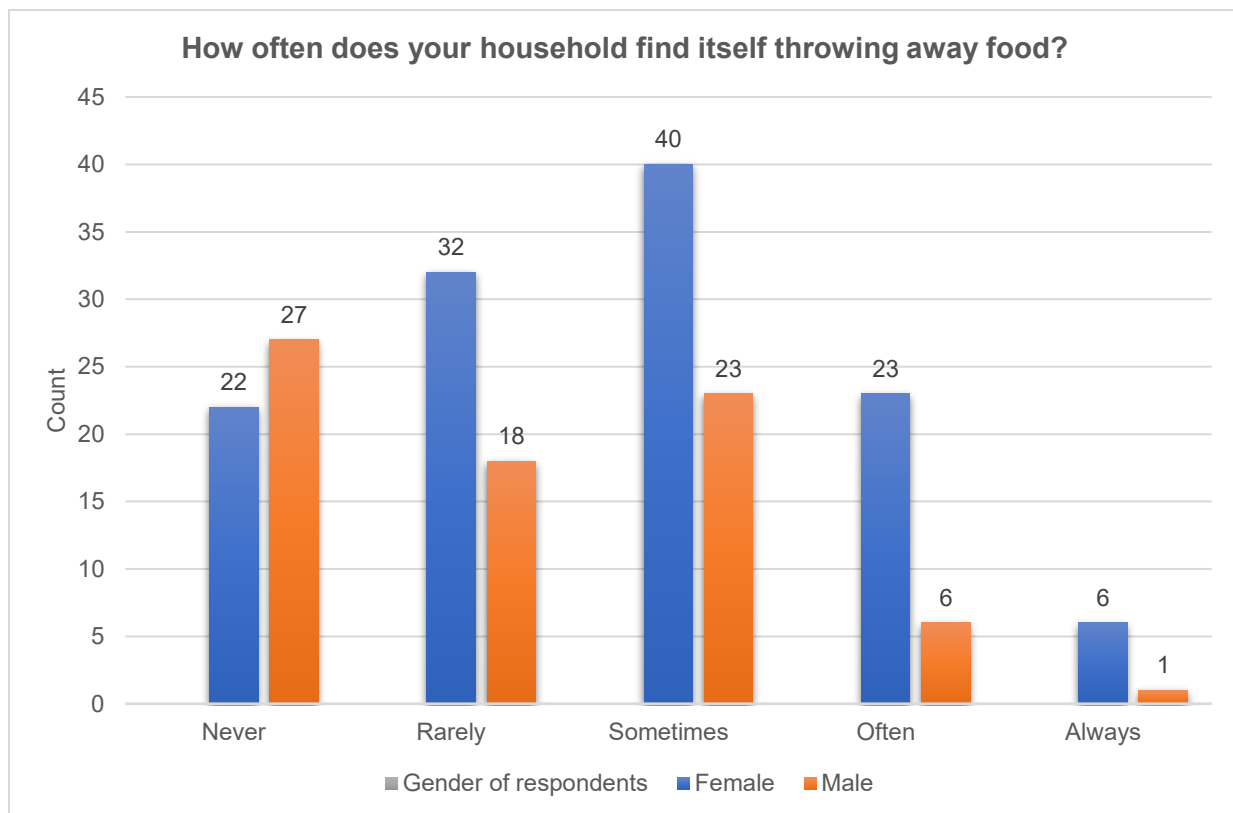


Figure 6.2: Household food disposal frequency per gender

6.5.3 Household food disposal per geographical location

Residents of Vhembe District generate also more FW be it in rural or urban areas. The graph above presents the cross-tabulation findings from respondents present during the study. The cross-tabulation presents the findings on how household members from the three different

geographical locations find themselves throwing away food. Results show that 31.8% sometimes throw away food, especially in Muledane and Thohoyandou, 25.3% rarely throw away food, while 24.7% never find themselves throwing away food, then 14.6% and 3.5% lastly throw away food often and always (Figure 6.3). It was reported that in Vhembe District, fruits and vegetables, pap, bread and other legumes are the most wasted as they are cheap in Venda.

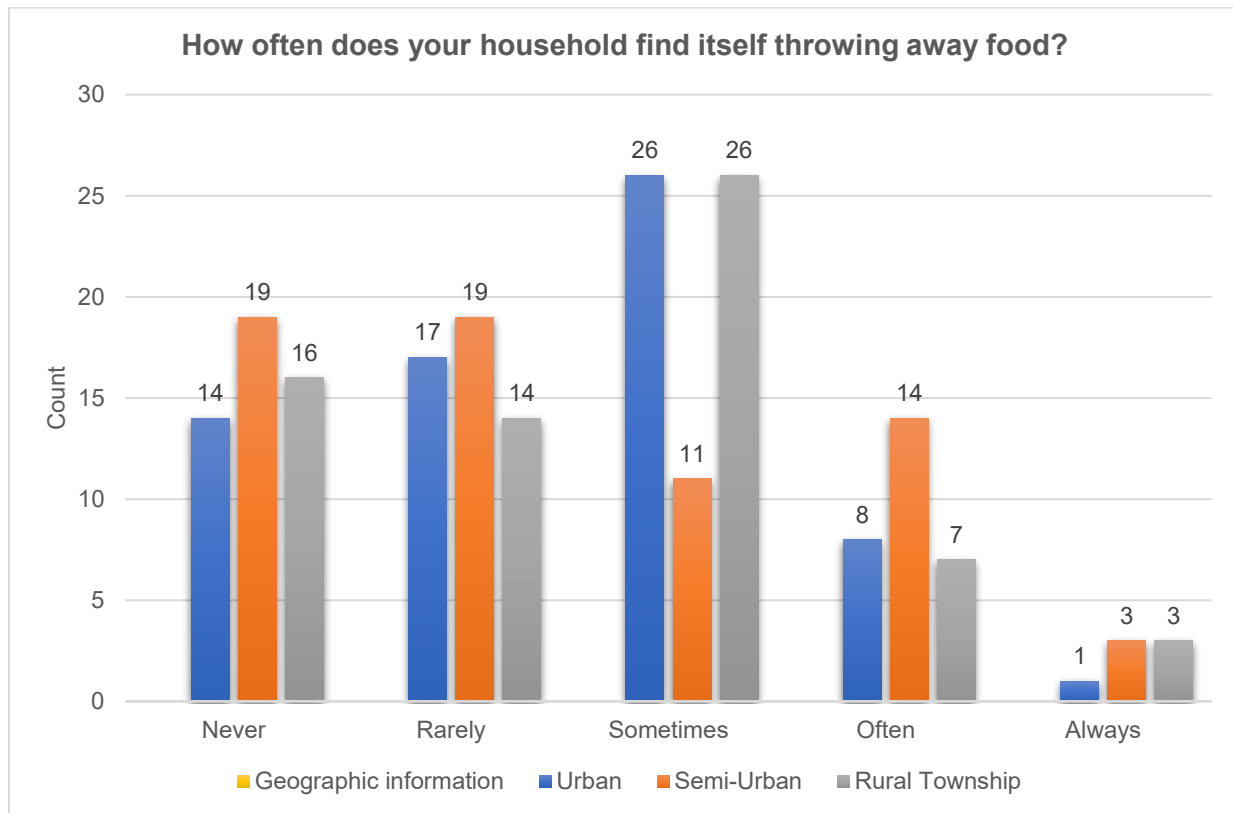


Figure 6.3: Household food disposal per geographical location

6.5.4 Household food waste reduction willingness

Findings revealed that a large number of household members in Vhembe (68,2%; n=198) express themselves that they are keen to reduce FW. It was also pointed out by another proportion (26.8%) of key informants who falls between in the category of those that are not keen to reduce food waste, followed by the last group of respondents (5.1%) claiming that they are not yet sure whether to reduce or not (Figure 6.4). This shows that those not willing to reduce FW tend to consider often food waste as acceptable and unavoidable to them. Also, they are not always aware of the food they are wasting daily. Further, the last group emphasized that discarding food

was not their choice, as a result, wasting food was not a problem for them. Discarding food in rural areas is not seen as a serious concern at all among many residents and consumers.

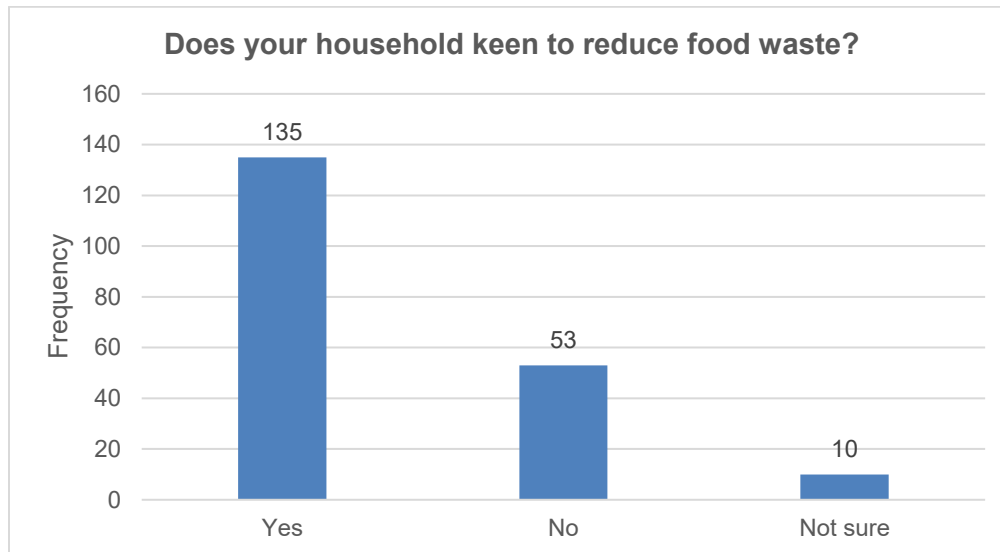


Figure 6.4: Household food waste reduction willingness

6.6 Household Food Waste Reduction Strategies

6.6.1 Household views to reduce food waste

Reducing FW requires a certain method or strategy. Hence, it is essential to adhere to personal decisions or planned rules to use food bought for home consumption before it goes to waste, and it is also advisable to follow the set rules or decisions. Household members as consumers waste food often when there are no rules in place. In Thohoyandou, 34,8% (n=198) of household members indicated that the promotion of food philanthropy is a good way to reduce FW, and 24,7% (n=198) opt for the provision of education. Two groups of respondents (15,2%) equally would encourage others to buy the food needed to avoid wastage and also purchase less perishable food (Figure 6.5). Ten percent (10,1%) of the respondents reported that being mindful and responsible would contribute to the reduction of food waste (n=198). Figure 6.5 below highlights the views of household members on what they wish can be done to reduce FW.



Figure 6.5: What can be done to reduce food waste

6.6.2 Results from Likert scale analysis

This section presents the results of the Likert scale analysis conducted. The aim was to provide respondents with the opportunity to freely share their opinions in response to stated items or questions. Different statements were presented to the respondents. These questions were asked to all respondents from the household. Five options were given to respond effectively: strongly disagree (SD), disagree (D), neutral (N), agree (A), and strongly agree (SA). The second category provided also five options as follows: never, rarely, sometimes, often and always.

6.6.2.1 Factors influencing people's motivation to reduce food waste

Results revealed that awareness of food waste issues, environmental concerns, ethical and moral considerations (e.g., feeling of guilt), influence of family and friends, financial savings, religious norms and motivations, including social influence (e.g., family, friends) do influence the motivation to reduce FW. However, based on the weighted average value, only awareness of food waste issues, financial savings, religious norms and motivations, and others (lack of enough food, incentives, religious educative songs or dramas, government policies) scored high perception, while the remaining items scored low perception. Hence, there are no awareness programmes led by RLS in the entire district (Table 6.4). Additionally, results show that the 50% response rate for the factors influencing people's motivation to reduce food waste at the household level was between 3.40 and 4.19 agreement score, equivalent to 4 which is an agreement, and the other 50% falls between 2.61 and 3.40 agreement score which is neutral (Table 6.4). This is because the higher the mean score the more the agreement is expressed. However, respondents indicated the need to reduce food wastage if there are religious-led programmes in place. This view was shared across the majority of the respondents who participated in the study.

Table 6.4: Reliability analysis results for the questionnaire items

		Statistics							
		Awareness of food waste	Environmental concerns	Ethical and moral considerations (E.g, feeling of guilt)	Influence of family and friends	Financial Savings	Religious norms and motivations	Social influence (e.g, family, friends)	Other
N	Valid	198	198	198	198	198	198	197	11
	Missing	0	0	0	0	0	0	1	187
Mean		3.90	3.36	3.35	3.20	3.49	3.46	3.39	3.45
Std. Deviation		1.117	.933	.974	1.021	1.125	1.006	.877	.934

a) Weighted average value

The researcher decided to use the perceptions of the respondents on factors influencing people's motivation to reduce food waste. The decision was made to get the weighted average value. To calculate the weighted average value (WAV), the researcher simply sums up the Mean values for the items, then divides them by the total number of the items as in the formula below for the factors influencing people's motivation to reduce food waste (see Table 6.4).

$$WAV = \frac{27,6}{8} = 3,45$$

Hence, the majority of respondents perceived highly items statements 1, 5, 6 and 8 while some respondents have low perception of statements 2, 3, 4, and 7. So, the researcher contribution is to show why the majority have low perception of this issue to make meaning of the findings.

The data analysis shows that majority of the respondents appeared to feel that awareness of food waste issues offered them opportunities to acquire more knowledge about FW despite any situation. Also, they felt that the awareness will give them opportunities to apply the acquired knowledge into real life situations in rural areas. They highly perceived that awareness will increase their self-efficacy to reduce the wastage of food. On the other hand, some respondents had low perception of the impact of the awareness of FW on their lives. Further, it helped them to wisely identify knowledge gaps that need to be filled and exhibit their strengths. This will allow them to apply the acquired knowledge within their households in order to flourish. Table 6.4 depicts the weighted average value of the Mean values for the factors influencing people's motivation to reduce FW.

6.6.2.2 Factors influencing food waste reduction behaviour through RLs

The emergent factors influencing FWR behaviour through RLs were asked to a broader population of 198 respondents during the second phase of this study for a better understanding was considered necessary (Table 6.5). Results have revealed that in the selected villages of the Vhembe District Municipality, respondents (43.4%) have high hope that RLs have the potential to address the issue of FW in their communities, 53.0% believe in education to teach household members and visitors and encourage everyone in the household to be mindful about over-serving food. A considerable number of respondents (58.6%) plan to contribute to the development of their society and protect the environment by reducing FW. Other factors influencing which RLs have to intervene are the following: societal carelessness, higher amount of FW, and cultural or family traditions. The weighted average value (WAV) for the factors influencing food waste reduction behaviour through RLs is **3,51** according to the formula below.

$$WAV = \frac{52,79}{15} = 3,51$$

Results revealed that 43.4% of the households had higher hopes that RLs have the potential to address FW issues in the study area. As presented in Table 6.5, 36.9% of household members think that society does not care about food waste, 30.3% is of the view that the cultural or family traditions lead them to wastage, 38.4% estimated that their amount of food waste is a lot, 53.0% is ready to educate household members, visitors and encourage everyone in the household to be mindful about over-serving food, 58.6% reported that reducing wasting food will make them contribute to the development of the society and protect the environment; 54.0% think that they should control food portion and be mindful of FW habits, 58.1% agreed to share surplus food with neighbours and participate in food-sharing initiatives at the community level, while 45.5% believed that reducing FW will improve their social responsibility of donating food to others. Results further show that for factors influencing food waste reduction behaviour through RLs; 6 items (3, 11, 12, 13, 14 and 15) score high perception, yet responses for items (3, 7, 11, 12, 13, 14 and 15) fall between 3.40 and 4.19 agreement score, equivalent to 4 which is an agreement, although item 7 scored low perception as it WAV is lower than 3,51 (Table 6.5).

Table 6.5: Factors influencing people's motivation to reduce food waste

Variable	SD	D	N	A	SA	Mean	Std Dev	Decision
1 Awareness of food waste issues	15 (7.6%)	4 (2.0%)	32 (16.2%)	82 (41.4%)	65 (32.8%)	3.90	1.117	High perception
2 Environmental concerns	6 (3.0%)	27 (13.6%)	73 (36.9%)	74 (37.4%)	18 (9.1%)	3.36	0.933	Low perception
3 Ethical and moral considerations (e.g., feeling of guilt)	10 (5.1%)	19 (9.6%)	83 (41.9%)	64 (32.3%)	22 (11.1%)	3.35	0.974	Low perception
4 Influence of family and friends	13 (6.6%)	29 (14.6%)	81 (40.9%)	56 (28.3%)	19 (9.6%)	3.20	1.021	Low perception
5 Financial savings	12 (6.1%)	20 (10.1%)	68 (34.3%)	54 (27.3%)	44 (22.2%)	3.49	1.125	High perception
6 Religious norms and motivations	12 (6.1%)	14 (7.1%)	65 (32.8%)	86 (43.4%)	21 (10.6%)	3.46	1.006	High perception
7 Social influence (e.g., family, friends)	4 (2.0%)	20 (10.1%)	88 (44.4%)	65 (32.8%)	21 (10.6%)	3.39	0.877	Low perception
8 Other (state the items specified here)	-	2 (1.0%)	3 (1.5%)	5 (2.5%)	1 (0.5%)	3.45	0.877	High perception

Note: N=198, SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, SA= Strongly Agree. Decision, weighted average = **3,45**.

Table 6.6: Factors influencing food waste reduction behaviour through RLs

Variable	SD	D	N	A	SA	Mean	Std Dev	Decision
1 Having money makes me wasting food	26 (13.1%)	48 (24.2%)	61 (30.8%)	26 (13.1%)	37 (18.7%)	3.00	1.286	Low perception
2 My religious beliefs and norms influence my attitude and behaviours to not waste food	10 (5.1%)	15 (7.6%)	93 (47.0%)	52 (26.3%)	28 (14.1%)	3.37	0.987	Low perception
3 I hope the issue of FW can be addressed through RLs	4 (2.0%)	11 (5.6%)	51 (25.8%)	86 (43.4%)	46 (23.2%)	3.80	0.927	High perception
4 I value food as a precious resource and a gift from God	10 (5.1%)	23 (11.6%)	81 (40.9%)	53 (26.8%)	31 (15.7%)	3.36	1.042	Low perception
5 I reduce FW to uphold my faith and showing love	4 (2.0%)	41 (20.7%)	73 (36.9%)	50 (25.3%)	30 (15.2%)	3.31	1.028	Low perception
6 I think lack of incentives promotes more food wastage	15 (7.6%)	20 (10.1%)	89 (44.9%)	43 (21.7%)	31 (15.7%)	3.28	1.085	Low perception
7 I think society does not care about food waste	13 (6.6%)	17 (8.6%)	67 (33.8%)	73 (36.9%)	28 (14.1%)	3.43	1.049	Low perception
8 My cultural or family traditions lead me to food waste	20 (10.1%)	24 (12.2%)	76 (38.4%)	60 (30.3%)	18 (9.1%)	3.16	1.082	Low perception
9 My estimated amount of food waste is a lot	13 (6.6%)	28 (14.1%)	56 (28.3%)	76 (38.4%)	25 (12.6%)	3.36	1.080	Low perception
10 Wasting food will tarnish my image in the community	9 (4.5%)	64 (32.3%)	85 (42.9%)	30 (15.2%)	10 (5.1%)	2.84	0.915	Low perception
11 I have to educate household members and visitors and encourage everyone in the household to be mindful about over-serving food.	4 (2.0%)	9 (4.5%)	27 (13.6%)	105 (53.0%)	53 (26.8%)	3.98	0.878	High perception
12 If I am reducing wasting food, I contribute to developing my society and protect my environment.	3 (1.5%)	6 (3.0%)	35 (17.7%)	116 (58.6%)	38 (19.2%)	3.91	0.788	High perception
13 I think I should control food portion and be mindful of food waste habits to reduce my wastage.	3 (3.0%)	3 (1.5%)	26 (13.1%)	107 (54.0%)	56 (28.3%)	4.03	0.866	High perception
14 I think I have to share surplus food with neighbours and participate in food-sharing initiatives at the community level	4 (2.0%)	-	29 (14.6%)	115 (58.1%)	50 (25.3%)	4.05	0.763	High perception
15 Reducing food waste improves my social responsibility of donating food to others	5 (2.5%)	4 (2.0%)	47 (23.7%)	90 (45.5%)	52 (26.3%)	3.91	0.897	High perception

Note: N=198, SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, SA= Strongly Agree. Decision, weighted average = 3.51

6.7 Exploratory Factor Analysis

In this study, the researcher used the Exploratory Factor Analysis (EFA) which is a computer-based method used technically to identify the structure or pattern of the relationship of variables in a data set. Thus, for the data to be appropriate for EFA, the KMO should be between 0.5 and 1.0, while Bartlett's test of sphericity should be significant (Hair *et al.*, 1998; Adhiatma, 2014). Results from the EFA provided a four-factor solution. The EFA test was run using the Maximum likelihood yielded a four-factor influencing solution (factor loadings >0.40). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was pretty good (0.709), and the Bartlett's Test of Sphericity (BTS) is statistically significant as the p value is less than 0.001 ($p < 0.000$). The KMO and Bartlett's Test were chosen depending on the objective of the study, the reason why it was the only test for the analysis (Figure 6.2). This is in line with Malhotra & Birks (2007) who stipulated that the KMO and Bartlett's sphericity tests were within the recommended threshold of 0.8 and $p < 0.05$. Factor loadings and communalities were performed based on a Maximum Likelihood as an extraction method, and Promax with Kaiser Normalisation as a rotation method. The scree plot diagram showing the four extracted factors is presented in Figure 6.3.

Table 6.7: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.709
Bartlett's Test of Sphericity	Approx. Chi-Square	904.762
	df	105
	Sig.	.000

In this study, the researcher used Factor analysis to identify the underlying factors that influence household food waste reduction behaviors and how RLs through religious beliefs and practices might be influencing those factors. The next section deals with factors influencing food waste reduction behaviour through RLs. The Pattern Matrix (also known as the rotative factor matrix) helped having some items being grouped into factors based on the factors loading. The items loaded well compared to others that may not load well below the mean rate. Some items were loaded into two factors or groups.

6.7.1 Factors influencing food waste reduction behaviour through RLs

The extraction of factors followed the Kaiser Normalisation method. Total Variance Explained accounted for one variable explaining 59.3% of the total value as shown in Table 6.8 below. The loading factors were reducing wasting food (0.585), then estimated amount of food waste (0.529), followed by value of food (0.515), and reduction of food (0.477) labeled due to their higher loadings. Figure 6.3 visualises the four factors extracted with values greater than 1 as shown on the Scree Plot. The results confirm that the initial communalities are usually greater than the extractive communalities. The communalities that are less than 1.81 were not considered and should be removed as the mean falls between 1.81 and 2.61 (mentioned earlier). This shows that there is a significant correlation between variables at a 0.37 level ($p < 0.01$). Table 6.6 below shows factor loadings and communalities based on an exploratory factor analysis with Maximum likelihood ($N = 198$).

Table 6.8: Factor loadings and communalities based on an Exploratory Factor Analysis with Maximum Likelihood (N = 198)

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communalities
	Food Philanthropy	Cultural Tradition	FWR Education	Food waste value	
Mindful of food waste	0.677				0.446
Sharing surplus food	0.645				0.471
Reducing food waste	0.608				0.379
Estimation of food waste		0.844			0.529
Culture and traditions		0.638			0.469
Careless society		0.617			0.326
Wasting food for community			0.704		0.585
Educate household			0.581		0.470
Hope to address food waste issue			0.559		0.395
Food waste Incentives				0.591	0.322
Upholding faith and showing love				0.559	0.477
Beliefs and norms				0.554	0.368
Precious resource value				0.528	0.515
Eigen values	2.320	1.779	2.312	1.962	(Total)
% of Variance	25.52	14.49	10.66	8.65	59.33

Factor loadings < 0.40 were suppressed.

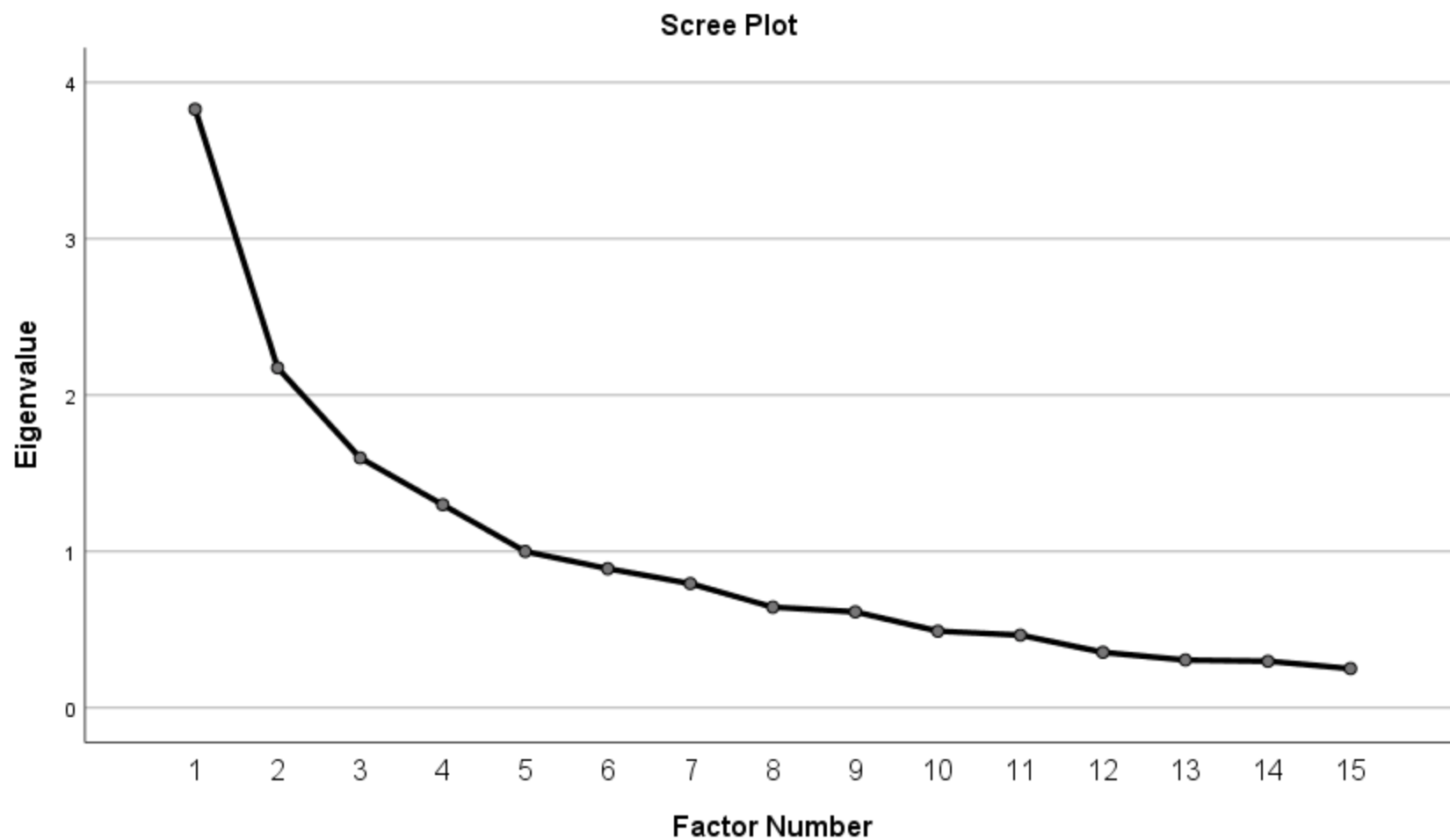


Figure 6.8: Scree plot diagram for four factors extracted

6.8 Discussions

The current study aimed at examining factors that can influence food waste reduction behaviour at the households' level through RLs. After the examination, an intervention strategy will be developed. This section discusses the results presented previously. The discussion starts with the results obtained on household FW practices and frequency, households FWR strategies; then lastly results on the factors influencing people's motivation to reduce food waste and factors influencing food waste reduction behaviour through RLs are thereof discussed.

6.8.1 How often households throw away food

Disposal of food is frequent at the households' level and the more food is thrown away, the more the generation of FW occurs. The findings of this study indicated that household members throw away food in the three selected locations. This was in line with findings by Gustavsson *et al.* (2011) that food waste occurs at consumption stage (households). Urban areas generated a greater quantity of FW, both in terms of type and composition than rural areas of Indonesia (Sugiyarto, 2021; Martianto *et al.*, 2024). In rural areas of eastern Poland, vegetables, including potatoes, and fruits have been frequently identified as large contributors to food waste from rural households in earlier studies (Rosner and Stanny, 2014; Florkowski *et al.* 2017). The region is classified among the 20 poorest regions of the European Union (EU), but rural households living in that region waste more food. The results of this study are also supported by Chenene (2020) who conducted a study in rural and urban Lesotho. Distinctively, the current study established the throwing of food related to a lack of preventive strategies. This requires more awareness and appropriate dissemination channels from RLs.

6.8.2 Household views to reduce food waste

Among the selected villages of Vhembe District Municipality, promotion of food philanthropy, provision of education (knowledge and awareness), buying the food needed only, being mindful and responsible were the views of household members for the reduction of food waste. Provision of education is widely needed by the majority of the respondents as they live near Thohoyandou where there is the University of Venda and other agricultural colleges. Yet, most respondents were literate and educated. Being mindful and responsible, means being able to prevent the continuous wasting behaviours and habits through capacity building. This connects also with a study by Katare *et al.* (2016) that implemented disposal taxes in the U.S., according to the authors, have helped to lessen this wasting habit and being responsible.

It is not sustainable for rural households in South Africa to continuously waste food because it contributes also to environmental degradation, pollution, and public health threats. Yet, food philanthropy is a sustainable strategy in addressing food insecurity which affects many rural communities of Southern Africa. Food philanthropy responds to moral and religious obligations to share with those who need food while help preventing edible food from being discarded. This study in agreement with Hebrok and Heidenstrøm (2019), suggests that people should donate and share food to avoid wastage. Most respondents in the study were of the view of buying only the food needed, especially the non-perishable one.

6.8.3 Households throwing away food per gender

Food waste impacts the lives of many community members as it is one of the main contributors to economic disparities and social inequalities. Looking at the fact that there is no general agreement among researchers regarding the impact of gender on the behaviours and attitudes that lead to FW, the study attempted to explore from the rural area of South Africa whether which gender wastes more than the other. Surprisingly, the results indicated only that a portion of women never throw away food comparing to men. However, the results indicated also that women sometimes throw away more than men. These findings align with the findings from Koivupuro *et al.*, (2012 and Silvennoinen *et al.* (2014) because some single women produce more food waste in comparison to single men; while at the same time agree and disagree with the studies conducted by Barr (2007); Secondi *et al.* (2015); Visschers *et al.* (2016). The current study shows that gender is an important factor that affects attitudes and behaviours of people in relation to food and a potential factor that could affect the amount of food wasted. Yet, most households are managed by women. Hence, RLs can capitalize on women as always responsible for cooking at home.

6.8.4 Households throwing away food per geographical location

It was reported that in Vhembe District, fruits and vegetables, pap, bread and other legumes are the most wasted as they are cheap in Venda and also due to the hot climatic conditions. These findings concur with those of De Laurentiis *et al.* (2018) as well as Heng and House (2022) with similar findings that due to rapid spoilage, fresh fruits and salads were the second and third most wasted foods, followed by fresh vegetables and fruits in the EU. Throwing away edible parts of fruits and vegetables is regarded as a problem of consumption habits (Gorgan *et al.*, 2022). This

habit is frequent in all selected geographical locations of this study. Like in Western Asia and the EU (Chereji *et al.*, 2023),

6.8.5 Food waste reduction willingness

The willingness to reduce household FW was indicated by respondents who were keen to reduce food waste. So, the reduction of FW could start with women as they are mostly in charge of the household food supply and management (UNDP, 2015). RLs have to capitalize on women to fight FW. It is essential to note that while a significant number of respondents are willing to reduce FW, a slight portion tend not to consider that they are wasting food. Further, they view that as acceptable and unavoidable as they are not always aware of the food they are wasting on a daily basis. Similar observations were made in a study conducted by Hebrok & Boks (2017). This is the reason Florkowski *et al.* (2017) admitted that some FW could be discouraged if the consumption choices were different from our actual consumption choices.

6.8.6 Factors influencing people's motivation to reduce food waste

Depending on the values, resources, and context, several factors can influence people's behaviours and beliefs. Yet, awareness, education, and the availability of tools and support systems are often key to changing behavior as each person may be influenced differently. Multiple perspectives are needed to discuss some of the factors. Findings of this study revealed that awareness, environmental concerns, ethical and moral considerations (e.g., feeling of guilt), influence of family and friends, financial savings, religious norms and motivations, including social influence (e.g., family, friend) do influence the motivation to reduce FW. The results of this study align with Khorakian *et al.* (2024).

6.8.7 Factors influencing food waste reduction behaviour through RLs

The moral, social, and cultural authority held by RLs can influence the reduction of FW. This is because intrinsic religious orientation impacts positively household FW prevention behavior. To understand household FW reduction behavior, the study used the theory of hope which is part of positive psychology. Most study respondents indicated that household FW was driven by a range of factors. This is supported by the findings from Filimonau *et al.*, (2022). In this study, cultural and family traditions, over-cooking, dishing more food portions, and amount of FW were

pronounced by respondents particularly during (family and friends) gatherings, such as religious celebrations, weddings, and funerals. Social and religious events generated the largest quantities of FW. Previous studies by Elhoushy & Jang (2021); Filimonau *et al.* (2022); Khorakian *et al.* (2024) indicated that religious teachings and religiosity emphasize positive behavior toward the environment. High hope people pursue goals with affective zest. This study examined those factors in how they can influence food waste reduction behaviour through RLs at the household level. This is because Khorakian *et al.* (2024) recommended that there is a need to examine FW behavior from the lens of religion. RLs through their religious orientations will influence household FW prevention behavior through the proposed FWR strategies.

6.9 Conclusion

Prevention is better than cure. Fighting against FW is key to meeting the Sustainable Development Goal (SDG) 12.3 of the UN aiming to reduce food wastage per capita by the year 2030. As this study has been conducted, it will reflect also on new challenges, opportunities, and weaknesses ahead. It is crucial to remain committed to solutions that are resilient, equitable, and inclusive by bringing on board RLs and other stakeholders. Further, as South Africa is committed to the promotion of sustainable communities; it is also so fortunate for RLs and the entire community for their dedication and optimistic goal to reducing food waste and embarking on the fight for a more just and sustainable food system in rural areas.

Although there are no awareness programmes in the entire district, RLs can lead the way in Vhembe District. Religious educative songs or dramas, government policies, and FW taxes will contribute to the reduction of FW. This study indicates that addressing FW in Vhembe District becomes a moral imperative to promote social cohesion, fairness, responsibility, and sustainability to enable building sustainable communities.

In conclusion, RLs are perceived to have a pivotal role in the fight against FW. Moreover, household FWR behaviour was analysed using hope theory to understand better the factors influencing food waste reduction behaviour. The findings from this study indicate that it is possible for RLs to influence household food waste-reducing behaviour with their intentions to reduce food waste, which can further be influenced through agency and pathways (attitudes, self-efficacy, motivation, planning, and goal setting).

The results contributed to the vast literature documenting the effects of culture - of which religion is certainly an important component on sustainable consumer behaviours of which food waste reduction is a particularly pressing issue. Finally, despite the limited use of religious leaders and

the religion-based approach, the current study emphasized its importance in guiding optimistic FWR strategic interventions. RLs in rural communities have a profound opportunity to influence household FWR behaviours. Their authority, moral guidance, and ability to foster a sense of community can play a crucial role in motivating individuals, household members, businesses, governments, schools, universities, and other stakeholders and institutions to adopt more sustainable practices when it comes to food consumption and waste.

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Chapter 7: Discussion, Conclusion and Recommendations

7.1 Introduction

Since factors influencing food waste reduction behaviour were presented in the previous chapter, this chapter deals with the discussion, conclusion and recommendations. It is structured in this manner: an introduction, a brief discussion of each specific objective, the purpose outcome, a conclusion and recommendations. The discussion starts with a summary of discussion of the key findings of each specific objective. This chapter focuses on restating and discussing how the above-mentioned objectives were realised. Recommendations for FW intervention strategies development, including the strengths and weaknesses of the proposed development programme are outlined. The contributions of the study, recommendations for policy, practice and further research are also discussed. The current study provided a contextualised ground-breaking FW prevention intervention for reducing the magnitude of household FW. The next section presents a summary of the discussion of the key findings for each specific objective.

7.2 Brief discussion of each specific objective

The main objective of this study was to examine the role of RLs in food waste reduction strategies for sustainable food security in the Vhembe District of Limpopo Province, South Africa. Explorative mixed methods were used to conduct the study. This was fulfilled through the following specific objectives:

1. To explore the role of religious leaders in imparting knowledge on FWR among community members.
2. To determine perceptions of RLs in the fight against food waste in Vhembe District.
3. To examine factors influencing food waste reduction behaviour at the household level.
4. To make recommendations for FW intervention strategies at the household level.

The key findings for each specific objective are discussed briefly here and discussion starts with the results obtained during the first phase of data collection and analysis.

7.2.1 The role of RLs in imparting knowledge on FWR among community members

The first specific objective yielded results on the role of understanding factors contributing to FW, the influencing roles of RLs, challenges faced by RLs in imparting knowledge, and lastly the interventions to reduce FW. Exploring the roles of RLs in imparting knowledge on FWR was important to understand factors contributing to household FW. This is because in South Africa,

food should not be wasted but always be valued. The majority of RLs in this study had an adequate understanding of FW including the factors leading to wastage so that they can be able to convey reduction messages as believers listen to them. This is because the behaviour of consumers is influenced by values and beliefs, which in turn are shaped by their cultures (Cummins, 2018). The results of this study is in line with Smith (2020) as an understanding of factors contributing to FW was required to change their FW behaviours and the factors that underpin these choices. Adding to this, the results of this study, as well as the Waste and Resources Action Programme (WRAP) (2018) and De Bruin *et al.* (2019) support the views of RLs that people carelessly and deliberately dispose food frequently. This showed a lack of compassion and empathy for those wasting food. This then explained the reason for the higher amount of FW in the district and it is one of the major challenges for household members.

The findings revealed also that RLs are seen as moral and spiritual guides, teachers of light and good manners, change agents and influencers, ubuntu and food security educators, behaviour changes and illuminators, as well as voice amplifiers among the mentioned roles when identifying the leading roles they can play in influencing FWR. Despite being prohibited by faith, it was found that the odds of wasting food among respondents as Christians were still higher, though they were asked not to waste any food, see John 6:12. This was supported by Hassan *et al.* (2022) when backing up the claim by Pope Francis that “throwing away food” is like “stealing from the table of those who are poor and hungry”. Also, a lack of leadership influencing roles and a lack of awareness creation and education on FWR were identified as the top challenges facing RLs to impart knowledge for FW reduction in the study area. Other challenges that may affect and prevent the implementation of FW or environmental sustainability within developing countries are the lack/inexistence of finance to promote sustainability, the absence of trained personnel, and the nonexistence of knowledge, awareness, practice, and interest in sustainability to achieve overall sustainable development. This suggests that FWR or other environmental sustainability barriers can be overcome when governments and other agencies are able to financially support these projects (Debrah *et al.*, 2021) in rural areas, train RLs to improve on FW and sustainability knowledge, and maintain strong partnerships.

7.2.2 Perceptions of RLs in the fight against food waste

According to the results of this study, RLs face barriers to fighting FW and promoting FWR due to a lack of capacity and a lack of community engagement. They proposed strategies to fight FW within the community where they operate. Conversely, there is room for government involvement to mobilise RLs to use their influence. Yet, RLs will require guidance and education on the

messages to include in their sermons. This finding has not been emphasized in some studies which examined the role of religious leaders in various facets of household food waste reduction.

Regarding the perceived strategies to fight food waste, the results of this study indicated that the need to be educated and trained. This is because providing education is essential for human empowerment. Thus, providing FWR education will enable the creation of new beliefs in an individual to allow new behaviours to emerge as interventions that shift social norms. These findings corroborate with similar results from Heise & Manji (2016) and Le Roux and Palm (2021).

7.2.3 Factors influencing food waste reduction behaviour at the household level

The findings of this study indicated that household members throw away food in the three selected locations. This was in line with findings by Gustavsson *et al.* (2011) that food waste occurs at consumption stage (households). Urban areas generated a greater quantity of FW, both in terms of type and composition than rural areas of Indonesia (Sugiyarto, 2021; Martianto *et al.*, 2024). Moreover, it was highlighted that the provision of education is widely needed by the majority of the respondents as they live near Thohoyandou where there the University of Venda and other agricultural colleges are based. Yet, most respondents were literate and educated. The study indicated that the promotion of food philanthropy, provision of education (knowledge and awareness), buying the food needed only, being mindful and responsible were the views of household members for the reduction of FW. Being mindful and responsible, means being able to prevent the continuous wasting behaviours and habits through capacity building. This connects also with a study by Katare *et al.* (2016) that implemented disposal taxes in the U.S., according to the authors, have helped to lessen this wasting habit and being responsible.

7.3 The purpose outcome

The purpose of this thesis was to examine the role of RLs in food waste reduction strategies for sustainable food security in the Vhembe District of Limpopo Province, South Africa. The study aimed at identifying effective interventions and best practices that can be adopted by governments, businesses, and communities to mitigate food waste, while also assessing the socio-economic and environmental benefits of these strategies. The current study also aimed at unpacking the existing roles of religious leaders in imparting knowledge on FWR among community members, perceptions of RLs in the fight against food waste, factors influencing food waste reduction behaviour, and then recommend a reduction in strategy. Through this research, the thesis seeks to contribute to the ongoing efforts to combat hunger, enhance food availability,

and promote sustainability in global food systems; with the ultimate goal of improving food security among rural households for sustainable rural development.

The next section presents the proposed development of an intervention program integrated with the meta-analysis and the conceptualization of the study findings. The researcher proposed two interventions, namely the educational development model programme and the FWR Strategy, recommended to be developed. The proposed intervention programme is guided by the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis and the Building on the Strengths, Overcoming the weaknesses, Exploring the opportunities, and Minimising the threats (BOEM) model. The BOEM was used to develop the proposed framework for enhancing food waste reduction behaviour through RLs at the household level.

7.4 Adapted process for the proposed intervention strategy development

Strategic planning is a critical means of helping companies or organisations to reach their goals. It is a part and a key to successful strategic management (Gurel and Tat, 2017). Previous researchers imply that strategic management is a set of managerial decisions and actions that determine the organisational performance over the long term (Weihrich, 1982; Studer, 2016; Widiatama, *et al.*, 2018). Thus, the researcher finds it fit that a well-designed and developed tailor-made strategic intervention will help RLs to play their pivotal role in assisting households and community members to reduce FW, after good strategic planning with other stakeholders. Moreover, SWOT Analysis consists of “Strengths”, “Weaknesses”, “Opportunities”, and “Threats”. It is a tool used for building organisational and competitive strategy (Gurel and Tat, 2017; Puri, 2017). Adding to this, it has been defined as a tool used to measure the organisation's strengths, weaknesses, opportunities for development, and threats that can affect the desired outcomes of a programme (Gretzky, 2010). According to Leliga *et al.* (2019), strengths and weaknesses are the internal factors that can be found within an organisation, and opportunities and threats are the external factors that affect the performance of any organisation (Leliga *et al.*, 2019).

Thus, formulating a good set of strategies will improve the performance or sales of an organisation. Hence, SWOT analysis was conducted to find solutions to maintain FWR performance of households. In this study, it was used to guide the development of the proposed framework to enhance the implementation of food waste reduction strategy (FWRS) services among household members. Adding to this, organisations use it often as a strategic planning tool to identify their internal strengths and weaknesses, as well as external opportunities and threats (Figure 7.1 below shows a SWOT analysis diagram). In brief, a SWOT matrix is a structured planning method used to evaluate the strengths, weaknesses, opportunities, and threats when

developing frameworks, programmes, and services of many institutions or organisations. Additional analysis of the matrix will focus on political, economic, social, technological, legal, and environmental (PESTLE) factors to develop the proposed framework. Therefore, based on the findings of the study, the researcher has identified internal and external factors. Below is the diagrammatical representation of the SWOT analysis (Figure 7.1).

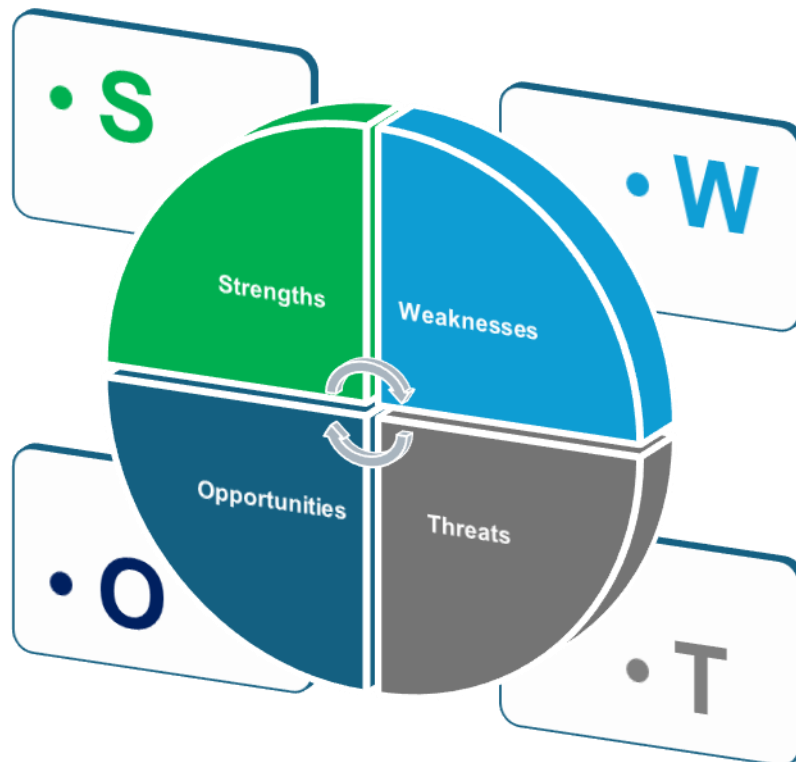


Figure 7.1: SWOT analysis diagram

7.5 Steps followed in SWOT analysis

SWOT analysis is a useful tool to provide valuable insights into the current status of FWR programmes and help to formulate strategies to improve their effectiveness (Leigh, 2010). Strengths are attributes that are helpful for the organisation to achieve its goals, whereas weaknesses are attributes that are harmful to the organisation to achieve its goals. Internal and external factors are identified and explained below.

7.5.1 Internal factors

The internal analysis examines the advantages and drawbacks of the programme. This is done by analysing its strengths and weaknesses as per the results of this study. Five steps are to be followed.

Step 1

Strengths are factors that have prompted outstanding organisational performance (Gretzky, 2010). The identified Strengths of the current proposed FWRS programme include the influencing role of RLs (moral and spiritual guiders; teachers of light and good manners; change agents and influencers; ubuntu and food security educators; behaviour changers and illuminators; voice amplifiers) for FWRS services, available infrastructure, and resources. This will help in leveraging existing strengths to enhance the easy implementation of the proposed FWRS.

Step 2

Weaknesses are the organisational factors that increase FW behaviours or reduce FW practices (Gretzky, 2010; Astika and Suharyo, 2021). The Weaknesses identified include gaps in service delivery, lack of leadership influencing role, lack of capacity, lack of community engagement, lack of awareness creation and education, including the absence of interfaith collaboration to tackle FW in communities. Addressing these weaknesses is crucial for improving the implementation of the proposed FWRS through RLs.

7.5.2 External factors

The external analysis examines the main points in the analysis of the actual circumstances and environment of RLs. This is done by identifying those points that represent opportunities and those that represent threats to future achievements.

Step 3

This step focuses on opportunities. Here, the researcher agrees with Gretzky (2010); and Astika and Suharyo (2021), stipulating that opportunities are the new initiatives available to any particular organisation. Opportunities that can enhance the implementation of the proposed FWRS, such as the potential to influence policy changes that support the integration of skills, innovative thinking models, funding opportunities, partnerships with community-based organisations, and advances technologies are identified. Leveraging these opportunities can help in the full implementation of the proposed FWRS.

Step 4

According to Gretzky (2010); and Astika and Suharyo (2021), threats are factors that can negatively impact the performance of an organisation or institution. Therefore, it is possible that threats can hinder the implementation of the FWRS identified in this proposed programme. This may include political interference, limited access to funding, and so on. So, mitigating these threats is essential for the successful implementation of the proposed FWRS programme.

Step 5

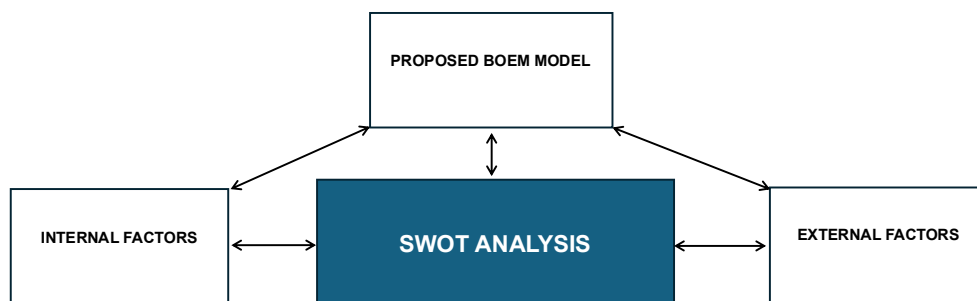
The researcher reviewed all the data from Chapters 4 and 5, and repeatedly listed strengths, weaknesses, opportunities, and threats. The SWOT matrix was developed according to the strengths, weaknesses, opportunities, and threats (Astika and Suharyo, 2021). The information on the SWOT matrix were used and the results turned into actionable entities. Build on the strengths, Overcome the weaknesses, Explore the opportunities, and Minimize the threats (BOEM) approach is used to guide the development of the proposed framework model for FWR Strategies for Sustainable Food Security in Vhembe District. Table 7.1 below depicts the SWOT analysis matrix.

Table 7.1: SWOT analysis matrix

SWOT Analysis Matrix			
STRENGTHS		WEAKNESSES	
		Internal Factors	
• Influencing role/Willingness of RL to contribute		• Lack of leadership influencing role	
• Behaviour changers		• Lack of capacity	
• Change agents and influencers		• Lack of community engagement	
• Moral and spiritual guiders		• Lack of awareness creation and education	
• Ubuntu and food security educators		• Limited knowledge of practical solutions	
• Voice amplifiers with established trust		• Absence of interfaith collaboration	
• Available infrastructure, networks, and resources		• Inconsistent Resources	
• Access to large audiences		•	
OPPORTUNITIES		THREATS	
		External Factors	
• The University of Venda		• Lack of funds for implementing FWR initiatives	
• Always preach on local radio stations		• Misinformation or misunderstanding	
• Community engagements on different platforms		• External environmental factors	
• Education and awareness campaigns		• Other competing priorities	
• Leveraging social media		• Resistance to change	
• Religious observances		• Engagement of other stakeholders	
• Thulamela and Vhembe Pastors Forum			
• South African Council of Churches			

7.6 BOEM Model Application

Build on the strengths, Overcome the weaknesses, Explore the opportunities, and Minimize the threats (BOEM) approach is used as a model in this study to guide the development of the proposed framework model for FWR Strategies for Sustainable Food Security in Vhembe District. The development of a strategy will arise from the analysis of the SWOT analysis outlined above. To strengthen the implementation of the proposed programme, RLs, government and other stakeholders should work together to polish this proposed programme for its successful implementation. This, through the leadership of RLs will create a cohesive and just society, and sustainable environment that improves the lives of the people by ensuring equal food philanthropy and feeding opportunities for all within the Vhembe District, ultimately contributing to the goal of reducing FW in South Africa, the SADC region and Africa at large.



BOEM development using SWOT Analysis

Figure 7.2: BOEM development using SWOT Analysis

7.6.1 The BOEM Action Plan for FWR

The BOEM plan is often used in health and management sciences. Hence, the researcher borrowed it intelligently to apply it in this study within the field of rural development. This should be guided by the results from the SWOT analysis. Further analysis of the matrix focused on political, Economic, social, technological, legal, and environmental (PESTLE) factors is needed to develop the framework. BOEM consists of four components described below with these questions that were answered by the researcher.

1. **Build** on the strengths
 - *What can be done to build on the strengths?*
2. **Overcoming** the weaknesses
 - *What can be done to overcome the weaknesses?*
3. **Explore** and exploit opportunities
 - *What can be done to explore and exploit the opportunities?*
4. **Minimize** the threats
 - *What can be done to minimize the threats?*

These questions will be answered on the BOEM Strategy (Table 7.2 below).

7.6.2 Validation of the proposed framework development

The Delphi technique is a structured communication method that involves a series of anonymous questionnaire rounds to gather expert opinions and achieve consensus (Mustakim *et al.*, 2023). This technique will be used to validate the proposed framework.

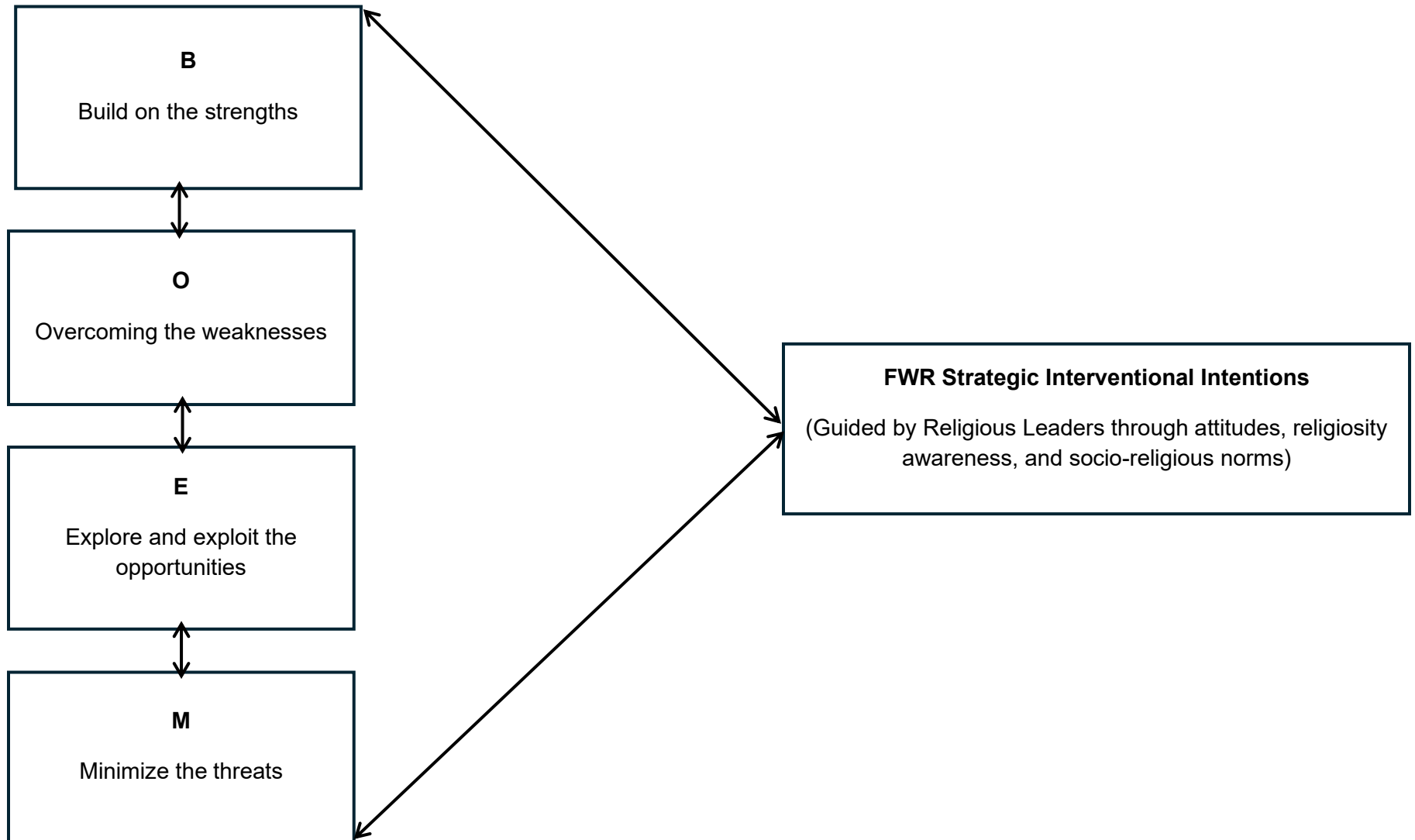


Figure 7.3: The BOEM Action Plan diagram for FWR Strategy (Author's own design).

Table 7.2: BOEM Strategy

BOEM Strategy			
BUILD ON THE STRENGTHS		OVERCOME THE WEAKNESSES	
		Internal Factors	
STRENGTHS	ACTIONS	WEAKNESSES	ACTIONS
Human resources	To facilitate that: - There must be staff trained in the provision of FWR services weekly. - Use SMS reminders to avoid wastage and for food donation. - There must be a mentor who will assist community members with FWR education and encourage them to utilize FWR services.	Accessibility	- Deploying foot soldiers/groundbreakers in remote areas can bridge the gap between FWR facilities and communities. - Encouraging communities to use their nearest church or NGOs. - Engaging local leaders and peer educators in awareness campaigns to reduce food waste and encourage food philanthropy.
Competence	- Regular training programmes for FWR workers to ensure that they are up to date with the latest protocols and can maintain high-quality food safety and care. - Establishing mentorship and food supply chain systems within the food industry workforce to improve job satisfaction and reduce misunderstandings. - Training of community FWR workers, food collectors, health	Acceptability	- Establishing food support groups for people living in key remote areas to provide a platform for sharing experiences and encouragement - Community food philanthropy literacy through FWR education on FWR services should be disseminated through community awareness campaigns, local newspapers, community radio, TV channels, and social media.

	promoters, and other categories on FWR services.		
Financial costs	- Providing financial subsidies for transportation and food collection costs - Programmes can offer vouchers or reimbursements to alleviate these burdens. - Implementing home visit programmes can offer additional support and ensure community members adhere to the plans.	Availability	- There should be availability of FWR services weekly in all Churches/parishes or congregations. - There must be a mentor and staff trained in the provision of FWR services. - Community food philanthropy literacy through FWR education on FWR services should be reinforced.
EXPLORE THE OPPORTUNITIES		MINIMIZE THE THREATS	
External Factors			
OPPORTUNITIES	ACTIONS	THREATS	ACTIONS
Political	- Advocating supportive policies and ensuring the availability of policies on food waste, food donation, and food sharing. - Involve a wide range of stakeholders, including civil society organisations and community leaders, in planning and decision-making processes to build a broad support base.	Political	- Utilising the available policies, protocols, and guidelines for community engagement.
Economic	- Advocate for government funding dedicated to FWR programmes.	Economic	- Motivate unemployed youths and students to participate in community development projects to

	- Leverage funding from international organisations and donors who are interested in supporting FWR initiatives. - Collaborate with non-governmental organisations (NGOs) that focus on food security and development to pool resources and expertise. - Engage with private sector companies to support FWR services as part of their Corporate Social Responsibility (CSR) initiatives.		acquire skills. - Advocate for supportive policies and legislation that prioritize FWR services within national agendas. - Establish alliances with various sectors, including agriculture, education, health, finance, and social development to build a broad support base for FWR initiatives.
Socio-cultural	- Educational programmes targeting families, communities, schools, universities can emphasize the importance of FWR services and support. - Develop clear and compelling messages that highlight the importance and benefits of FWR services to both policymakers and the public.	Socio-cultural	
Technology	- Use SMS reminders and telefood for follow-up and reminders. - YouTube/WhatsApp Motivational messages and tips to people utilising FWR services.	Technology	- Engaging other stakeholders such as ward counsellors and CDW committees to disseminate information on the challenges affecting FWR facilities. The stakeholders will assist in identifying different communication options that can be used

			to disseminate information to the community.
Laws	- Guidelines, protocols, and policies that food security workers can encourage community members involved in FWR services interventions. - Advocate for laws that empower communities to participate in the planning and implementation of FWR services.	Law	- Strengthening community involvement in FWR services and promote counselling to discourage food waste and encourage food philanthropy. - Strengthen the establishment of support groups.
Environmental	- Strengthening community partnerships can build trust and increase service uptake. - Establish food support groups for people to share food, experiences and encourage each other to donate food. - Encouraging people to donate in their nearest church. - Deploy foot soldiers/groundbreakers to reach remote areas, providing FWR services directly within communities.	Environment	- Utilise peer educators and community leaders to build trust and encourage service involvement.

Note: This proposed BOEM Strategy can be amended and modified.

(Source: Author's own design).

7.7 Conclusion

Throughout the African continent, RLs possess significant potential to contribute to FW reduction by virtue of the assets they manage. However, in many African countries including South Africa, FW initiatives and programmes led by RLs are non-existent. This is due to their limited integration and participation in the national food system sustainability priorities, which may hinder their proactive engagement in FW initiatives. To address this, it is crucial to foster a concerted, participatory approach involving RLs, FBOs, government, the private sector, and other stakeholders.

Most of the customers (household members) in Vhembe District indicated that they are keen to reduce FW, while also acknowledging that RLs are well positioned to address this issue as they are trusted by them. The majority of respondents frankly agreed that they waste food often, yet willing to learn and be capacitated as well. This gives place to a proposed educational development programme model and a FWR Strategy. Engaging RLs in the fight against FW is such a great opportunity for intervention, and the impacts of reducing FW within communities.

This is the right time to realise the potential of reducing FW in rural communities of South Africa. Understanding that the reduction of food wastage is a promising strategy, thus will save more money for the country and achieve food security by improving the food system sustainability. Surely, sustainability involves meeting the needs of the present without compromising the ability of future generations to meet their own needs. Thus, through this study, the researcher seeks to strengthen and advance the international effort to achieve the SDGs by 2030. Therefore, RLs require more capacity building, training, including both financial and technical assistance to implement FWR initiatives in rural areas. This study proposes a development model for FWR Strategies. Coordinated efforts to reduce FW will contribute to rural development in Vhembe District Municipality and countrywide; while also complementing efforts to reduce food insecurity, social inequality linked to food accessibility, as well as methane emissions from landfills. The researcher proposed two interventions namely the educational development model programme and the FWR Strategy recommended to be developed as a contribution.

7.8 Outcomes of the Study

The results of this study is expected to contribute to better engagement of RLs in facilitating FW reduction strategies and mitigation at the household level through moral responsibility. Implications and suggestions for further research and recommendations for household members were provided based on responsible consumption and sustainable management. This study

complemented the work of the National Planning Commission to achieve the desired objectives of the NDP Vision 2030 and enable greater understanding and measurement of FW at the household level and also shedding light on contributing factors and practical solutions. Another positive outcome of this study is achieving a reduced FW and food security in the study area. This study will help in designing a code of conduct on sustainable food consumption and developing a sustainable FW reduction strategy through social innovation and indigenous methods. Further, the study contributed to the body of knowledge, and peer-reviewed papers are expected.

7.9 Potential Impact

Multidisciplinary in nature, this study includes perspectives and disciplines ranging from agriculture, human development, consumer behaviour, theology and religion, planning, sociology, and environmental policy among others. Further, it addressed a global issue adding a new approach focusing on religious leaders, as well as new and ongoing debates around systemic causes and solutions, including behaviour change, social innovation, new technologies, spirituality, redistribution, animal feed, and activism. The study described waste prevention and reduction strategies for sustainable food security.

Regarding science for society, this study impacts positively on the society by bringing solutions through the development of interventions to reduce food wastage in order to contribute to food security. Further, with the implications of religious leaders as key players within the civil society sector, the study will impact in minimizing the problem of food insecurity and inequality, hunger, and malnutrition among residents of Vhembe District Municipality in Limpopo Province of South Africa. Because the continuous wastage of food is a human rights violation and an act of immorality that lacks the Ubuntu values and principles. The researcher believes that the FW Reduction strategy was proposed for future development from this study, and will become a national responsibility and a moral obligation for every person with responsible ethical leadership and high spirituality of love, care and compassion towards others, especially those less fortunate, disadvantaged and vulnerable for a sharing community. This is because whenever we talk about FW, we talk about life, humanity and our existence as the custodians of the planet earth that produces food for us all.

7.10 Recommendations

7.10.1 Recommendation for Policy

It is recommended that policymakers develop policies on the role of RLs in FWR strategies for sustainable food security. These policies could leverage the influence of RLs and their faith-based communities (FBOs) to encourage ethical consumption, food philanthropy, stewardship, and solidarity, while fostering sustainable practices. Policymakers should also develop tailor-made training programmes for RLs to educate congregations about the environmental, ethical, and social consequences of FW. This could involve creating educational materials that integrate faith-based teachings with practical food-saving and FWR strategies.

7.10.2 Recommendations for Practice

This study highlights the important role of RLs in influencing household food waste prevention behaviour. This contributes also to infusing science into understanding the behavioural dynamics of FWR strategies in remote areas of South Africa. It is recommended that capacity building be provided to RLs in South Africa. Further, there is a need for government involvement to train and mobilise RLs to use their influence towards FWR by 2030 to meet the Sustainable Development Goal (SDG) 12.3 and align to the the National Development Plan (NDP) Vision 2030. Knowledge and skills will increase the capability of RLs to address FW issues in the study area. Awareness campaigns, advocacy, and community engagement should be implemented by RLs to stimulate food waste reduction at home.

RLs in partnership with the government could initiate a media initiative aimed at educating the public about the importance of indigenous food conservation and other innovative methods. Eventually, by fostering greater collaboration and addressing these recommendations, South Africa can immensely harness the full potential of its RLs to contribute significantly to the national goal of reducing FW, thereby advancing the country's goals for a sustainable food system transformation. Household members should be encouraged to plan meals, proper food preparation, and do shopping lists that contain the products needed to reduce food waste. Also, they should be encouraged to save leftovers and be provided with the skills and knowledge on how to re-use and transform leftovers into a new meal. The reduction in FW is seen as a critical factor for achieving food and nutrition security, feeding the hungry, and also saving the lives of those in starvation.

7.10.3 Recommendations for further research

This study has examined the role of RLs in food waste reduction strategies for sustainable food security in Vhembe District of Limpopo Province, South Africa. Yet, studies into the role of religion in solid waste management (SWM) are extremely limited in the literature (Mohamad *et al.*, 2012). Further research should focus on extending the research to other locations, national and regionally within the SADC. Therefore, future studies might address limitation of this study. There is a need for an increased understanding of food waste handling in other sectors while infusing RLs. Hence, conducting further research in these areas can provide valuable insights and guidance for designing effective food waste management strategies in South Africa. In addition, it should include the development of the proposed FWR Strategy Framework.

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Annexures

Appendix 1: Ethics Approval Certificate

ETHICS APPROVAL CERTIFICATE

ETHICS APPROVAL CERTIFICATE

FACULTY OF SCIENCE, ENGINEERING AND AGRICULTURE RESEARCH ETHICS COMMITTEE

NAME OF RESEARCHER/INVESTIGATOR: Mundadi J.M.M.

STAFF/ STUDENT NO: 14004516

PROJECT TITLE: Food Waste Reduction Strategies for Sustainable Food
Security in South Africa

ETHICAL CLEARENCE NO: FSEA/22/IRD/24/1707

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Obadine O. S	International Relations and Partnerships	Supervisor
Oelofse S.H.H	Council for Scientific and Industrial Research	Co-supervisor
Marjono M.M	University of Venda, Institute for Rural Development	Co-supervisor

Type: Student research

Risk: Minimal risk to humans, animals, or environment (Category 1)

Approval Period: March 2023-January 2026

The Faculty Research Ethics Committee (FREC) of the Faculty of Science, Engineering and Agriculture hereby approves your project as indicated above.



University of Venda

PRIVATE BAG X3050, THOHoyANDOU, 09503, LIMPOPO PROVINCE, SOUTH AFRICA
TELEPHONE: (015) 962 8504/8313, FAX: (015) 962 9090
"A quality driven financially sustainable, Comprehensive University"

Data Collection Tools

Appendix 2: Letter of information for participants

LETTER OF INFORMATION FOR PARTICIPANTS

Consent to be a research participant

Dear Participant,

I am Joseph M. Mundadi, currently completing my Masters in Rural Development at the University of Venda, Department of Rural Development within the Faculty of Science, Engineering and Agriculture (FSEA). I am carrying out a study on **Food Waste Reduction Strategies for Sustainable Food Security in Vhembe District, Limpopo Province, South Africa**. I humbly requesting you to answer the following questions as honestly as possible for the purpose of this research which will benefit the community particularly and the country in general. I truly assure you that the information given will be treated with confidentiality and your details will not be revealed at any time.

Your cooperation in this regard is most appreciated. Participation in this research project is voluntary. You can stop any time you choose to leave. You do not have to answer questions you do not feel comfortable with throughout the duration of the study.

Signature of participants

Date: / / 2024

Signature of interviewer

Date: / / 2024

Appendix 3: Statement of consent

STATEMENT OF CONSENT

I have read the information provided above and understood the contents of this invitation to participate in the study. Further, I have had the opportunity to ask questions about the study and they have been answered to my satisfaction. Thus, I voluntarily agree to participate in this study.

Signature of participants

Date: / / 2024

Signature of interviewer

Date: / / 2024

THANK YOU FOR ACCEPTING TO PARTICIPATE IN THE STUDY

Appendix 4: Letter of consent

LETTER OF CONSENT

Dear Prospective participant,

You are being invited to participate in a research study on **Food Waste Reduction Strategies for Sustainable Food Security in Vhembe District, Limpopo Province, South Africa**. I am Joseph M. Mundadi, a Doctoral student within the Institute for Rural Development, Faculty of Science, Engineering and Agriculture (FSEA) at the University of Venda. This study is being carried out in fulfilment of the requirements of the Doctoral Degree. I will be working together with my two research assistants to facilitate the work regarding the data collection process. The study examines the role of Religious Leaders in Food Waste Reduction Strategies for Sustainable Food Security in Vhembe District of Limpopo Province, South Africa while exploring their influence in imparting knowledge on food waste reduction among community members.

You have been selected to participate in this survey because of your knowledge in community development activities. This research will require about 1-2 hours of your time. During this time, you will be interviewed about your experiences in the role religious play in rural development efforts. The interviews will be conducted wherever you are comfortable.

There are no anticipated risks, harm or discomforts related to this research. Your participation in this research is completely voluntary. You are free to withdraw from the study at any time for any reason. By participating in this research, you may also benefit others by helping people to better understand the roles and responsibilities of religious leaders in rural development work.

Several steps will be taken to protect your anonymity and identity. Interviews will not contain any mention of your name, and any identifying information will be removed. The questionnaires will be kept safe in a locked filing cabinet at the University of Venda. All information will be destroyed within 5 years' time.

The results from this study will be used to write up the thesis. In addition, journal articles will be published on the study so as to add knowledge on the body of knowledge pertaining food waste. The outcomes of the study will be presented to you and the rest of the participants so that you access the new knowledge generated. The policy recommendations will be disseminated to relevant institutions through a policy brief. However, at all these stages, names of the study participants will not be mentioned.

If you wish to receive a copy of the results from this study, you may contact me telephonically on +27 (0) 78 577 3921. Please do not hesitate to contact me if you have any other questions regarding this study or your rights as a participant in this research, you may also contact my supervisory team made of Dr. OS Obadire; Professor SHH Oelofse and Dr. MM Manjoro at: segun.obadire@univen.ac.za; soelofse@csir.co.za, marizvikuru.manjoro@univen.ac.za

Sincerely

Name

Signature

Date

Appendix 5: Permission to conduct the study

University of Venda
Thohoyandou, 0950

The District/Municipal Manager
Vhembe District Municipality
Thohoyandou
0950

Dear Sir/Madam,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY

This letter serves to request permission to conduct a study entitled: **FOOD WASTE REDUCTION STRATEGIES FOR SUSTAINABLE FOOD SECURITY IN VHEMBE DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA**. I hereby formally request permission to carry out the above study in the Vhembe District area particularly in Thulamela and Makhado Municipalities for the Doctoral degree in Rural Development within the Faculty of Science, Engineering and Agriculture (FSEA) at the University of Venda. The purpose of this study is to examine the Role of Religious Leaders in Food Waste Reduction Strategies for Sustainable Food Security in Vhembe District of Limpopo Province, South Africa while exploring their influence in imparting knowledge on food waste reduction among community members. This will involve the use of interviews, focus & visual group discussions, questionnaire, and personal observation. This study is quite significant because the findings will not only be used for academic qualification but can also be used to develop solution-driven interventions for the reduction of household Food Waste for Sustainable Food Security in South Africa.

Kindest regards,

Mr. Joseph M. Mundadi

Appendix 6: Questionnaire

Your assistance is hereby requested to complete the questionnaire to the best of your knowledge. This questionnaire may take 30 minutes to complete. Kindly hand the completed questionnaire to the person who gave it to you immediately after filling it. The questionnaire comprises of four sections.

Instructions

Kindly answer the following questions by **filling** or marking an **X** to the section that best describes your opinion. Please note that some questions may appear similar, however, they address different issues. Read each question carefully before answering.

Date:	
Activity:	

Section A: Biographical Data

A.1. Personal Data

1	Gender	☐ Female (1) ☐ Male (2) ☐ Prefer not to say (3)					
2	City/ Town/ Village						
3	Geographic location	Urban (1) ☐		Semi-Urban (2) ☐		Rural Township (3) ☐	
4	Municipality						
5	Province						
6	Country						
7	Age Group (please tick)	18-35 (Youth) (1) ☐		36-59 (Adults) (2) ☐		60 and above (Elderly) (3) ☐	
8	Employment Status	Employed (1) ☐	Unemployed (2) ☐	Self-employed (3) ☐		Other (4) ☐	
9	Marital Status	Single (1) ☐	Married (2) ☐	Divorced (3) ☐	Widow (4) ☐	Widower (5) ☐	
10	Race	African ☐ (1)	Coloured ☐ (2)	Indian ☐ (3)	White ☐ (4)	Other ☐ (5)	
11	Religion	Atheist (1) ☐	Christianity ☐ (2)	Hinduism (3) ☐	Islam (4) ☐	Traditional (5) ☐	Other (6) ☐
12	Education level	Primary School (1) ☐	Secondary School (2) ☐	Vocational (3) ☐	Adult literacy (4) ☐	Tertiary (5) ☐	☐ Degree (1) ☐ Honours (2) ☐ Masters (3) ☐ PhD (4)
13	Are you living with a disability	☐ No (1)		☐ Yes (2)		If yes specify type of disability ☐ Physical (1) ☐ Sensory (sight, hearing, taste, speech, smell) (2) ☐ Learning (3) ☐ Mental (4) ☐ Other (5)	

A.2. Household Data and Behaviour

Variable	Question
14	Household source of income What is your source of income? ☐ Wage or salary (1) ☐ Investment Business (2) ☐ Government grant (3) ☐ Pension (4) ☐ Other (5)
15	Average household income How much does your household earn or receive every month on average? ☐ Less than R 1000 (1) ☐ R1001 - R5000 (2) ☐ R5001 - R 10 000 (3) ☐ Over R10 000 (4)
16	Number of household members How many are you in your households ☐ One (1) ☐ Two (2) ☐ Three (3) ☐ Four (4) ☐ Five (5) ☐ Over six (6)

Section B: Household FW Practices

Read each statement below and tick the correct answer

1. How often does your household find itself throwing away food? (Select only one)

1	Never	
2	Rarely	
3	Sometimes	
4	Often	
5	Always	

2. How often do people throw away uneaten food products?

1	Daily	
2	Several times a week	
3	Once a week	
4	Once or twice a month	
5	Less than once a month	
6	Never	

3. What is the main reason for your household food waste? (Select only one)

1	Over-purchasing of food during promotions	
2	Poor meal planning	
3	Food spoilage due to improper storage	
4	Cooking too much food	
5	Lack of knowledge on food preservation	
6	Other (please specify)	

4. Which types of food do your household waste most often? (Select all that apply)

1	Dairy products	
2	Drinks and other beverages	
3	Fruits and vegetables	
4	Grains (bread, pasta, rice)	
5	Meat and poultry	
6	Prepared meals	
7	Other (please specify):	

5. Does your household keen to reduce food waste? Yes ☐ No ☐ Not Sure ☐

If yes, explain then go to the next section.

.....

.....

Section C: Factors that Influence Household FW Behaviour (HFWB)

C1: Agency (Self-Efficacy and Motivation)

1. What factors influence people's motivation to reduce food waste?

SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, SA= Strongly Agree

		SD	D	N	A	SA
1	Awareness of food waste issues					
2	Environmental concerns					
3	Ethical and moral considerations (e.g., feeling of guilt)					
4	Influence of family and friends					
5	Financial savings					
6	Religious norms and motivations					
7	Social influence (e.g., family, friends)					
8	Other (please specify)					

2. How does RLs led-awareness influence FW behaviour change at your household?

1	Not at all influenced	
2	Slightly influenced	
3	Moderately influenced	
4	Very influenced	
5	Extremely influenced	

3. What do the religious leaders do to motivate households to reduce food waste?

.....

.....

4. What other factors that influence people's food waste behaviour?

Key to responses

SD= **Strongly Disagree**, D= **Disagree**, N= **Neutral**, A= **Agree**, SA= **Strongly Agree**

	Social Motivation	SD	D	N	A	SA
1	I do pay attention always to keep food in the fridge or freezer.					
2	I shop often for food without any reason.					
3	I throw away food without sharing it.					
4	I do not enjoy wasting food at home.					
5	I have many concerns and family problems regarding food waste.					
6	I think like we insult God when we are wasting food.					
7	Load shedding also contributes to food wastage.					

5. What factors can influence food waste reduction behaviour through RLs?

Key to responses

SD= **Strongly Disagree**, D= **Disagree**, N= **Neutral**, A= **Agree**, SA= **Strongly Agree**

	Cognitive Motivation	SD	D	N	A	SA
1	Having money makes me wasting food.					
2	My religious beliefs and norms influence my attitudes and behaviours to not waste food.					
3	I hope the issue of food waste can be addressed through RLs?					
4	I value food as a precious resource and a gift from God.					
5	I reduce food waste to uphold my faith and showing love.					
6	I think lack of incentives promote more food wastage.					
7	I think the society does not care about food waste.					
8	My cultural or family traditions lead me to food waste.					
9	My estimated amount of food waste is a lot.					
10	Wasting food will tarnish my image in the community.					
11	I have to educate household members, visitors and encourage everyone in the household to be mindful about over-serving food.					
12	If I am reducing wasting food, I contribute to develop my society and protect my environment.					
13	I think I should control food portion and be mindful of food waste habits to reduce my wastage.					
14	I think I have to share surplus food with neighbours and participate in food-sharing initiatives at the community level.					
15	Reducing food waste improves my social responsibility of donating food to others.					

Section D: Household FWR Strategies

D2: Pathways (Planning and Goal Setting)

1. What can be done to reduce food waste?

1	Donate food and promote food philanthropy	
2	Provide education	
3	Encourage people to buy only what they need	
4	Buying less perishable food	
5	Be responsible and mindful steward	

2. Do you have a plan or strategy in place for reducing food waste in your household?

1	Yes, a detailed plan	
2	Yes, a general plan	
3	Neutral	
4	No, but I am considering creating one	
5	No, I do not plan to create one	

3. If yes, please provide us with that plan

.....

.....

4. How often do you set specific goals related to reducing food waste?

1	Never	
2	Rarely	
3	Sometimes	
4	Often	
5	Always	

5. Do you try to avoid wasting food in your daily life?

1	Never	
2	Rarely	
3	Sometimes	
4	Often	
5	Always	

6. What methods do you use to manage and reduce food waste?

SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, SA= Strongly Agree

		SD	D	N	A	SA
1	Meal planning					
2	Keeping a shopping list					
3	Proper food storage					
4	Food Philanthropy (donation)					
5	Using leftovers creatively					
6	Composting food scraps					
7	Feeding pets					
8	Other (please specify):					

7. How effective do you believe your current methods are in reducing food waste?

1	Not at all effective	
2	Slightly effective	
3	Moderately effective	
4	Very effective	
5	Extremely effective	

8. What kind of support or resources would help you in reducing food waste through RLs?

		SD	D	N	A	SA
1	Interfaith Educational materials					
2	Practical tools (e.g., food storage containers)					
3	Religious Workshops or training sessions					
4	Religious Community programmes					
5	Online resources or food waste reduction apps or Artificial Intelligence Software					
6	Other (please specify):					

Thank You