

# Household behaviour towards waste management – A case study amongst the youth in Parys, South Africa

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## ABSTRACT

The aim of this study was to investigate household behaviour towards waste management amongst the youth in Parys, South Africa. Various research studies have been conducted globally which indicated the acute household waste problem in cities like China, Seoul, Brazil and Mexico City. These cities receive more than 10 000 tonnes of household waste per day. The Saharan African region is characterised by household waste creation due to population growth and urbanisation. In South Africa the situation is also deteriorating. The youth is the future citizens of the nation and they should actively participate in solving environmental issues (Sujatha, 2012:6).

Household waste has been increasing annually by an alarming rate, exacerbating threats such as global warming and ozone depletion, if not managed well. The legal mandate in South Africa is briefly discussed in this study, to establish the structures that are in place to assist with household waste management in South Africa. The waste management hierarchy is embedded in the South African waste policy (NEMWA). This hierarchy guides household waste behaviour by avoiding and reducing household waste as the preferred method, rather encouraging re-using, recycling and treatment of household waste. Disposal of waste is seen as the last resort.

The Theory of Planned Behaviour (TPB) served as theoretical lens to understand the influencing factors of household waste behaviour. This is a popular and validated tool to assist in explaining the influencing factors of human behaviour towards household waste.

The quantitative study using a questionnaire, established that learners have a proper understanding of household waste, regarding it as everything that is thrown away in the kitchen bin. They occasionally have a sense of responsibility towards the environment. Environmental education (EE) can improve environmental awareness, yet steps have to be taken to address this phenomenon. Treatment of waste in terms of creating a compost heap is not a favourable option.

Learners do engage in the re-use of items from household waste regularly, and they do make an attempt to avoid the creation of waste. Recycling does however, not take place enough and there seems to be a misconception that recycling is time-consuming. Most households do not sort their household waste. Learners are willing to sort and recycle waste if a system can be implemented that does not take up much time. The use of incentives for recycling waste is also an attractive option. Individuals must focus on reduction (prevention/minimisation) of household waste and where it is not possible, re-use, recycle and recover (Parkour *et al.*, 2014).

**Keywords:** Household waste, household waste behaviour, household waste management, youth, Parys

## OPSOMMING

Die doel van hierdie studie is om huishoudelike gedrag teenoor afvalbestuur te ondersoek onder die jeug in Parys, Suid-Afrika.

Verskeie navorsingstudies is reeds wêreldwyd uitgevoer en die globale huishoudelike afval probleem is akuit in stede soos China, Seoul, Brasilië en Mexico stad. Hierdie stede ontvang daaglik meer as 10 000 ton huishoudelike afval. Die Sub-Sahara Afrika gebied oorheers die dilemma weens oorbevolking en verstedeliking. In Suid-Afrika is die toestand ook besig om te versleg. Die jeug is die toekoms van die land en hulle moet aktief deelneem om omgewingsprobleme op te los (Sujatha, 2012:6).

Huishoudelike afval neem jaarliks baie vinnig toe en vererger gevare soos die toename in aardverwarming en osoonvernietiging, indien dit nie reg bestuur word nie. Die regstelsel in Suid-Afrika word kortliks bespreek in hierdie studie, om die strukture te noem wat gebruik word vir die bestuur van huishoudelike afval. afvalbestuur hiërargie maak deel uit van die Suid-Afrikaanse afvalbeleid (NEMWA). Hierdie hiërargie lei gedrag ten opsigte van huishoudelike afval deur aspekte soos die vermyding en vermindering van huishoudelike afval as die beste opsie, en die aanmoediging van die hergebruik, herwinning en behandeling van afval. Die weggooi van afval word as die heel laaste opsie beskou.

Die *Theory of Planned Behaviour* (TPB) het die teoretiese raamwerk vir hierdie navorsing verskaf, om die faktore te verstaan wat huishoudelike gedrag beïnvloed. Dit is 'n baie gewilde hulpmiddel om die faktore te verduidelik wat menslike gedrag beïnvloed.

Die kwantitatiewe studie het bewys dat leerders 'n goeie begrip het van huishoudelike afval en beskou die items wat weggegooi word in die kombuis asblik as huishoudelike afval. Leerders het nou en dan 'n gevoel van verantwoordelikheid teenoor die omgewing. Omgewingsopvoeding kan omgewingsbewustheid verbeter. Die

vervaardiging van kompos deur middel van komposhope is nie 'n gunstige opsie vir leerders nie.

Baie items van huishoudelike afval word wel hergebruik en gesinne probeer oor die algemeen om onnodige afval te vermy. Herwinning vind nie baie gereeld plaas nie en daar is 'n wanbegrip dat herwinning baie tyd in beslag neem. Die meeste huishoudings sorteer wel hul huishoudelike afval. Leerders is ook meer gewillig om afval te sorteer indien 'n sisteem gebruik word wat nie baie tyd in beslag neem nie. Die idee dat hulle vergoeding of 'n beloning kan ontvang vir herwinning is 'n baie aantreklike opsie. Individue moet fokus op vermindering of voorkoming van huishoudelike afval en wanneer dit onmoontlik is, dan fokus op herwinning en hergebruik (Parkour *et al.*, 2014).

**Sleutelwoorde:** Huishoudelike afval, huishoudelike afval gedrag, huishoudelike afvalbestuur, jeug, Parys.



## LIST OF ABBREVIATIONS

CBD	Central Business District
DEAT	Department of Environmental Affairs and Tourism (now the Department of Environmental Affairs, DEAT)
EE	Environmental Education
FEE	Foundation for Environmental Education
IDP	Integrated Development Plan
IWMP	Integrated Waste Management Plan
MSW	Municipal Solid Waste
NEMA	National Environmental Management Act
NEMWA	National Environmental Management Waste Act
NWMS	National Waste Management Strategy
NWU	North West University
PEB	Pro-environmental behaviour
SAWIC	South African Waste Information Centre
TPB	Theory of Planned Behaviour
UNESCO	United Nations Educational Scientific and Cultural Organisation
WESSA	Wildlife and Environment Society of South Africa



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## CHAPTER 1: INTRODUCTION

### 1.1 INTRODUCTION

Caring for and managing global waste has become a growing concern globally, since the population on Earth increases. Locations of waste depositing have become a focal area in healthy living and waste control. Waste poses a hazard to human health, since waste affects water supplies, and causes soil contamination that gives rise to an environment that has become uninhabitable. An increasing human population causes a considerable increase in consumption of resources, resulting in large amounts of waste. This study focuses on household behaviour towards waste management and follows a quantitative research method. The problem statement is provided and research questions are covered. Household waste as a problem is discussed next.

### 1.2 GLOBAL HOUSEHOLD WASTE PROBLEMS AND DEFINING HOUSEHOLD WASTE

Household waste can be described as solid waste that is generated by everyday household activities. It includes waste that is collected from streets or parks, as well as waste collected by state authorities such as municipalities. Household waste comprises mostly of bottles, cans, packaging, leftover food, newspapers, magazines and yard trimmings (Kirakozian, 2016:52; Tucker & Farrelly, 2016:682-706; Mbande, 2003:2). Household waste may even include more hazardous materials such as paint, medicines, batteries, light bulbs, pesticides, containers and fertilizers.

Waste generation has increased rapidly and waste management is currently surfacing as a major global issue (Kirakozian, 2016:526). The global household waste problem is acute in emerging cities in China, Seoul, Brazil and Mexico City. Each of these cities receives more than 10 000 tonnes of household waste per day (Hoornweg, Bhada-Tata & Kennedy, 2013). China's household waste creation is expected to increase from 520 550 tonnes per day in 2005 to 1, 4 million tonnes per day in 2025. East Asia is now the

fastest growing region regarding household waste, but this is likely to shift to India in 2025 and then to the Sub-Saharan Africa region in 2050 (Hoornweg, Bhada-Tata & Kennedy, 2013). The Sub-Saharan Africa region is dominating household waste generation due to population growth, urbanisation, an expanding middle-class and changing consumer habits (UNEP, 2018:1). Improper management of household waste will hinder sustainable development in Africa (UNEP, 2018:1). The municipal solid waste (MSW) in Africa in 2012 was about 125 million tonnes per annum. The waste generation is expected to grow to 244 million tonnes per year by 2025, a growth of 0,78 kg per person per day, which is still lower than the world average of 1,2 kg per person per day (UNEP, 2018:35).

One of the reasons for the global waste increase could be ascribed to the increasing world population since the 1950s. This population growth, followed by an increase in waste creation and waste management or rather the lack thereof, has begun to pose serious problems to humans, animals and the environment. There is a significant growth in the amount of household waste as a result of the increase in population as well as the advances in technology (Cimen & Yilmaz, 2015). The rapid increase in household waste could also be the result of individuals' household waste behaviour, underlining the fact that individuals must focus on reduction (prevention/minimisation) and, where this is not possible, re-use, recycle and recover (Parkour *et al.*, 2014).

Household waste that is not properly managed can have a negative impact on health, the economy and the environment (Hoornweg & Bhada Tata, 2012:2 & UNEP, 2018:1). It is important to manage waste properly, because failure to do so may lead to diseases, environmental degradation, global warming, water and soil pollution, ozone depletion and an overall negative impact on quality of life for all species (Miller, 2000).

### **1.3 THE HOUSEHOLD WASTE PROBLEM IN SOUTH AFRICA**

Household waste has increased by 62% during the last decade in South Africa, while the annual increase in all other waste sectors has been about 5% (Department of



Environmental Affairs and Tourism, 2011:4). South Africa is regarded as a developing country and is facing problems with the management of household waste, because of inadequate infrastructure, lack of law enforcement, insufficient awareness of household waste and the lack of willingness to reduce the amount of household waste (Sthiannopkao & Wong, 2013:114). Waste creation depends on the attitude of households, the income level and culture (UNEP, 2018:35). The possible causes for this increase could be socio-economic factors, education and training, cultural factors and social and public behaviour towards household waste (Palatnik *et al.*, 2014).

In South Africa, only 64% of households have waste removal (DEAT, 2012:4). This results in illnesses, land degradation, land and air pollution, global warming and an overall negative impact on the quality of life for mankind (Miller, 2000). South Africa is facing many problems pertaining to household waste management, mainly because of authorities not enforcing the applicable laws, bylaws and regulations (Sthiannopkao & Wong, 2013:114). South Africa is regulated by the necessary laws and regulations that make provision for the management of household waste (Sthiannopkao & Wong, 2013:114). However, the problem is the execution and enforcement of the legal mandate regarding household waste management (Sthiannopkao & Wong, 2013:114). The need arises to holistically understand household waste behaviour, as there is a link between intention and action (Barr *et al.*, 2001). This behavioural intention is a person's willingness to undertake certain behaviour with regard to household waste management (Barr *et al.*, 2001) and action is actually what individuals then set out to do.

#### **1.4 MOTIVATION FOR THE RESEARCH**

No studies have yet been conducted in the study area, Parys relating to the role of high school learners in household waste management and how they are approached as the future generation, in sensitising them of proper waste management strategies to ensure a sustainable future. The youth is the future citizens of the nation and they should actively participate in solving environmental issues (Sujatha, 2012:6).

By understanding these influential factors, the norms and values that shape the behaviour of individuals can be understood, as well as people's motivation to behave in a certain way (intentions) relating to household waste management (Miliute-Plepiene *et al.*, 2016).

Household waste behaviour is better understood as a moral norm, and this understanding assists in predicting environmentally responsible behaviour (Chan & Bishop, 2013). Understanding these factors may facilitate the identification of possible household waste management problems and reduction of the impact of negative household waste, both socially and environmentally. The need arises to holistically understand household waste behaviour so that comparisons between behaviours can be made and the differences explained (Barr *et al.*, 2001). The behaviour of high school learners towards household waste management has not yet been researched in Parys.

## **1.5 STUDY AIM AND OBJECTIVES**

The aim of this study was to investigate household behaviour towards waste management amongst the youth in Parys, South Africa. It was a quantitative study using statistics and numbers to share the data and findings. The following research questions guided the study:

### **1.5.1 Research question 1**

What is the current level of understanding of household waste amongst the high school learners in Parys, South Africa?

Objective: to determine the current level of understanding of household waste amongst high school learners in Parys, South Africa.

### 1.5.2 Research question 2

What is the current level of participation of these high school learners in providing waste management alternatives such as avoiding, reducing, re-using, recycling and treatment of household waste?

Objective: To determine the current level of participation of these high school learners in providing waste management alternatives such as avoiding, reducing, re-using, recycling and treatment of household waste.

### 1.5.3 Research question 3

What is the level of willingness of these high school learners to participate in waste management alternatives such as avoiding, reducing, re-using, recycling and treatment of household waste in the future?

Objective: To determine the level of willingness of these high school learners to participate in waste management alternatives such as avoiding, reducing, re-using, recycling and treatment of household waste in the future.

### 1.5.4 Research question 4

To what extent does the demographic profile influence household waste behaviour amongst the high school learners within the study area?

Objective: To determine to what extent the demographic profile influences household waste behaviour amongst the high school learners within the study area.

## 1.6 STRUCTURE OF THE RESEARCH

Chapter 1 provides a definition of household waste and states the global problem with increasing household waste. The current situation regarding household waste in South

Africa is discussed, as well as the motivation for the research, followed by the study aim and research questions.

The discussion in Chapter 2 links with the four study objectives as well as the waste hierarchy to address alternatives such as avoiding and reducing, re-using, recycling and treatment of household waste which will lead to a better understanding of the research objectives. It is argued that the terms mentioned in the research objectives, namely the awareness (understanding), participation, willingness and demographic profile may be used to explain household waste behaviour when combined. The literature study done in Chapter 2 investigates the household waste problem, the waste management hierarchy, waste management legislation and the factors influencing current awareness (understanding), participation and willingness in managing household waste.

In Chapter 3, the main methodology for this study is discussed, which includes a questionnaire that was designed to evaluate high school learners' household waste behaviour in Parys, South Africa. Chapter 4 presents the findings from the questionnaires. Statistics are provided and discussed. The study concludes with Chapter 5 providing a discussion of data presentations from Chapter 4, aiming to answer the research objectives. An overall conclusion and a section reflecting on the way forward are also provided.

## **1.7 CONCLUSION TO CHAPTER 1**

Household waste is created every day and is rapidly increasing annually. Worldwide cities and towns are mostly affected as populations grow larger. The quality of life can be negatively affected if household waste is not managed properly. Mismanagement could also contribute to global warming and ozone depletion.

Various research studies have been conducted globally and in South Africa, but not yet to the extent where a study has focused on the household waste behaviour of the youth in Parys, South Africa. This study investigated four research objectives embraced by

the research questions, namely the current awareness (understanding), current participation in household waste management, willingness to participate in household waste management and the impact of the extent of the influence of the demographic profile on household waste behaviour amongst the high school learners within the study area. The intention of this research was not to conduct an in-depth behavioural study. The study focuses on household waste related behaviour, and aspects related to this, in the context of environmental management. Apart from references to literature to provide context to this study, no inputs from any social or behaviour scientist were included in the research.

## CHAPTER 2: LITERATURE REVIEW

### 2.1 INTRODUCTION

The purpose of the literature review was to investigate results from other similar studies already conducted (Cresswell, 2014). The literature review was conducted in order to understand the background of the study and to design the research. The literature review assisted in answering the four research questions by providing information about the understanding of household waste, introducing the waste hierarchy and investigating demographic factors influencing household waste behaviour.

A literature review fills gaps, extends information on previously done studies, emphasises the relevance of the study, and compares results from findings in the study with those of previous work (Cresswell, 2014). The literature review of this study provides a context to assess and evaluate the results of the study, against the results that other studies have previously found. The literature review makes use of international and national articles. Different types of literature sources are used, including journal articles (up-to-date information), books (which form a good starting point), government publications (providing statistics from research done by the government), newspapers (current issues in the community), dissertations and other library sources from the North-West University.

This chapter provides an overview of some of the global household waste management problems and specifically household waste problems in South Africa. The chapter also addresses the importance of the role of the youth (high school learners) in household waste management practices and investigates the factors influencing household waste behaviour, such as demographics, awareness, and willingness, and the impact on household waste management specifically in Parys, Free State, South Africa. The content of the literature review focuses mainly on establishing trends from the research results based on subjective views of how household behaviour and relates to household waste management, how aware they are of household waste management practices

and the waste hierarchy, which focuses on alternatives of managing household waste. An introduction to the waste management hierarchy explains management alternatives and provides more insight into aspects such as avoiding and reducing, re-using, recycling and treatment of household waste. This is followed by an investigation into the level of awareness of households on waste management practices, the factors influencing current participation in alternatives, and the willingness to recycle household waste. The legal mandate and basis of waste management in South Africa are addressed to provide information on exactly what structures are in place to assist the household waste management problem currently experienced in South Africa.

## **2.2 GLOBAL HOUSEHOLD WASTE MANAGEMENT PROBLEMS**

Where you have people, you will have household waste creation (Adenrelie, 2013). Not only is there an increase in the amount of household waste, as indicated in Chapter 1, but also an increase in the complexity of the household waste created (Webster, 2012). Household waste is one of the major sources of municipal waste, and needs to receive urgent attention to ensure environmental sustainability (Parkour *et al.*, 2014:980). A problem arises when household waste is not properly managed and becomes an environmental problem, as mentioned in the previous chapter (Adenrelie, 2013).

Globally, the management of household waste is facing many problems as millions of tonnes of household waste are created daily (Adenrelie, 2013; Webster, 2012 & Yoda *et al.*, 2014).

Currently world cities generate about 1.3 billion tonnes of household waste per year. This volume is expected to increase to 2.2 billion tonnes by 2025 (Hoornweg & Bhada Tata, 2012:1).

The United States of America produces an amount of 220 million tonnes of household waste annually, according to the United States Environmental Protection Agency in 2015 (Abrashkin, 2015:23). Japan creates 50 million tonnes of household waste,

despite introducing the 4 R's (reduction, reuse, recycling and recovery [treatment]) some time ago (Abrashkin, 2015:7, 8). Research done in New Zealand found that the public expressed environmental concern and that 87% of the respondents said that New Zealand households generate too much household waste (Tucker & Farrelly, 2016:2). In 2011, New Zealand households produced more than one tonne of waste, of which the majority was sent to landfill sites. The bulk of this waste is not renewable, recyclable or degradable (Tucker & Farrelly, 2016:2)

### **2.3 SOUTH AFRICAN HOUSEHOLD WASTE MANAGEMENT PROBLEMS**

South Africa is also facing numerous social and economic changes, and this has led to more household waste creation per capita, and, consequently, plenty of household waste management problems (Yoda, 2014). The increased household waste problem is characterised by insufficient removal of refuse, illegal dumping of waste in certain areas, household waste activities that are illegal, waste sites that are not properly managed and misused, as well as the lack of implementation of the waste hierarchy principles (Muzenda, 2014).

Waste generation in South Africa has increased by 62% during the last decade. Waste management relies mostly on landfill sites for waste disposal, with 90% of all the household waste directed to landfill sites in South Africa (DEAT, 2012). The lack of certain resources has pushed the demand for recovering waste from the waste disposal chain, as only 64% of households in South Africa have proper waste removal systems (DEAT, 2012).

### **2.4 HOUSEHOLD WASTE MANAGEMENT PROBLEMS IN PARYS, FREE STATE**

Almost 87% of the municipalities in South Africa lack the capacity or infrastructure to minimise waste (Muzenda *et al.*, 2011:3). Only 64% of the households in South Africa had access to the refuse disposal services of their municipalities in 2012 (StatsSA, 2013b:3). Refuse bins are currently on the priority list to be added to Parys, although



very few are seen in town, especially with illegal dumping happening (Ngwathe IDP, 2017).

According to the Integrated Development Plan (IDP) of Ngwathe municipality, of which Parys forms part, the function of the local municipality with regard to household waste, is regarded as the removal of all household waste and depositing it in a suitable area reserved for the purpose of dealing appropriately with waste. It further includes the maintenance and control of any infrastructure or facility to ensure a clean and healthy environment (Ngwathe IDP, 2017:48).

The IDP is a principal strategic planning instrument, which guides and informs all planning, budgeting, investment, development, management and implementation in the medium-term decision-making in the local government (Ngwathe IDP, 2017).

The local municipality collects refuse in one truck, even though some residents do sort their waste (Britten, 2013). It is very likely that sorted and unsorted waste will end up together on landfill sites outside town (Britten, 2013). A study done by Afri-forum found that the landfill sites in Parys do not adhere to national standards (Greeff, 2018). All landfill sites must meet certain requirements, such as access control, illegal dumping and rehabilitation, and landfills must meet 80% of the requirements to pass inspection (NEMWA, 2008). Parys meets only 8% of these requirements, according to Afri-forum (Greeff, 2018).

## **2.5 LEGAL MANDATE FOR WASTE MANAGEMENT IN SOUTH AFRICA**

Refsgaard and Magnussen (2009) indicated that, "...it is important for every country to have legislation and policies in place that will support sustainable waste management." A proper regulation framework will improve health, environmental protection, waste creation and long-term sustainability (in Abrashkin, 2015). South Africa has made a concerted effort in the past 20 years in addressing problems relating to waste management (Abrashkin, 2015).

- The Constitution is the highest level of law in South Africa and provides the broad framework for environmental legislation (Constitution of the Republic of South Africa, 1996). The Constitution contains environmental rights which provide a mandate for the regulation of waste management. It also contains the mandate for the protection of people's rights to have an environment that is not harmful to their health and to have the environment protected through reasonable legislative and other measures. Apart from the Constitution of South Africa, household waste management in South Africa is currently governed by a number of pieces of legislation listed below (South African Waste Information Centre SAWIC, 2013): Hazardous Substances Act (Act 5 of 1973);
- Health Act (Act 63 of 1977);
- Environment Conservation Act (Act 73 of 1989);
- Occupational Health and Safety Act (Act 85 of 1993);
- National Water Act (Act 36 of 1998);
- The National Environmental Management Act (Act 107 of 1998);
- Municipal Structures Act (Act 117 of 1998);
- Municipal Systems Act (Act 32 of 2000);
- Mineral and Petroleum Resources Development Act (Act 28 of 2002);
- NEM: Air Quality Act (Act 39 of 2004); and
- National Environmental Management: Waste Act, 2008 (Act 59 of 2008).

Some legislation relating to waste management in South Africa is briefly discussed in the following sections. The aim of the following section is not to provide an extensive review of legislation, but rather to provide some background information about legislation in South Africa regarding household waste management.

### 2.5.1 The National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (Act 107 of 1998) provides principles and procedures for environmental decision-making regarding environmental issues (NEMA, 1998).

The NEMA (Act 107 of 1998) sets out laws and policies on environmental issues. Section 2 of this Act also provides sustainability principles, which are also applicable to the management of waste. These principles encourage accountability, cradle-to-grave waste management, household waste avoidance and waste reduction (minimisation).

### 2.5.2 The National Environmental Management Waste Act–NEMWA (Act no. 59 of 2008)

The National Environmental Management Waste Act (Act No. 59 of 2008), as amended in June 2014, specifically addresses waste management issues in South Africa.

The Act aims to avoid and minimise the creation of waste. This is done by following the principles of the waste hierarchy, namely avoiding, reducing, re-using, recycling and treatment of waste. Disposal should only be the very last option. Local municipalities are forced by law to provide a waste management system which deals with waste removal, waste storage and waste disposal in a sustainable way. Municipalities abide by the country's national and provincial standards. Local government also needs to formulate and implement an integrated waste management plan, as well as by-laws to deal with the waste problem.

Section 17 of the NEMWA (2008) provides for the re-use, recycling and recovery of waste, rather than disposal, provided that these processes use fewer natural resources or are less harmful to the environment than the disposal of household waste.

### 2.5.3 The National Waste Management Strategy (2011)

The National Waste Management Strategy is a legislative requirement of the National Environmental Management Waste Act (Act No 59 of 2008). The purpose of the NWMS is to achieve the objectives of the above Act. The NWMS has a total of eight strategic goals governing waste management. Two of the goals of the strategy relates directly to the waste management hierarchy, while a third goal focuses on waste management awareness.

Goal 1 promotes household waste reduction (minimisation), re-use, and recycling, as well as the recovering of household waste. Goal 2 emphasises the need to recycle. The landfills that are already overfilled could be 50% less full if waste is recycled (Parkour *et al.*, 2014). The target of Goal 2 is to divert 25% of recyclables away from landfills and introduce separation at source programmes at municipal level (Department of Environmental Affairs, 2011).

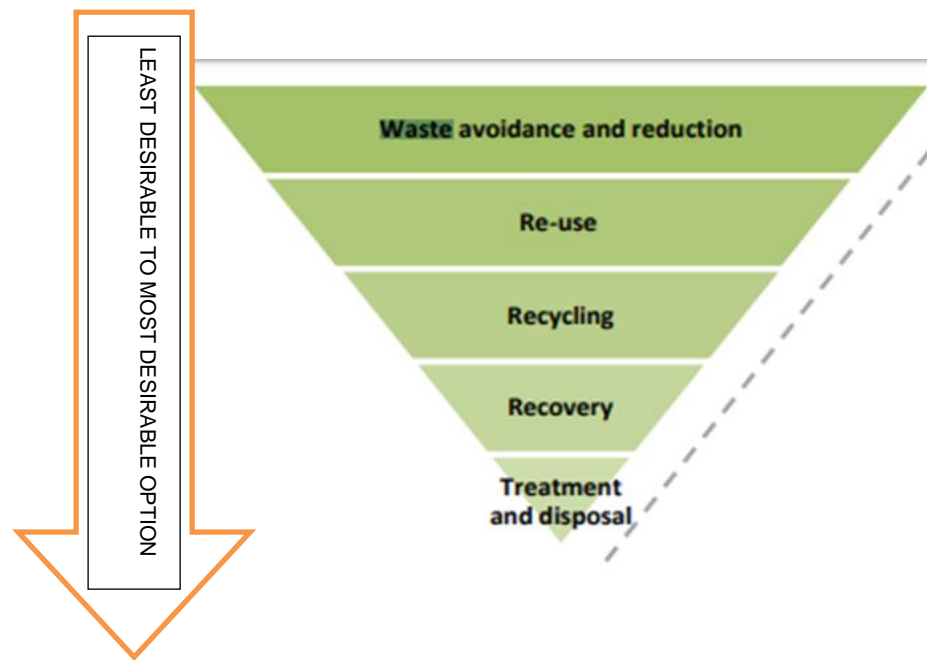
Goal 4 also relates to the management of household waste. Goal 4 wants to make sure that there is an increased awareness (understanding) of the impact of household waste on the livelihood of all living and non-living things. The target set here is that 80% of schools in South Africa will have implemented waste awareness programmes within the next 10 years (Department of Environmental Affairs, 2012). By making households aware of the impact and the importance of waste management, waste-related behaviour may change, which could potentially have a positive impact on waste management.

Although South Africa has a legal mandate in place, it lacks proper guidelines and is also experiencing a lack of skilled technical personnel. Therefore, implementation remains a problem (Okalebo *et al.*, 2014). Studies indicate that, although much effort has been made in terms of laws and regulations, mankind is indeed failing to reverse the trend to reduce the increase in household waste and to change household waste behaviour (Kirakozian, 2016). The limited knowledge relating to waste management practice and the waste behaviour of most of the population is another reason why

implementation is not taking place properly (Okalebo *et al.*, 2014). Local governments in South Africa often lack the authority and resources to provide a good and economically viable public service (Yooda *et al.*, 2014). In order to have an effective household waste management system, there must be an equal distribution of responsibilities and funds between the different local governments (Yooda *et al.*, 2014). The municipalities do not compensate for fast population growth in cities and the budgets are definitely not adjusted accordingly (Ruhiga, 2013). Local municipalities are forced by law to explore ways to ensure that less organic waste ends up on waste dumps and according to Awoso and Tariwo (2010), the waste problem in South Africa originates from a lack of environmental awareness. Researchers further state that South Africans waste much during the preparation of food (Awoso & Tariwo, 2010 & Yooda *et al.*, 2014). There should be an increase in awareness from the government and the public sector which will demand better household waste management in order to minimise environmental and health risks (Serret & Brown, 2014). The handling and management of household waste has become an important policy issue for government and municipalities in South Africa (Palatnik, 2014).

## **2.6 THE WASTE MANAGEMENT HIERARCHY**

The waste management hierarchy is internationally accepted and is embedded in the South African waste policy (NEMWA). This hierarchy is a technical approach to understanding waste and forms a systematic method for waste management globally and nationally. Using the National Environmental Management Waste Act (Act no. 59 of 2008), the waste hierarchy is further entrenched in the legal framework to manage waste in South Africa. The aim of the waste hierarchy is to guide behaviour and make use of goods and products without generating an excessive amount of waste (DEAT, 2012). The first three research objectives stated in Chapter 1 were formulated based on the hierarchy's principles.



**Figure 2.1: The waste management hierarchy (*The National Waste Management Strategy, 2011*)**

It is important to list the definitions as defined in the NEMWA relating to the waste hierarchy:

- “Reduce” (waste avoidance and reduction) when used in relation to waste, means the avoidance of the amount and toxicity of waste that is generated and, in the event where waste is generated, the reduction of the amount and toxicity of waste that is disposed of. (National Environmental Management Waste: Act, 2008 (Act No. 59 South Africa, 2008);
- “Re-use” means to utilise the whole, a portion or a specific part of any substance, material or object from the waste stream for a similar or different purpose without changing the form or properties of such substance, material or object (National Environmental Management Waste Amendment Act (Act No. 26 South Africa 2014).
- “Recycle” means a process whereby waste is reclaimed for further use, of which the process involves the separation of waste from a waste stream for further use

and the processing of that separated material as a product or raw material in accordance with the National Environmental Management Waste Act, 2008 (Act No. 59 South Africa, 2008).

- “Recovery and Treatment” mean the controlled extraction or retrieval of any substance or material or object from waste in accordance with the National Environmental Management Waste Amendment Act (Act No. 26 South Africa, 2014).

“Treatment” means any method, technique or process that is designed to –

- change the physical, biological or chemical character or composition of waste; or
- remove, separate, concentrate or recover a hazardous or toxic component of waste; or
- destroy or reduce the toxicity of waste in order to minimise the impact of the waste on the environment prior to further use or disposal as dictated by the National Environmental Management Waste Act, 2008 (Act No. 59 of South Africa, 2008).

- “Disposal” – waste ending up on landfill sites.

In Figure 2.1 above, it is illustrated that the treatment and disposal of household waste should indeed be the last resort and only a small amount of household waste should end up on landfill sites. It is best to avoid creating household waste at all. The figure also indicates that avoidance (reduction) of waste is the most desirable option, followed by re-using of materials more than once, recycling, treatment of waste, and the disposal of waste to landfill sites is the least favourable option when dealing with waste management.

The most viable way to reduce household waste is to avoid creating it. The best approach would be to purchase products with environmental friendly packaging, such

as fresh vegetables that can be processed at home, or purchasing items from a shopping list. A simple solution is to recycle and/or compost most waste such as kitchen scraps and garden trimmings (Britten. 2013). Only 10% of South African waste is recycled and the country is starting to fall short of space for landfills (StatsSA, 2015). The most commonly recycled items in South Africa are plastic (81,5%), glass (75,6%), paper (60,2%) and tin and cans (44,8%) (StatsSA, 2015). Recycling creates formal and informal employment and, in South Africa, an estimated 37 000 people, or waste pickers as they are commonly referred to, earn a living through recycling (Langenhoven & Dyssel, 2007). In Durban, for example, the recycling sector “employs” 300-400 waste pickers annually (Langenhoven & Dyssel, 2007).

Recycling alone is not sufficient to minimise household waste (Barr *et al.*, 2013). Waste reduction must be promoted both when manufacturing products and at consumer level. Reduction is seldom undertaken, while reuse is conducted on a more regular basis (Barr *et al.*, 2001). Influential factors in waste management, specifically recycling, may lead to more effective recycling programs introduced in a community (Parkour *et al.*, 2014). Recycling reduces waste and assists in conserving natural resources, minimising the negative impact on the environment (Botetzagias *et al.*, 2015).

## **2.7 THE THEORY OF PLANNED BEHAVIOUR (TPB)**

The Theory of Planned Behaviour (TPB), which was introduced by Icek Ajzen (1991:179), deals with factors like intention, attitude, social norms, perceived behavioural control, and the correct household waste behaviour. Family and friends have the most observable influence on household waste behaviour and an increase in social pressure will cause individuals to behave more positive towards the environment, which in turn could change a household’s waste behaviour positively (Niaura, 2013:74). Information about household waste management and the creation of awareness (understanding) about this issue are important to ensure a more positive attitude towards household waste reduction (Kirakozian, 2016). People will be more inspired to



change their waste behaviour to become increasingly environmentally responsible (Kirakozian, 2016).

The TPB indicates the importance of circumstantial limitations. Empathic concern could play an important role (De Leeuw *et al.*, 2014). When a human feels the environment is oppressed or in need, empathic concern could arise. This includes feelings of sympathy or compassion and research has shown that people who are less self-centred and more empathic will act more pro-environmentally (De Leeuw *et al.*, 2014). People could have the intention to participate in household waste recycling, but they do not because they believe that one person's behaviour will not have a notable environmental impact (Miliute-Plepiene *et al.*, 2016). A person's intention to adopt pro-environmental behaviour (PEB) should increase so much, that they demonstrate a more favourable behaviour towards PEB.

The TPB provides this research with a theoretical framework to facilitate understanding in regard to the influential factors that contribute to household waste behaviour. It is a popular and validated tool to assist in explaining the influential factors of human behaviour towards household waste (Parkour *et al.*, 2014). If a person's intention to adopt pro-environmental behaviour (PEB) increases enough, they can practise more sustainable choices towards the environment, for example, when high school learners believe that adopting environmentally sustainable behaviour will produce a positive outcome, their household waste behaviour becomes more positive. The opposite is also true. If learners associate PEB with mostly negative consequences, their behaviour will not change to become more positive. These values and norms are influenced to a large extent by family, friends and the school (De Leeuw *et al.*, 2014). The factors that influence household waste behaviour are discussed in the next section.

## **2.8 FACTORS INFLUENCING HOUSEHOLD WASTE BEHAVIOUR**

The decision to take part in household waste recycling is very complex, because many factors have to be taken into account (Botetzagias *et al.*, 2015). Recycling programmes

and campaigns, environmental awareness, legislation and behaviour towards recycling are factors that influence the process of recycling (Botetzagias *et al.*, 2015).

### 2.8.1 Current awareness

The role of families is very important when it comes to creating awareness about recycling programmes and initiatives. They can drive programmes to assist in the reduction of household waste (Bolaane, 2006). The more households are involved in sorting activities and the closer recycling is done to the source, the higher the quality of waste materials and the cleaner the recyclables, the higher value they have and greater the demand (Miliute-Plepiene *et al.*, 2016). Individuals with a strong internal locus of control (individuals believing they can influence events and their outcomes) are more aware and more likely to participate in household waste management activities such as recycling, because they believe that they can do it and they are bringing about a positive change (Yilmaz, 2004).

There is some awareness concerning waste management amongst people in general in South Africa (Steg & Vlek, 2009). This awareness may lead to the adoption of pro-environmental behaviour that does little or no harm to the environment (Steg & Vlek, 2009).

This awareness and understanding of the environment can lead to the development of more responsible environmental behaviour. Even if environmental education is dealt with under topics like global warming and climate change, there is a weak link between knowledge and positive environmental behaviour (Yilmaz, 2004). Two of the factors that influence awareness (understanding) specifically are gender and age. Females have a greater awareness of household waste, while males have proven to be more sensitive to the environment (Yilmaz, 2004). Age plays a significant role, with younger children being more aware and having a more positive behaviour towards the environment than older learners (Yilmaz, 2004).

Research has proven that environmental knowledge and emotional attitudes are important factors that may lead to environmental responsibility (Stern, Powell, & Hill, 2014). It is important to understand the current awareness and practices of high school students, in order to be able to empower the youth to understand the need and requirements towards a more sustainable future.

### 2.8.2 Current level of participation

Household waste behaviour has a social aspect to it, and in a study conducted on household waste behaviour, social norms and self-image with respect to socio-economic factors played a role in the household waste behaviour of individual people (Kirakozian, 2016; Niaura, 2013). Social aspects, such as norms, influence young people through example, rather than pressure. The intention to recycle is based on a personal feeling to 'do-what-feels-right' and not to conform to social standards.

### 2.8.3 Level of willingness to participate

Environmental problems can only be solved with changes in the household waste behaviour of individuals, and this change requires 'changing people's knowledge and moral values' towards household waste creation (Cimen & Yilmaz, 2015). The implementation of incentives, such as payment for glass bottles, will bring quick results, while a change in the household waste behaviour will result in a more permanent solution to reduce household waste creation (Kirakozian, 2016). Environmental problems cannot be solved with technology or law enforcement only; it is only possible with changes in individual behaviour and requires changes in attitude, knowledge and moral values (Cimen & Yilmaz, 2015). It is clear from this discussion that people's willingness to participate is influenced greatly by their knowledge, attitudes and moral values, but also by an introduction of more creative measures such as incentives.

Households are more willing to recycle household waste if incentives are given and if recycling is more convenient in terms of their knowledge about recycling and the ease

of the process, e.g. kerbside recycling is highly convenient, while drop-off recycling at collection points is not (Miliute-Plepiene *et al.*, 2016). Recycling costs a lot in terms of time and effort, because people have to sort and store the household waste, as well as transport the recyclable waste to a location where it can be recycled (Chan & Bishop, 2013). Therefore, ways should be sought to encourage better management of household waste behaviour through easing the process and making it a worthwhile endeavour in the eyes of households.

#### 2.8.4 The influence of demographics

Demographic and socio-economic factors such as income, gender, level of education, household size, and the composition of the household could influence household waste behaviour, as well as the willingness to engage in recycling programmes (Miliute-Plepiene *et al.*, 2016). The theory of planned behaviour suggests numerous influencing factors such as age, gender, ethnicity, socio-economic status, education, personality and past experiences that may influence the behaviour of people (De Leeuw *et al.*, 2014).

Studies have indicated a link between learners with a higher level of education and positive environmental behaviour (Yilmaz, 2004). Learners with higher knowledge scores had more positive waste management behaviour than learners with lower knowledge scores.

## 2.9 THE IMPORTANCE OF THE YOUTH IN HOUSEHOLD WASTE MANAGEMENT

Young people are critical role-players, because they are influenced by what happened in the past as well as by the current behaviour towards the environment (De Leeuw *et al.*, 2014). Some young people are responsive towards environmental degradation by feeling personally responsible, while others are in denial (Doherty & Clayton, 2011; Reser & Swim, 2011).

The youth, aged 15 to 24, are the segment of the population mostly responsible for the creation of household waste (Quested *et al.*, 2013).

The population in Parys has a large group of learners aged 10-19 years old which indicates that the majority of the population is still young (Ngwathe IDP, 2017).

The transmission of knowledge or education to the youth concerning environmental issues is not adequate (Quested *et al.*, 2013). According to De Leeuw (2014), the current beliefs of the youth concerning household waste management should be determined, so that environmentalists can better understand how their beliefs affect their intention and behaviour. Only once they understand these beliefs can environmentalists adopt the desired behaviour and encourage a more positive behaviour (De Leeuw *et al.*, 2014). Household waste behaviour is triggered by personal beliefs, intentions and household habits (Quested *et al.*, 2013). The youth can bring the change needed regarding household waste behaviour (De Leeuw *et al.*, 2014).

## **2.10 RECOMMENDATIONS TO IMPROVE THE MANAGEMENT OF HOUSEHOLD WASTE**

If the human race wants to stop the rapid household waste creation and the degradation of our natural environment, they need to change their environmental behaviour (Boevende Pauw & Van Petegem, 2010). A longstanding recycling programme and environmental education (EE) will lead to a personal obligation to do the right thing (Botetzagias *et al.*, 2015). A much more positive behaviour towards the environment may lead to a reduction in household waste creation (Niaura, 2013).

Environmental education (EE) plays an important role in encouraging recycling awareness. EE should be a part of an individual's childhood and in countries like Malaysia, EE has already been introduced in school subjects such as English, Geography and Science, with topics including conservation and preservation of the environment (Mahmud & Osman, 2010). Researchers have investigated the nature of

EE that is taking place at school level and have found that EE can help foster environmentally literate citizens (Mahmud & Osman, 2010). To be environmentally literate means that learners are more sensitive and aware about environmental issues and they better understand these issues (Yilmaz, 2004).

## **2.11 CONCLUSION TO CHAPTER 2**

There is a global increase in the volumes of waste, as well as the complexity of household waste created. The problems originate from the fact that there is insufficient household waste removal, illegal dumping and poorly managed waste sites. Household waste has increased by 62% in South Africa during the past 10 years. Most residents in Parys do not sort their household waste and the landfill site in Parys does not adhere to national standards.

The Constitution of South Africa (1996) is the highest level of law in South Africa and provides a legal framework for environmental legislation. The Constitution provides a mandate for household waste regulation and provides an environment that is not harmful to health. Although this chapter did not aim to provide a detailed review on legislation, it gave an outline of the most important household waste legislation, such as NEMA, NEMWA and the NWMS. The latter relates to the waste management hierarchy and waste management awareness (understanding). The implementation of legislation remains a problem. This is evident in the increasing amount of household waste, so the law did not change household waste behaviour as such. There is a lack of knowledge of exactly how to implement the legislation successfully. Local governments seem to struggle with responsibilities and funds.

The waste management hierarchy is an internationally accepted instrument to aid the method of waste management. The aim of the waste hierarchy is to guide household waste behaviour in preventing the amount of household waste that ends up on landfill sites. The definitions contained in the waste hierarchy were explained, namely,

reducing, re-using, recycling and recovery. The best waste management principle according to the waste hierarchy would be to avoid creating waste in the first place.

Solutions that were suggested, are shopping from a shopping list, recycling and starting a compost heap. The most commonly recycled items in South Africa are plastic, glass, paper, tin and cans. Recycling in our country is mostly done by informal waste pickers. Recycling could lead to less waste on landfill sites.

The waste hierarchy guides behaviour as well as the TPB (Theory of Planned Behaviour). This theory was introduced by Icek Ajzen in 1991 and deals with factors like intention, attitude, social norms, perceived behavioural control and the correct household waste behaviour. This theory speaks of emphatic concern when people feel the environment is oppressed. Feelings of sympathy and compassion may arise and cause them to act more pro-environmentally.

The factors that influence household waste behaviour were discussed and include current awareness (understanding), current level of participation, level of willingness to participate and the influence of demographics (the four research objectives posed as research questions) (Ajzen, 1991).

The more households become involved in sorting activities and recycling closer to the source, the higher the quality of waste materials. Individuals believing they can influence events and outcomes are more likely to participate in recycling (Ajzen, 1991).

Awareness (understanding) is greatly influenced by age and gender. Younger children and females have a better awareness (understanding) than older children and males. Social aspects such as norms and setting an example can influence participation. Introducing incentives can bring a more permanent solution to reduce household waste creation. Knowledge, attitudes and moral values can influence people's willingness to participate (Ajzen, 1991).

Demographic factors such as age, gender, ethnicity, socio-economic status and education may influence the behaviour of people and cognisance should be taken of these factors. The youth, aged 15 to 24, are mostly responsible for the creation of household waste. The youth are critical role players, influenced by what happened in the past as well as the current behaviour towards the environment. The transmission of knowledge and education about environmental issues is not adequate. The current behaviour and beliefs of the youth relating to household waste should be determined to understand and encourage a more positive household waste behaviour (Ajzen, 1991)..

Environmental education (EE) will lead to more positive household waste behaviour and encourage recycling. EE could be implemented in school subjects in South Africa just as in Malaysia. Environmental education can foster environmentally literate citizens.

## CHAPTER 3: METHODOLOGY

### **3.1 INTRODUCTION**

This chapter describes the research methodology used to address the research aim introduced in Chapter 1, which was to investigate the behaviour (current awareness, participation and willingness to participate in waste management) of the youth (high school learners) in Parys, Free State, as it relates to the management of waste at a



household level. This chapter discusses the design of the questionnaire and provides detail on the study area, collection of data and the approach taken to analyse the gathered data.

## **3.2 RESEARCH DESIGN**

Quantitative research can be described as a method by which predetermined instruments, in this case structured questionnaires, are handed out to gather information from respondents, before being subjected to statistical analysis (Cresswell, 2003 & Boeren, 2018). The collection of secondary data in this study consisted of an extensive literature review to understand household waste management problems, the factors that influence household waste behaviour and the recommendations that have been proposed to improve the management of household waste. This is aligned with what was discussed in Chapter 2, the literature review.

### **3.2.1 Questionnaire**

A questionnaire-based method was used to collect data from high school learners. A pilot study was conducted first to test an initial questionnaire, followed by the revision of questions. Questionnaires are practical, economically liable and can possibly collect a large quantity of information from a large population. Structured questionnaires were used to obtain data to help answer the research questions. Questionnaires are the preferred type of data collection method for this study because of the economy of design, convenience and the rapid turnaround time in data collection (Cresswell, 2014).

According to Matveev (2002) structured questionnaires hold the following advantages:

- “It is the most suitable for acquiring demographic data, for example, age, gender and income;
- The inexpensive nature is very favourable;

- Tabulating and analysing of information, using statistical programmes, are relatively easy;
- Specifying both the independent and the dependent variables under investigation, is clear and specific; and
- Reliable data is obtained due to the controlled nature of data gathering.”

Structured questionnaires were administered to a sample of 415 learners from Grades 8 to 11. Grade 12 students were excluded as it would have interfered with their preliminary examination in September. The 415 learners comprised 93% of all the learners in a specific school from Grades 8 to 11.

The questionnaire consisted of four sections, namely Section 1 – Demographic Information, Section 2 – Defining Household Waste, Section 3 – The Waste Hierarchy, and Section 4 – Household Waste Behaviour. Each section collected information from the high school students to retrieve data that could be used in order to understand and answer the four objectives posed as questions in Chapter 1. A short description of the questionnaire is set out in Table 3.2 below. The questionnaire that was completed by students can be viewed in Annexure A.

The first section of the questionnaire (Appendix A) consisted of 10 questions. Section 1 aimed at gathering basic demographic information and is listed in Table 3.2. The second section consisted of only 2 questions. The aim here was to determine the level of understanding amongst the high school students as to what household waste is. This was done by asking the respondents whether they knew what household waste is and to name the 5 things they dispose of the most in the kitchen dustbin. The third section dealt with questions relating to the waste hierarchy, as discussed in section 2.5 of Chapter 2. The waste hierarchy was taken as a framework because it sets the framework for waste management principles and guides waste behaviour.

Questions 3.1-3.6 aimed to determine the level of participation by households represented by the respondents at Parys High School. The final section aimed to

determine the importance that the students placed on recycling and sorting of household waste, to determine the motivation, participation and willingness to manage household waste more responsibly. The section also aimed at determining the reasons for their answers and to obtain recommendations on how their household waste behaviour may be improved.

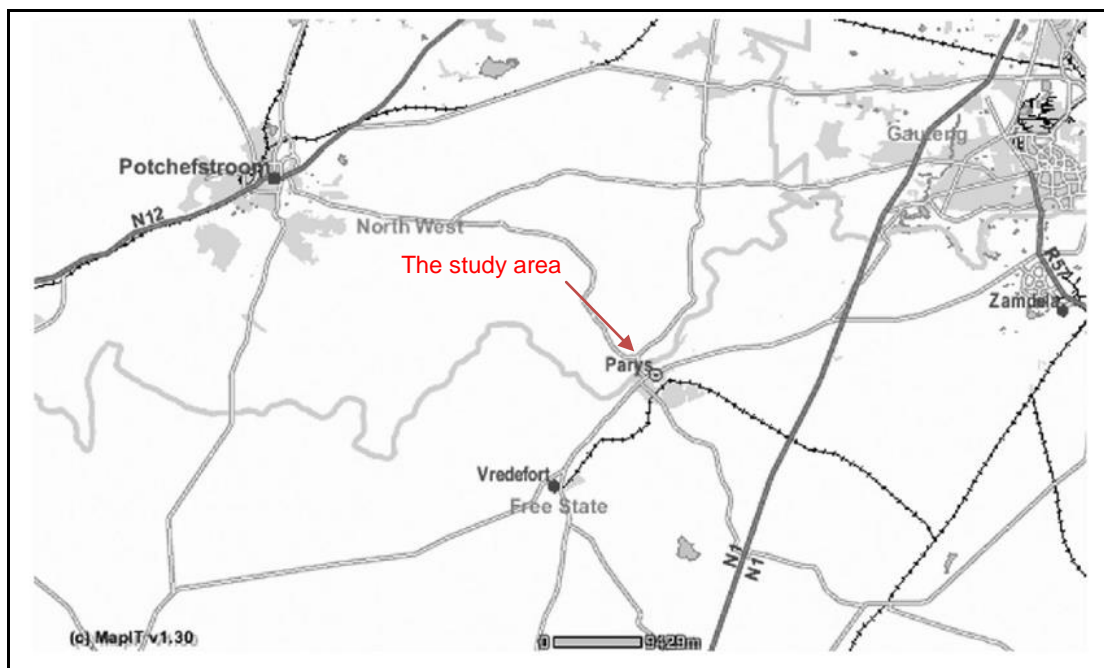
Table 3.1: Details of the household waste management behaviour questionnaire (Appendix A)

Section	Target information	Question numbers
<b>Section 1:</b>  <b>Demographic information</b>	This section aimed at gathering demographic information from students, such as gender, age, ethnic group, home language, residential area, employment status, total household members, children, averages and subjects taken. The aim was to investigate which factors have an influence on the awareness, participation and willingness regarding household waste management.	<b>Questions 1.1 – 1.10</b>
<b>Section 2:</b>  <b>Household waste awareness</b>	This section aimed at determining the composition of household waste and to gauge the learner's awareness of household waste behaviour.	<b>Questions 2.1 and 2.2</b>

<b>Section 3:</b>  <b>Waste hierarchy</b>	This section aimed at explaining the different levels of the waste hierarchy and to gauge the participation of the learners at each of the different levels of waste management.	<b>Questions 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6.</b>
<b>Section 4:</b>  <b>Household waste behaviour</b>	This section aimed at determining the importance of recycling, type of waste recycled, sorting of household waste and motivation that would inspire households to be more responsible regarding household waste. This section investigated the willingness of the youth to participate in waste management alternatives.	<b>Questions 4.1.1, 4.1.2 4.2.1, 4.2.2, 4.2.3 and 4.3.</b>

### 3.2.2 An overview of the study area, Parys, Free State

Parys is situated next to the Vaal River, forming the border between the Free State and the North West provinces. This small town lies about 115km south west of Johannesburg, close to the N1. The town is located in the Ngwathe Local Municipality, which is a Category B municipality situated in the Fezile Dabi District Municipality. The main areas or towns within the municipal boundaries are: Parys, Vredefort, Koppies, Heilbron and Edenville (refer to Figure 3.1).



**Figure 3. 1: An overview of the location of Parys, Free State Province (Google images)**

The town of Parys is located in the Vredefort Dome area which is a World Heritage Site declared by UNESCO (United Nations Educational, Scientific and Cultural Organisation) in July 2005. Parys is regarded as a primary development area and a gateway to this heritage site. Parys is the largest 'small' town in the Fezile Dabi district and the most important service centre in the area (Booyens & Visser, 2010:37).

According to research done by Booyens and Visser (2010), Parys was rated the fourth most important tourism cluster in the Free State, following Bloemfontein, Clarens and Bethlehem. The study stated that poor service delivery by the local government (such as dirty streets, parks and other areas) is certainly a barrier to tourism development in this area. There appears to be a failure by the local government to understand its contribution towards maintaining and developing local tourism (Booyens & Visser, 2010:380).

The large number of restaurants, shops and overnight facilities make Parys the perfect corridor to the Vredefort Dome and other surrounding areas. These facilities greatly contributed to the popularity of Parys as an overnight and weekend destination (Dreyer, 2013:15).

### 3.2.3 Background information on Parys High School

This high school is situated in town (refer to Figure 3.2) and serves the wider community because it is a parallel medium school. Parys High School was chosen because of its accessibility and the fact that many activities in the community revolve around this school. Parys High School is an eco-school which means that the school forms part of an international programme of the Foundation for Environmental Education (FEE).

'The programme aims to create awareness and action around social and environmental sustainability in schools and support Education for Sustainable Development in the national curriculum.' ('Wessa Eco-Schools' available at <http://wessa.org.za/wessa-eco-schools/> (accessed 24 November 2019).)

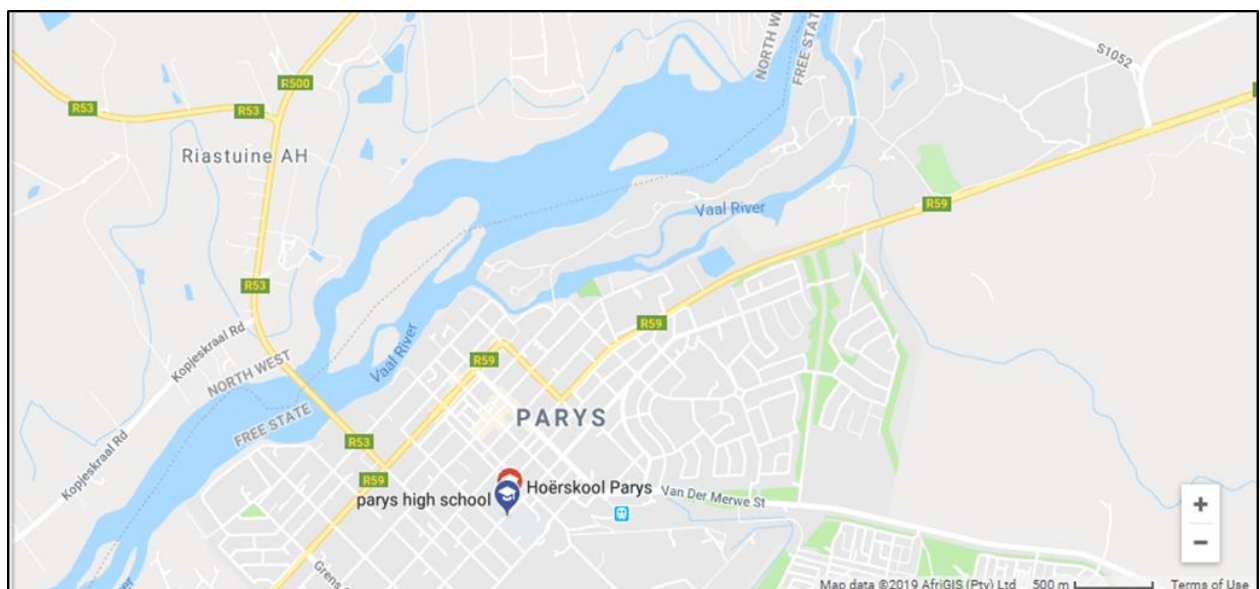


Figure 3.2: Location of Parys High School (Source: Google images)



Figure 3.3: Parys High School (Source: Google images, 2019)

### 3.3 Data collection and sampling

This section deals with the way in which the survey was conducted at the high school, the administering of the questionnaires, and the type of data analysis done.

#### 3.3.1 Administration of the survey

The questionnaires had to be completed by high school learners; therefore, permission had to be granted by the Head Office of the Free State Department of Education in Bloemfontein (Annexure D). The school principal was interviewed to gain permission to conduct the research at Parys High School, Parys, South Africa (Annexure E). The study was approved for ethics by the ethics committee of North-West University (Annexure F). The questionnaire and the accompanying annexure were shared with the principal and the teaching staff at Parys High School. The annexure that was added to the questionnaire (refer to Annexure B of this document) elaborates on the need and purpose of this study, as required by the Ethics Committee of the Research Unit for Environmental Sciences and Management of the NWU. It also gives an explanation of difficult terminologies used in order to ensure basic knowledge amongst learners before completing the questionnaire. Consent letters were sent home for parents to fill in, after which it was collected again from the students in their register classes. The contact

details of the researcher were made available on the consent letter (Annexure C) in this document, should participants be interested in the outcome of the study.

### 3.3.2 Administering the questionnaires

Parys High School consists of a total of 545 learners. Data were collected during the last two weeks of September 2018, during a formal class session where Grade 8 to 11 learners were involved. The register teachers of every class were informed as explained in section 3.3.1. The purpose of the study was explained to the learners as well, and the teachers facilitated the process by using the annexures, in case any questions were unclear on the questionnaire. The questionnaires were distributed to all the Grade 8 to 11 classrooms by the researcher. Educators then assisted each class with the completion of the questionnaire. Learners completed the questionnaires under the supervision of the educators in that specific class at school. The questionnaires were then collected from the various classes by the register teacher and handed to the researcher.

A total of 416 questionnaires were collected from the high school learners at Parys High School. Ninety-nine of the school's learners were in Grade 12 and did not participate in the study, as they were busy with preparation for the examinations. Thirty of the Grade 8 to 11 learners did not complete the questionnaires either because they were absent during the date of administration of the questionnaires or because it was done voluntarily and they could exercise their right not to participate in the study. The resulting sample size was 76% of the entire school (if Grade 12 learners are included) or 93% of the Grade 8 to 11 learners. An availability sample was used, instead of a random sample, and the representativeness of the sample was therefore not of significance for this study.



### 3.3.3 Data analysis

The data obtained during the study were analysed to determine the household waste behaviour with respect to household waste management amongst the youth of Parys. The data analysis programme used to analyse the data is SPSS Inc. (2017) IBM Corporation and its licensors. The analysis of the data was done using frequencies and contingency tables.

“Contingency tables represent the cross-classification of two or more categorical variables” (Field, 2009:815).

“The levels of each variable are arranged in a grid, and the number of observations falling into each category is noted in the cells of the table” (Field, 2009:815).

Contingency tables are tables which have two categorical variables and each variable has only two categories.

## 3.4 LIMITATIONS OF THE RESEARCH

Questionnaires do have less attractive characteristics, such as the effects of the emotions of the respondents, truthfulness, and the fact that respondents and the researcher do not always have the same thought process (Popper, 1959). During this study, the first limitation was the fact that the focus was only on Gr. 8 to 11 learners and excluded the Gr. 12 learners because of the exams they were busy with.

The second limitation was the response rate. Not all of the questionnaires were answered, while some were not answered comprehensively. The fact that the language of instruction was English could have been a limitation because it is not their home language, but the learners were assisted by teachers, so the answering of questions was facilitated. The data analysis had a few limitations in terms of interpretation and representation, e.g. the drawing of graphs. An attempt was made to acknowledge the limitations when the data analysis was done in Chapter 4.

### **3.5 CONCLUSION TO CHAPTER 3**

This chapter covered a detailed description of the geographical area and background information about Parys High School. The type of research was indicated, the questionnaires were discussed, the ethical and institutional preparation and approval were dealt with, and the administering of the questionnaires to collect data on the household waste behaviour of high school students (the youth) at Parys High School was addressed. The questionnaires acted as a quantitative approach to gather information in order to answer the four research objectives. A pilot study was done and the questions were adjusted to maximum effectiveness. The next chapter deals with the findings of the study.

## **CHAPTER 4: RESULTS AND DISCUSSION**

### **4.1 INTRODUCTION**

The previous chapter provided an overview of the design of the questionnaire and reasons for using this type of data collection method. In this chapter, the data collected from the four sections in the questionnaire, namely, household waste awareness, the participation of learners in the waste hierarchy, the willingness to participate in future household waste management, and the demographic profile are presented and discussed.

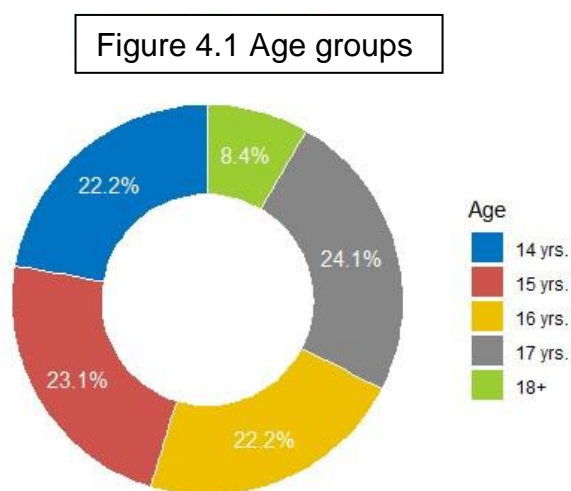
Section 1 of the questionnaire (Question 1.1-1.10) investigated the demographic information of the sample group. Section 1 aimed at answering research question 4. Simple frequencies were used to analyse Section 1 of the questionnaire. Section 2 (Question 2.1-2.2) investigated the awareness or understanding of what household waste is. Section 2 aimed at assisting in answering research question 1. Section 3 (Question 3.1-3.6) focused on the waste hierarchy and the participation at each level of the hierarchy. Section 3 aimed at assisting in answering research Question 2. Section 4 (Question 4.1-4.3) concluded the questionnaire by focussing on household waste behaviour and the willingness towards future participation in the management of household waste. Section 4 aimed at assisting in answering research Question 3.

### **4.2 PRESENTATION OF DATA FROM QUESTIONNAIRES**

In the following section, Sections 1 to 4 are presented graphically, followed by a brief explanation of the findings from the questions in the different sections. The demographic information in Section 1 attempted to answer research question 4. It is presented first merely because of the structure of the questionnaire. No analysis was done in any section yet, this section includes only the presentation of data from the questionnaires.

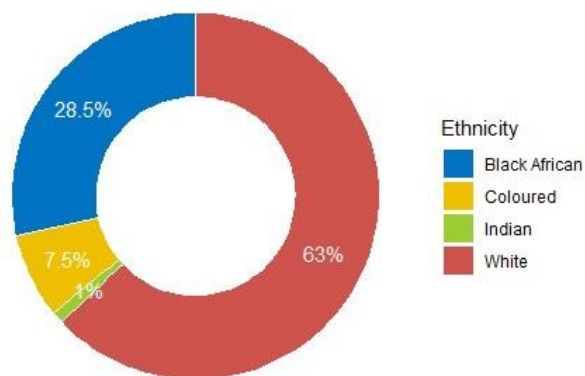
4.2.1 Section 1: Demographic information (Research question 4) A total of 415 students completed the questionnaire of which 41.9% were male learners and 58.1% were female learners.

Figure 4.1 presents the results for Question 1.2 – Age groups.



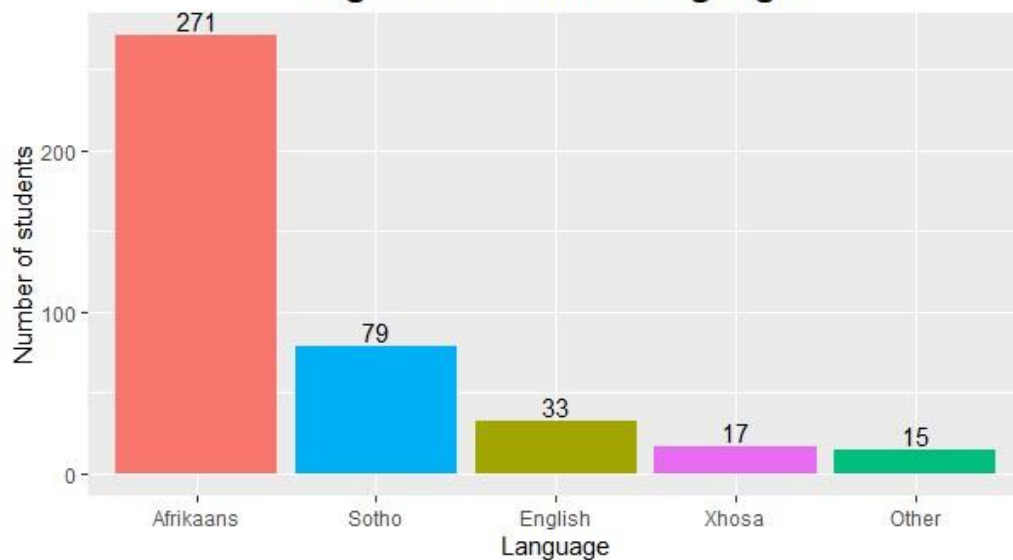
The students in this study were evenly spread in age, between the different grades at school. The 14-year-old age group made up 22,2% of the learners, and the 17-year-old age group made up 24.2% of the learners. The 17-year-old age group was the largest group. The smallest age group was 18 years and older, only representing 0.2%.

Figure 4.3 presents results for Question 1.3 about the different ethnic groups.

**Figure 4.3 - Ethnicity****Figure 4.3: Ethnicity**

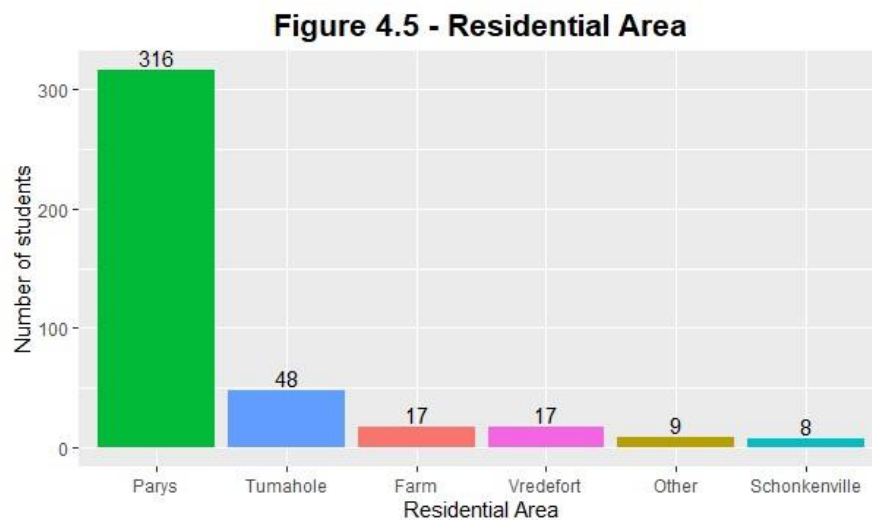
The largest ethnic group was the white learners (62,9%), followed by black African learners (28.4%), Coloured learners (7,5%) and Indian learners were the least (1.0%).

Figure 4.4 presents results for Question 1.4 – Home language.

**Figure 4.4 - Home Language****Figure 4.4: Home language**

The Afrikaans speaking learners were the largest group (65.3%), followed by Sotho speaking learners (19.0%) and English native language speaking learners (8,0%). This is to be expected, since Parys High School is traditionally an Afrikaans school, but has recently become a parallel medium school. In every grade, there are three Afrikaans classes and one English class.

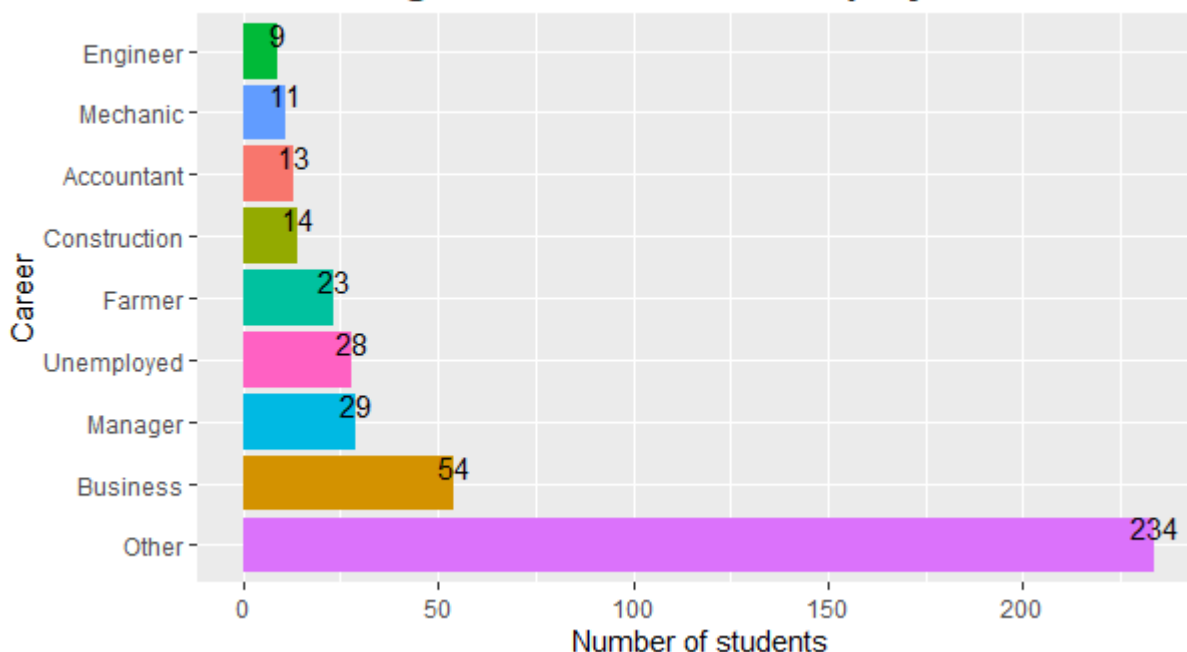
Figure 4.5 presents results for Question 1.5 – Residential area.



**Figure 4.5: Residential area**

The largest group of learners reside in Parys (76.1%), followed by the township

**Figure 4.6 - Parent's employment**



Tumahole (11.7%), surrounding farms (4,1%) and the other township Schonkenville (1.9%). The school in Vredefort does not have Gr. 10 to 12 learners, so the large number of learners from such a small town can be explained by the fact that learners from Vredefort attend Parys high school because it is the closest to their town. Figure 4.5 presents results for Question 1.6 – Parents' employment.

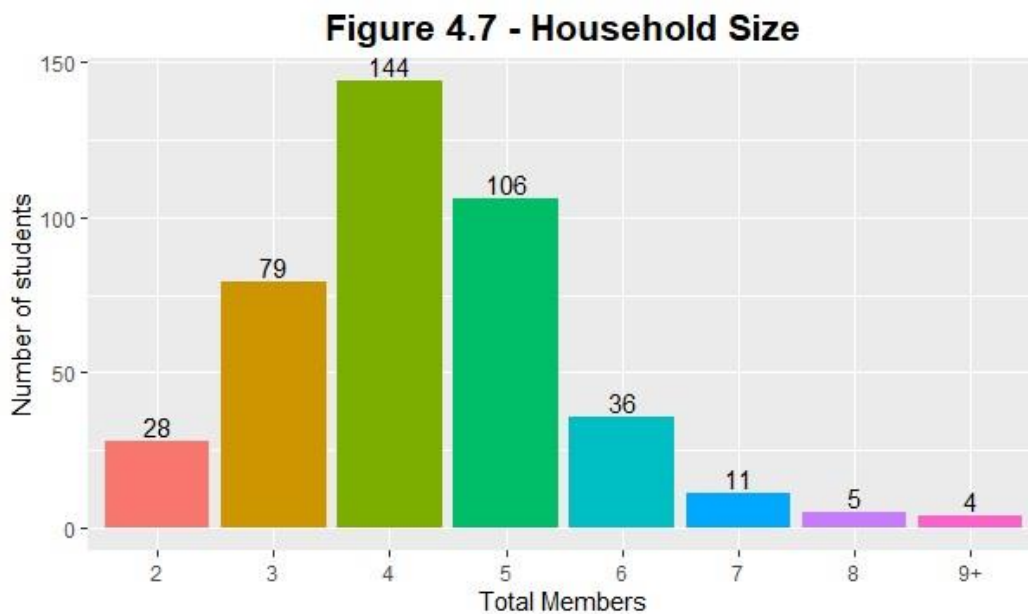
**Figure 4.6: Parents' employment**

The study indicated a vast variety of different careers. The learners would probably not have known the total income of the family, but the career they pursue could indicate whether a family falls within the lower, middle or high income group. The lower income group earns less than R5 600 per month, middle income group earns R5 600 to R40 000 per month, while the high income group earns more than R40 000 per month, according to 'article name' available at [businesstech.co.za](http://businesstech.co.za) (accessed 24 November 2019).). The study focussed only on the careers mentioned above. A total of 61 learners did not indicate their parents' professions at all. The professions mentioned in

Figure 4.5 above were those professions that were mentioned in the questionnaire. A lot of parents are involved in business practices, teaching, managerial positions and farming.

A total of 93.2% of the group indicated that their parents are employed. In more than 60% of the cases, both of the parents are employed, while 6,8% of the learners (28) lived in households where the parents were not employed, but it cannot be assumed that there is no income.

Figure 4.7 presents the results for Question 1.7 – Household size

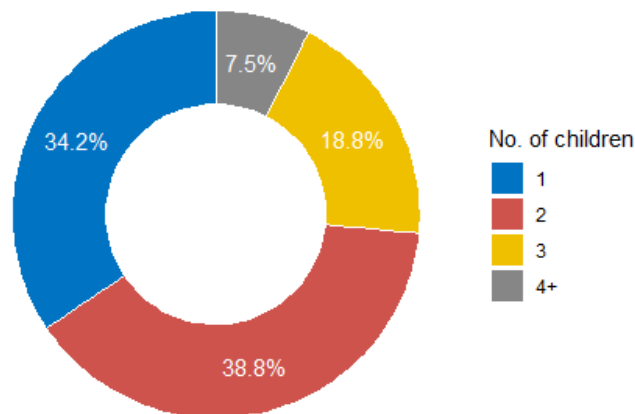


**Figure 4.7: Household size**

Most of the households consist of three people (19,1%), four people (34,5%) and five people (27,5%) on average.

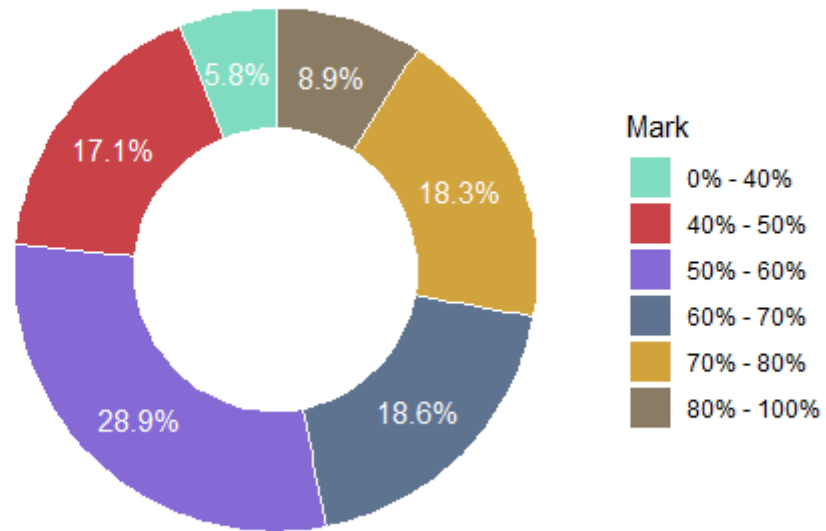
Figure 4.8 presents the results for Question 1.8 – Number of children in households.

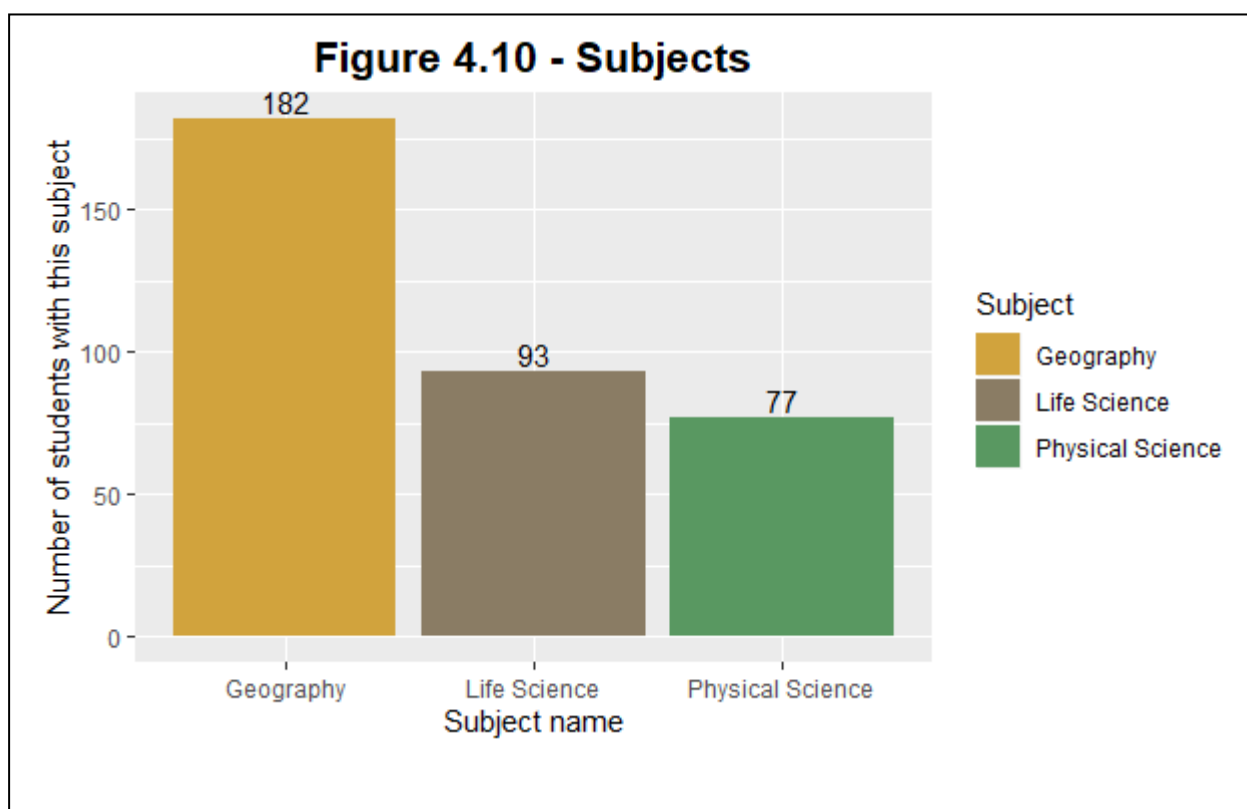


**Figure 4.8 - Amount of children in household**

The children (younger than 18 years) mostly reported being two children per household (39,1%), or just one child per household (34,5%). The households do not have large numbers of children overall. Only 2.2% of the total amount of households has 4 or more children.

Figure 4.9 presents academic performance per grade (Question 1.9).

**Figure 4.9 - Academic performance per grade**



Almost 30% of the learners indicated that the average marks they obtained are between 50% and 60%. These percentages were not verified by teachers. It is the learner's own reflection. One can assume that most of the learners perform on an average level, with a total of 22.9% that obtain 50% and less. There is a good percentage of 18.6% and 18.3% respectively for the marks 60% to 70% and 70% to 80%. The number of learners obtaining higher than 80% was only 8.9%. Only 0.7% of the total indicated that they are failing their grade. Figure 4.9 presents the results for Question 1.1.0 – Subjects.

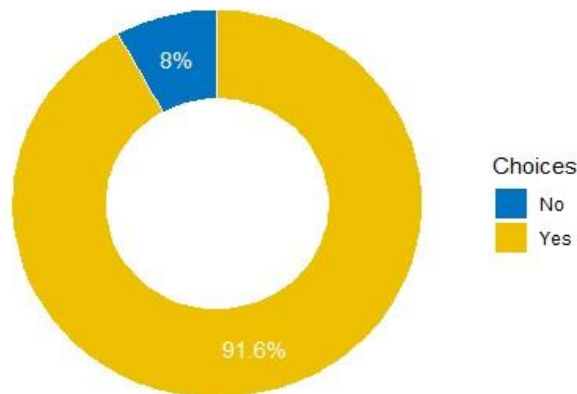
#### **Figure 4.10: Subjects**

Many learners indicated that they had Physical Science and/or Life Science as subjects. A total of 18.6% of the learners indicated that they were enrolled for Physical Science, while 22.4% indicated that they were enrolled for Life Science (Biology). The majority of learners selected Geography as a subject.

#### 4.2.2 Section 2 - Defining household waste (Questions 2.1 and 2.2)

Figure 4.11 presents the results for Question 2.1 – Do you know what household waste is?

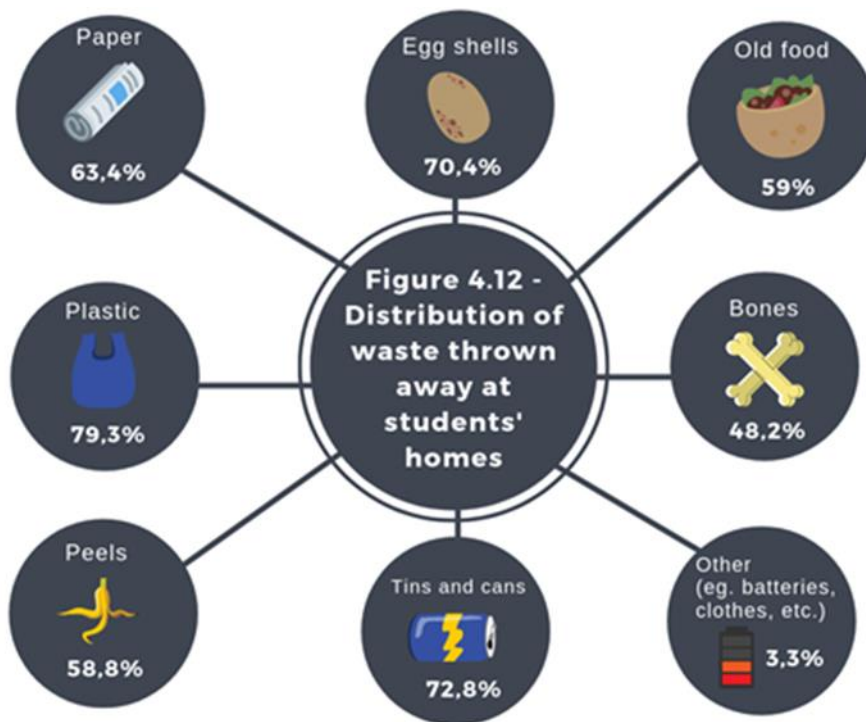
**Figure 4.11 - Do you know what household waste is?**



**Figure 4.11: Do you know what household waste is?**

Most of the learners indicated that they do know what household waste is (92,0%). A total of 33 learners (8,0%) said that they do not know what household waste is, while two learners did not answer the question.

Figure 4.12 presents the results for Question 2.2 – Name five things you as a family mostly throw away at home.



**Figure 4.12: Variety of waste thrown away at students' homes**

Items that get thrown away the most in students' homes are plastic (79.3%), tins and cans (72.8%), egg shells (70.4%), paper (63.4%), old food (59.0%), peels (58.8%) and bones (48.2%).

#### **4.2.3 Section 3 and 4 – Waste management hierarchy (Questions 3.1 – 3.6) and Household waste behaviour (Questions 4.1.1, 4.2.1, 4.2.2, 4.2.3 and 4.3)**

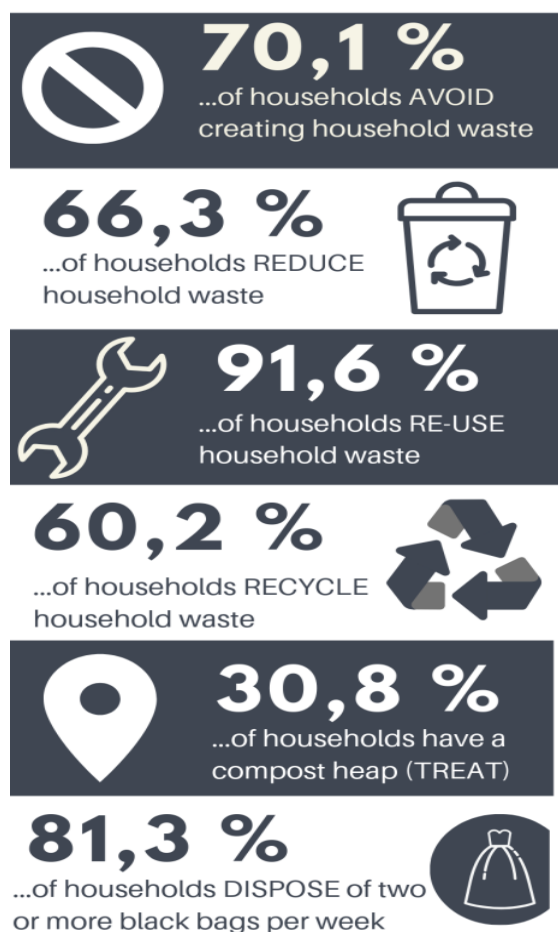
Figure 4.13 and Figure 4.14 are combined in Figure 4.12 below. The presentation was done using an info-graphic.

Figure 4.13 presents the results for Question 3.1 (Does your family avoid creating household waste), as well as the results for Question 3.2: How does your family avoid creating household waste?

The following two figures are based on Section 3 of the survey questionnaire. Section 3 gathered information on how households participate in waste management according to the waste hierarchy.

### FIGURE 4.13 - THE WASTE HIERARCHY

Presenting results from household behaviour



### FIGURE 4.14 - EXPLANATION OF THE HIERARCHY

Presenting reasons for why households participate in waste management



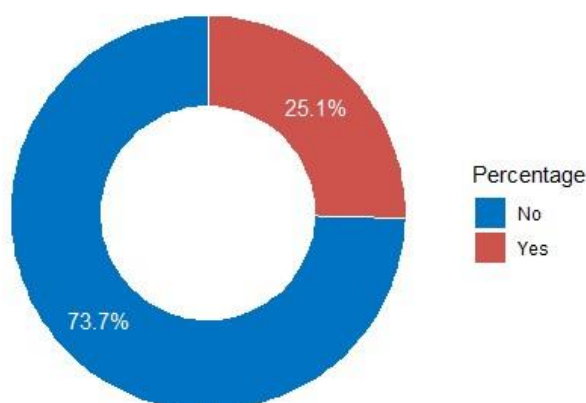
### Figure 4.13: The waste hierarchy

Most of the learners answered that they only buy what is needed (37.8%) and avoid (70.1%) creating unnecessary household waste in the manner. Many families use a shopping list (35.2%) to buy products, and then only purchase fresh food (25.8%) to limit packaging. Few households purchase on a strict budget (18.3%) and a small group grow their own vegetables (11.6%). Most of the learners (34.9%) indicated that they do not sort their household waste bags because it takes up too much time.

Learners were given the choice to select the items that they mostly recycle. Most indicated that it is plastics that get recycled the most (38,8%). Plastics, along with other items like fabric, paper and glass, were being recycled.

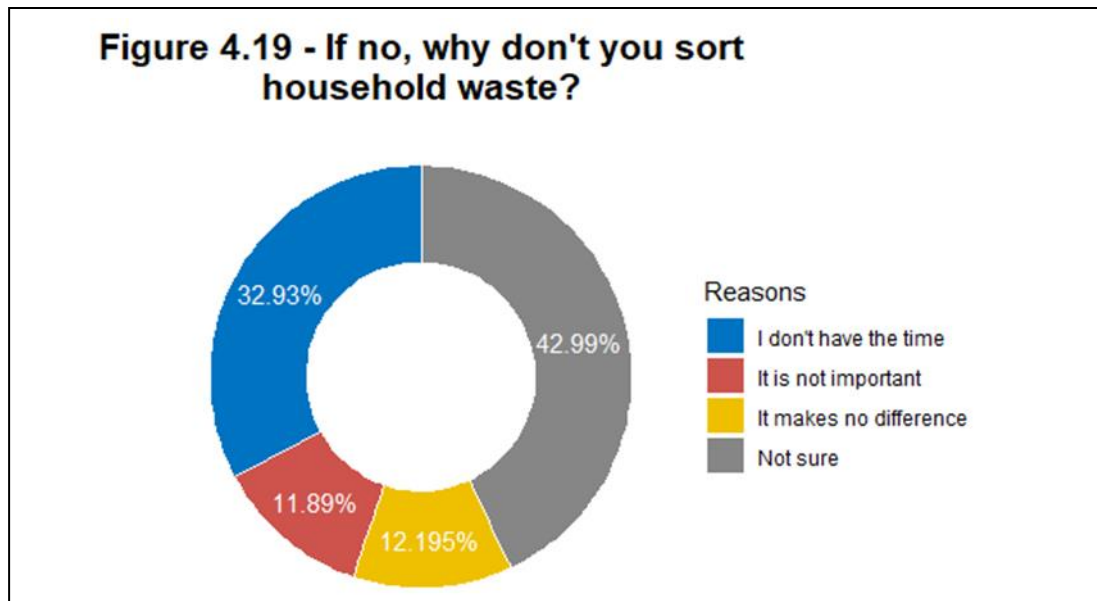
Figure 4.17 presents the results for the Question - does your family sort household waste?

**Figure 4.17 - Do you sort household waste?**



**Figure 4.17: Do you sort household waste?**

Most of the learners indicated that their families do not sort their household waste (73.7%). Figure 4.19 presents the reasons why families do not sort household waste.



**Figure 4.19. Reasons why families do not sort household waste**

The majority of the learners (42.99%) are not sure why their families do not sort household waste. 32.93% of respondents said that they do not have enough time to sort household waste. A group of 11.89% felt that it was not important, while 12.2% felt that it would not make any difference. The reasons why most of the learners do sort their waste is because it can negatively impact the environment not to do so (11,6%), and because of the fact that it is their waste and they need to sort it (11,3%).

Most of the learners indicated that, if the process of sorting (40,7%) and recycling (43,6%) was made easier, they would certainly do it. They also indicated that payment for recycling would inspire them to sort and recycle more often.

The 'see others doing it' answer has the least responses. In the literature, this is identified as an important factor that influences households' behaviour. It is clear from the results that the learners do not really participate in good practices and therefore they also don't see a lot of other families doing it, so the knock on effect from seeing others doing it has not yet occurred in the area.



Figure 4.20 presents the factors that would make families act more responsibly with their household waste.

**Figure 4.20 - What would motivate you and your family to handle household waste more responsibly?**

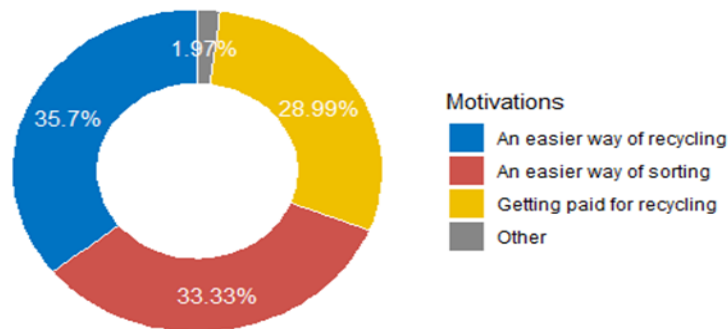


Figure 4.20: Factors that would make families act more responsibly with their household waste

### 4.3 ASSOCIATIONS FOUND BETWEEN DATA

During this analysis, cross tabulation was used to test for associations between different demographic variables. The demographic variables included gender, age, ethnic group, parents working, who is working, number of people in the household, average marks obtained, physical science as subject, life sciences as subject and geography as subject. The demographic variables were tested against the following eight questions:

- Do you know what household waste is? (Question 2.1)
- Does your family avoid creating household waste? (Question 3.1.1)
- Does your family reduce household waste? (Question 3.2.1)
- If yes, what articles are you re-using at home? (Question 3.3.1)
- Does your family recycle any household waste? (Question 3.4.1)
- Does your family have a compost heap? (Question 3.5.1)

- Does your family sort the waste from the kitchen before they dispose of the bags? (Question 3.6.2)
- Do you sort household waste? (Question 4.2.1)

In this study, only the Phi value, which indicates practical significance, is used to indicate which demographic variable has an effect on each of the eight questions mentioned above. The p-values, which indicate statistical significance, are reported for the sake of completeness. It is very important to note that these values are only guideline values and not cut-offs. The values indicated in the study are merely close to these values. It is important to know whether a relationship between two variables is practically significant or not. Ellis and Steyn (2003) provide the following guidelines for interpretation of data:

'The Phi values can be interpreted in the following way:

0.1= non-significant (small causality)

0.3= practical visible (medium causality)

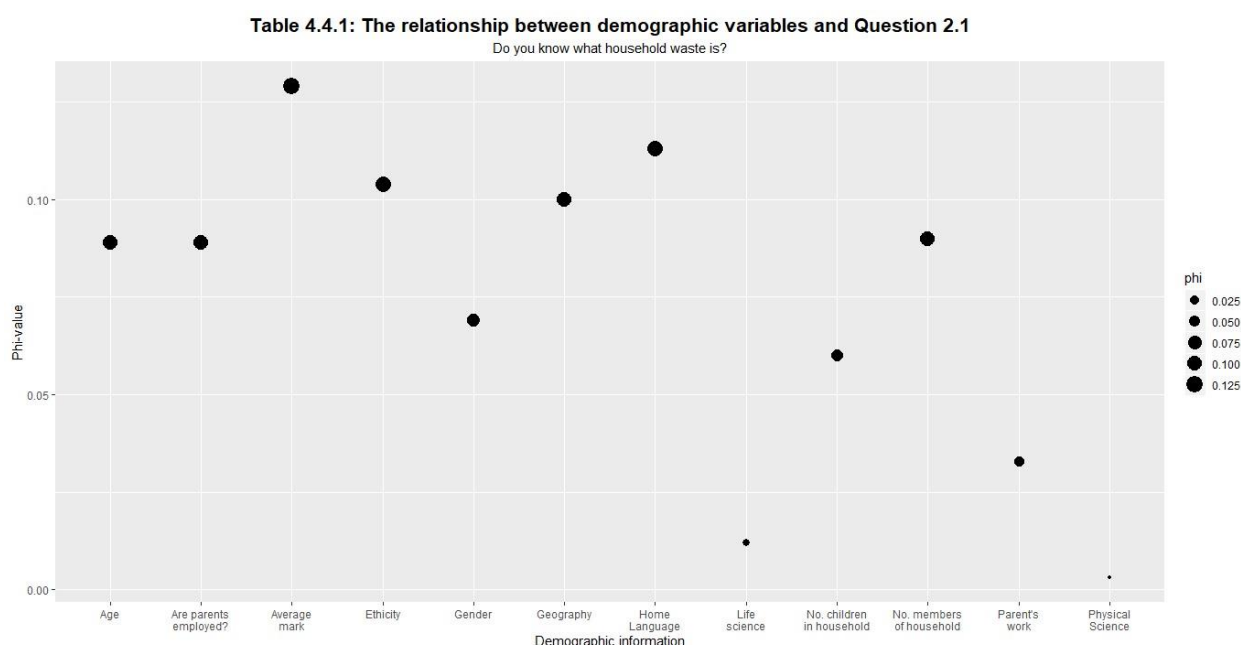
0.5= practical significant (large causality)

In the tables below indicating the relationships between the different variables and the specific questions in the questionnaire, the significance is shown between variables and another variable. The higher the dots and the larger the dot, the more significant is the relationship between the two variables.

**Table 4.1: The relationship between demographic variables and Question - 2.1 Do you know what household waste is?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,069	0,16
1.2 Age	0,089	0,515
1.3 Ethnic group	0,104	0,108
1.4 Home language	0,113	0,153
1.6.1 Parents working	0,033	0,502

1.6.2 Who is working	0,089	0,212
1.7 Total number of people in household	0,09	0,651
1.8 Number of children in household	0,06	0,684
1.9 Average mark	0,129	0,238
1.10.1 Physical science	0,003	0,943
1.10.2 Life science	0,012	0,805
1.10.3 Geography	0,1	0,043

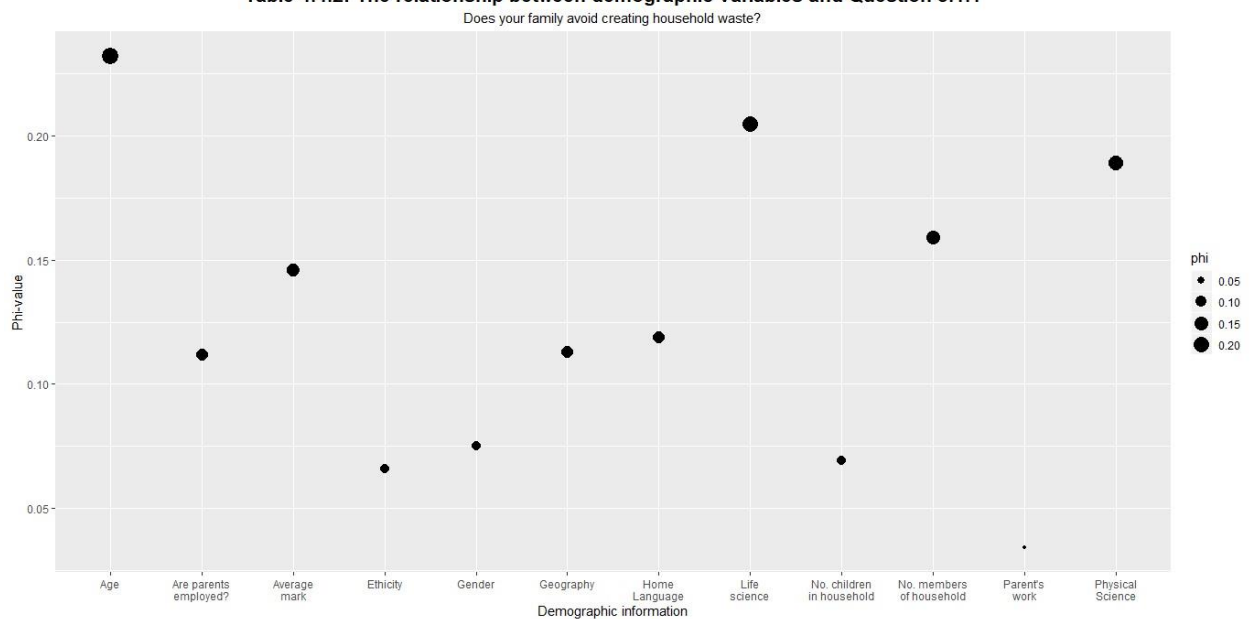


Only practical non-significant associations are indicated between the demographical variables and Q2.1 (Do you know what household waste is?) as the highest phi value is 1.129. It is only with age and ethnic group that there is a tendency to be practically significant. Learners within the age groups 14, 16 and 17 have the highest significance. Approximately 95% of 14-year-olds, 95% of 16 year-olds and 91% of 17-year old indicated that they know what household waste is.

**Table 4.2: The relationship between demographic variables and Question 3.1.1 Does your family avoid creating household waste?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,075	0,129
1.2 Age	0,232	0
1.3 Ethnic group	0,066	0,41
1.4 Home language	0,119	0,118
1.6.1 Parents working	0,034	0,494
1.6.2 Who is working	0,112	0,087
1.7 Total number of people in household	0,159	0,063
1.8 Number of children in household	0,069	0,578
1.9 Average mark	0,146	0,123
1.10.1 Physical science	0,189	0
1.10.2 Life science	0,205	0
1.10.3 Geography	0,113	0,022

**Table 4.4.2: The relationship between demographic variables and Question 3.1.1**



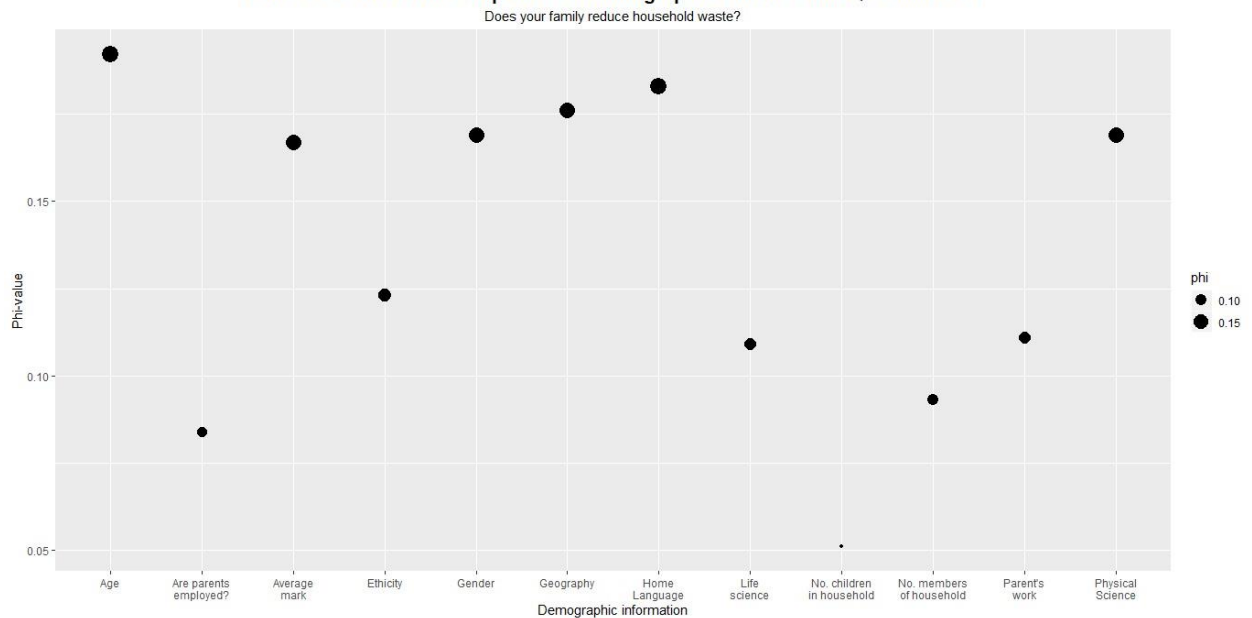
The demographical variable age tends to have a practically visible association with Question 3.1.1 as the phi value is reported at 0,232. Smaller percentages of the age groups 15 and 16 years old (61.5% and 56.5% respectively) indicated that they do avoid

creating household waste, while 84% of 14-year-olds, 75% of 17-year olds and 80% of 18+ year olds indicated that their families avoided the creation of waste.

**Table 4.3: The relationship between demographic variables and Question 3.2.1 Does your family reduce household waste?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,169	0,001
1.2 Age	0,192	0,005
1.3 Ethnic group	0,123	0,047
1.4 Home language	0,183	0,004
1.6.1 Parents working	0,111	0,025
1.6.2 Who is working	0,084	0,257
1.7 Total number people in household	0,093	0,62
1.8 Number of children in household	0,051	0,786
1.9 Average mark	0,167	0,051
1.10.1 Physical science	0,169	0,001
1.10.2 Life science	0,109	0,028
1.10.3 Geography	0,176	0

**Table 4.4.3: The relationship between demographic variables and Question 3.2.1**

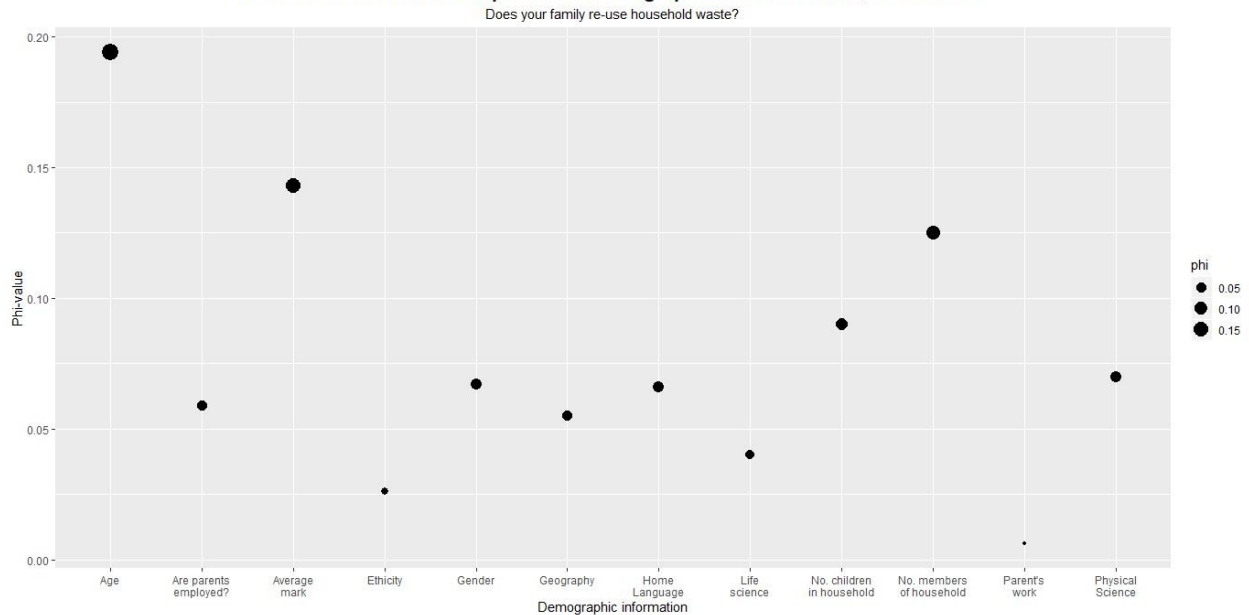


Only practically non-significant associations are indicated between the demographical variables and Q3.2.1 (Does your family reduce household waste?) as the highest phi value is 0.192. Demographics do not appear to have any influence on reducing the amount of household waste created.

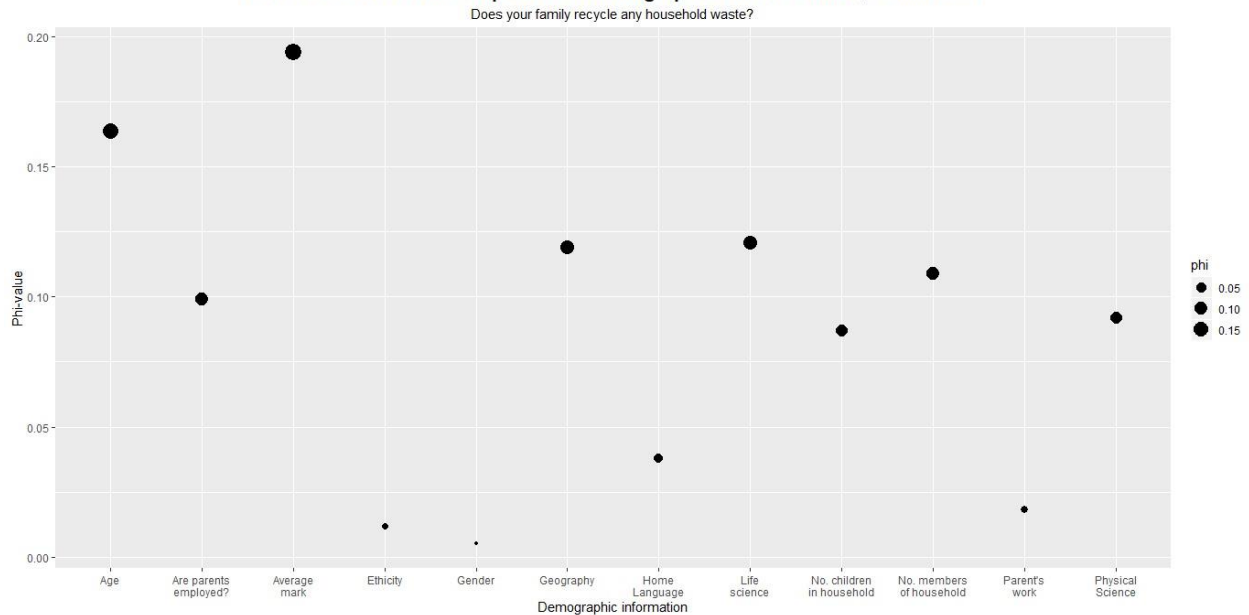
**Table 4.4: The relationship between demographic variables and Question 3.3.1: Does your family re-use household waste?**

<b>DEMOGRAPHIC VARIABLES</b>	<b>Phi</b>	<b>p-value</b>
1.1 Gender	0,067	0,174
1.2 Age	0,194	0,004
1.3 Ethnic group	0,026	0,875
1.4 Home language	0,066	0,616
1.6.1 Parents working	0,006	0,895
1.6.2 Who is working	0,059	0,505
1.7 Total number of people in household	0,125	0,266
1.8 Number of children in household	0,09	0,345
1.9 Average mark	0,143	0,146
1.10.1 Physical science	0,07	0,154
1.10.2 Life science	0,04	0,412
1.10.3 Geography	0,055	0,262

Only practically non-significant associations are indicated between the demographical variables and Q3.3.1 (Does your family re-use household waste?) as the highest phi value is 0,194.

**Table 4.4.4: The relationship between demographic variables and Question 3.3.1****Table 4.5: The relationship between demographic variables and Question 3.4.1: Does your family recycle any household waste?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,005	0,918
1.2 Age	0,164	0,059
1.3 Ethnic group	0,012	0,97
1.4 Home language	0,038	0,898
1.6.1 Parents working	0,018	0,719
1.6.2 Who is working	0,099	0,157
1.7 Total number of people in household	0,109	0,45
1.8 Number of children in household	0,087	0,394
1.9 Average mark	0,194	0,012
1.10.1 Physical science	0,092	0,064
1.10.2 Life science	0,121	0,016
1.10.3 Geography	0,119	0,017

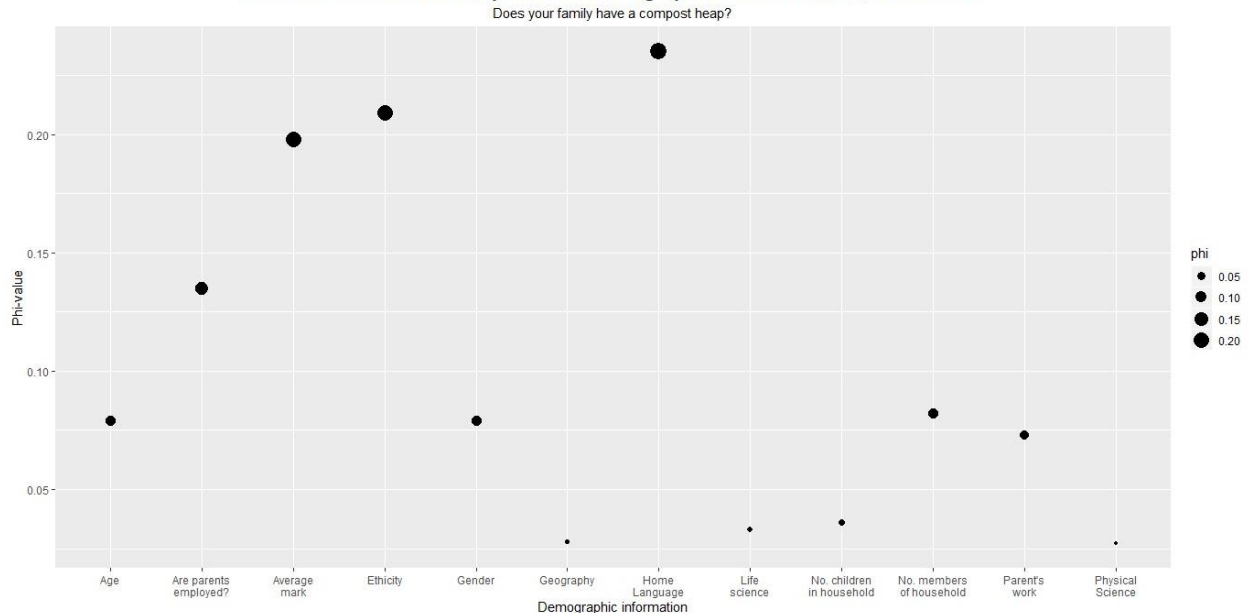
**Table 4.4.5: The relationship between demographic variables and Question 3.4.1**

Only practically non-significant associations are indicated between the demographical variables and Q3.4.1 (Does your family recycle any household waste?) as the highest phi value is 0.164.

**Table 4.6: The relationship between demographic variables and Question 3.5.1: Does your family have a compost heap?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,079	0,108
1.2 Age	0,079	0,629
1.3 Ethnic group	0,209	0
1.4 Home language	0,235	0
1.6.1 Parents working	0,073	0,141
1.6.2 Who is working	0,135	0,029
1.7 Total number of people in household	0,082	0,741
1.8 Number of children in household	0,036	0,913
1.9 Average mark	0,198	0,008
1.10.1 Physical science	0,027	0,581
1.10.2 Life science	0,033	0,498
1.10.3 Geography	0,028	0,565



**Table 4.4.6: The relationship between demographic variables and Question 3.5.1**

The two demographical variables home language and ethnic group tend to have a practically visible association with Question 3.5.1 (Does your family have a compost heap?) as the phi value is reported at 0,232. Mostly Afrikaans people (38.3%) indicated that they do have a compost heap.

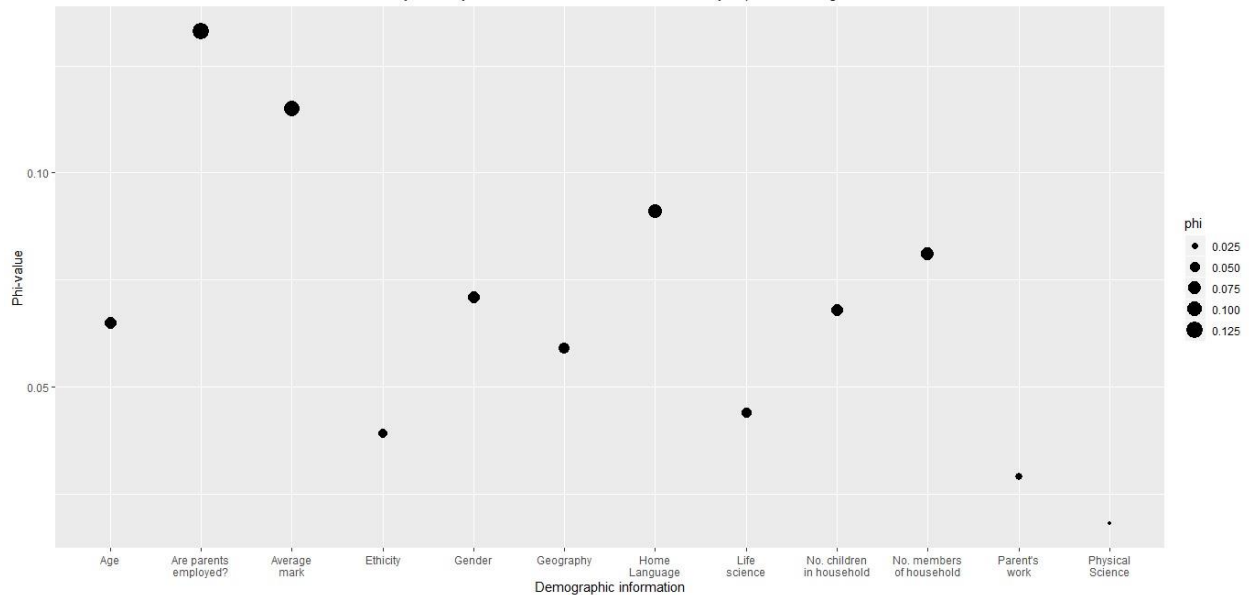
**Table 4.7: The relationship between demographic variables and Question 3.6.2: Does your family sort the waste from the kitchen before they dispose of the bags?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,071	0,151
1.2 Age	0,065	0,777
1.3 Ethnic group	0,039	0,728
1.4 Home language	0,091	0,331
1.6.1 Parents working	0,029	0,553
1.6.2 Who is working	0,133	0,032
1.7 Total number of people in household	0,081	0,749
1.8 Number of children in household	0,068	0,598
1.9 Average mark	0,155	0,084

1.10.1 Physical science	0,018	0,714
1.10.2 Life science	0,044	0,371
1.10.3 Geography	0,059	0,234

**Table 4.4.7: The relationship between demographic variables and Question 3.6.2**

Does your family sort the waste from the kitchen before they dispose of the bags?



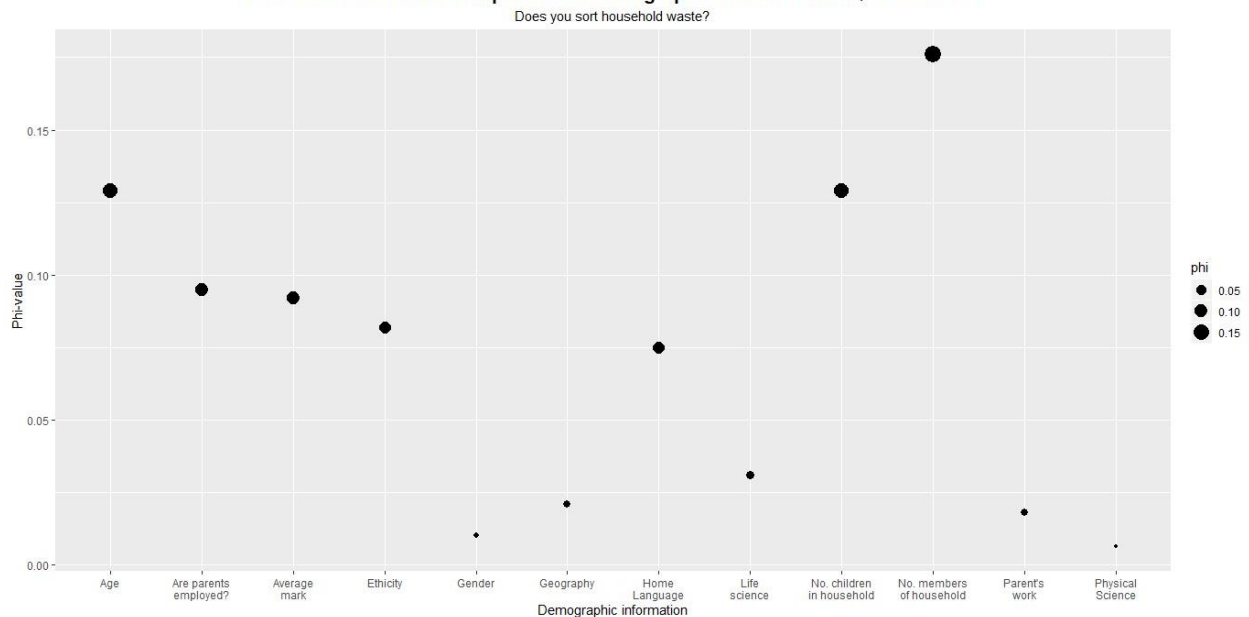
Only practically non-significant associations are indicated between the demographical variables and Q3.6.2 (Does your family sort the waste from the kitchen before they dispose of the bags?) as the highest phi value is 0.155.

**Table 4.8: The relationship between demographic variables and Question 4.2.1 Do you sort household waste?**

DEMOGRAPHIC VARIABLES	Phi	p-value
1.1 Gender	0,01	0,84
1.2 Age	0,129	0,148
1.3 Ethnic group	0,082	0,254
1.4 Home language	0,075	0,51
1.6.1 Parents working	0,018	0,714
1.6.2 Who is working	0,095	0,175
1.7 Total number of people in household	0,176	0,028
1.8 Number of children in household	0,129	0,079

1.9 Average mark	0,092	0,641
1.10.1 Physical science	0,0062	0,211
1.10.2 Life science	0,031	0,525
1.10.3 Geography	0,021	0,672

**Table 4.4.8: The relationship between demographic variables and Question 4.2.1**



Only practically non-significant associations are indicated between the demographical variables and Q4.2.1 (Do you sort household waste?) as the highest phi value is 0.176.

## 4.4 CONCLUSION OF FINDINGS

The following conclusion addresses some of the findings from the different sections in the questionnaire.

### 4.4.1 Demographic information (Research question 4)

The number of members in the household does not have a great influence on many of the waste management questions, but the relationship spikes when asked whether they sort waste. This indicates that larger families may not have the time or resources to sort the implied larger quantities of waste although there are more people to sort.

The average mark's relationship is always above 0.05, showing that academic performance is linked with environmental awareness. The making of compost heaps at home occurred mostly amongst the white ethnicity group. Does this mean that having a compost heap is a cultural occurrence?

Income is related to educational level and this study's literature review indicated a positive relationship between education level and waste behaviour.

The results from the questionnaire indicated parents' work is rarely above 0.10 meaning that income does not really have an influence on waste behaviour here. Data rather links it to gender and ethnicity, because of the high relationship between these two demographic factors and the questions.

#### 4.4.2 Current level of awareness (understanding) of household waste

(Research Question 1)

The learners do not only know what waste is, but also specifically what their families dispose of. The awareness of the nature of waste shows that the problem of waste is known, but this does not mean that they participate in responsible waste management.

#### 4.4.3 Current level of participation (Research question 2)

Most of the students who do not sort waste do not know why they refrain from such behaviour – there is thus a lack of knowledge (maybe even on the parents' side) on proper waste management techniques in these households. A reason that follows closely behind the lack of knowledge in the responses of Section 4, is that they do not have time – they should be more focused on time management.

#### 4.4.4 Level of willingness (Research question 3)

There does not seem to be a single incentive that would motivate the families to recycle. Although the three main choices are divided almost perfectly in thirds, the biggest

proportion of the three is the incentive of an easier way to handle household waste. This can once again point to a lack of knowledge of the process or the apathetic attitudes of the families. The attitude problem can also be seen in Figure 4.15 – recycling is definitely not a priority to most families.

Of the 90% who knew what waste is, only 60% actually admitted that they recycle, which means that there is a 30% gap in the audience that needs to be educated. Even the most desirable option, avoidance of waste, is only done by 70%, leaving 20% of people who know that there is a problem but do not take action – they know about the waste problem but they may not know or care, or may not have the time to do something about it.

Every household produces waste so every household should be a part of the solution.

#### **4.4.5 Conclusion**

It is clear from the results that all learners did not recycle. Only some acted responsibly and behaved appropriately. What is of much concern is the fact that families were so apathetic in their support of responsible waste management. The findings could be generalised because of the larger numbers of respondents that participated. Parental education must incorporate responsible waste management which must be taught to children at home so that the schools do not remain the only institutions fighting litter and waste problems. The next chapter deals with the conclusion to the study.

## CHAPTER 5: INTERPRETATION AND CONCLUSIONS

### 5.1 INTRODUCTION

The aim of this study was to investigate the behaviour of high school learners towards household waste in their local environment in Parys, as it relates to the management of waste within a household. Chapter 5 provides a summary of results with reference to the four research objectives posed in Chapter 1 and the results presented in Chapter 4. Section 5.2 discusses the findings from the data collected from the questionnaires. Section 5.3 provides an overall conclusion on the household waste management behaviour of high school students in Parys, Free State in South Africa. Finally, the chapter comments on the way forward in Section 5.4.

### 5.2 DISCUSSION OF FINDINGS FROM CHAPTER 4

Section 5.2 discusses the findings from the data collected and presented in Chapter 4.

#### 5.2.1 The demographic profile of the respondents (Section 1 from the questionnaire)

The TBP theory suggests numerous influencing factors such as age, gender, ethnicity, socio-economic status, education, personality and past experiences that may influence the behaviour of people (De Leeuw et al., 2014). Almost 60% of the learners, who filled in the questionnaires, were female. Literature indicated that females tend to have a greater environmental awareness than males. The age groups were evenly spread, with most of the learners in the 14 to 17-year-old age group. Older learners have a more pro-environmental behaviour than younger learners. From the literature study, it emerges that two factors that influence awareness are gender and age (Yilmaz, 2004). This study only found age to be an important factor because the age group including 15-year-olds (23,10%) and 17-year-olds (24,10%) tended to be the most positive towards a higher pro-environmental awareness. Studies indicated that the youth are more reluctant to engage in positive environmental behaviour than older people (De Leew et al., 2014). Other studies found the youth to be more responsible towards the

environment, as they feel personally responsible, while others are in denial (Doherty & Clayton, 2011; Reser & Swim, 2011). In this study, the youth did indicate that they care about the environment, and they did admit to be responsible for their own waste (as in Section 5.2.2), but only occasionally. The White, Afrikaans speaking learners made up the majority of the learners who were involved in the study, followed by black Sotho and Xhosa learners. Findings indicated that 62,90% of the white Afrikaans group is positive towards environmental awareness. The White ethnic group displayed the highest level of awareness on environmental issues.

Most of the learners who participated in the survey resided in Parys, the main feeder area, and few in the township, on farms and in Vredefort. The unemployment figure is 6,7% indicating fewer economic problems. Most of the parents were employed, as presented in Figure 4.6. They were employed in the finance, construction, education, managerial and farming sectors. The assumption can be made, according to Figure 4.6 as well, that most families earned a decent income and fell into the middle income group. The average household size and number of children were not too large, and there were only 9 families that had more than 4 children. The income of parents would equip them to support most of the family's needs as the middle class group do earn salaries, while both parents were working in most cases.

Learners that have Physical Science and Life Science as subjects obviously need to have good academic performance to be able to take those subjects. According to the Theory of Planned Behaviour (TPB) discussed in Section 2.6, environmental education should be better introduced in subjects like English, Geography and Science (Mahmud & Osman, 2010).

Geography deals with sustainability and a positive environmental behaviour. The majority of learners selected Geography as a subject. The expectation here was that Geography learners would have a far greater environmentally responsible behaviour than those that do not have Geography. This study proved that it was not the case and that it made no significant difference whether learners were taking Geography, although

studies indicated a link between learners with a higher level of education and a positive environmental behaviour (Yilmaz, 2004). Learners with higher knowledge scores had a more positive behaviour than learners with lower knowledge scores. Even if environmental education is dealt with under topics like global warming and climate change, there is a weak link between knowledge and a positive environmental behaviour (Yilmaz, 2004). The findings from this study support Yilmaz.

In this study, the two demographic indicators namely age and race were the two aspects with the most influence on the household waste behaviour of the youth, but virtually no connection was found between other demographic factors and waste behaviour. The reasons for this could be a lack of knowledge or possibly just ignorance. Another possible reason could be the belief that someone is being paid to care for the environment, and that it is therefore not their responsibility.

#### 5.2.2 Defining household waste and awareness (Section 2 from the questionnaire)

This section established that learners have a proper understanding of household waste as 92,0% of them indicated that they *know* what household waste is. It can therefore be assumed that learners are currently aware of what household waste is. Learners did indicate that they defined household waste as the items that they throw away in the kitchen bin. Although they know that the waste ending up in the kitchen bin is regarded as household waste, the complexity of waste is not realised by many learners. The items that are thrown away, in descending percentage order, are plastic, tins and cans, egg shells, paper, old food, peels, bones and other items such as batteries and clothes, as already mentioned in Section 2.5. The understanding of household waste would lead to a greater awareness of the way household waste is managed. The learners are aware of the environment, but it is not very important to them. They do not realise that every person can make a difference improving household waste management.

The learners do have a sense of responsibility and doing what is right, but it is only occasionally that they will think about that. They often do not know why they do not



participate more in alternative ways of waste management and some blame a lack of time for their lack of participation. Environmental awareness can be improved by environmental education in schools.

According to the data collected from this research, treatment of household waste is not sufficient or very successful. Question 3.5.1, the treatment of waste by using a compost heap, for example, was asked to determine the level of waste treatment. The majority of learners (69%) said that they do not have a compost heap because they do not know how to create one, or do not use it and that it smells bad and attracts flies. Environmental education could focus more on the treatment of household waste, as learners do not have a high level of participation in the treatment of household waste. Environmental education (EE) helps to foster environmentally literate citizens. Providing advantages and instructions on compost heaps will encourage more families to start their own treatment initiatives in a similar manner. In this way, less useful resources will end up on landfill sites. More education and awareness should be provided on how households may treat their household waste. Learners' understanding of waste is limited. They are not aware of the fact that it is not waste but valuable resources. A paradigm shift is required.

### 5.2.3 The waste management hierarchy: participation (Section 3 from the questionnaire)

The emphasis should be on waste prevention (avoidance), re-using, recycling and treatment of waste, with disposal as the very last resort. Learners indicated that avoidance is undertaken least often, while re-use is conducted more often (Barr *et al.*, 2001). In this study however, avoidance (70%) and re-use (91,34%) proved to be important, with re-use being done the most. The learners indicated that they do avoid creating waste (70,1%). Most of the households proved to have a decent income (Section 1) and the learners indicated that they do purchase from a shopping list, although not so much according to a strict budget. This is informative; because it appears that they may purchase extra products that they do not really need as it is not

on the shopping list. The main reasons why the respondents do not avoid the creation of household waste are unclear. It could well be the fact that it is time-consuming, and may have a lack of knowledge on how to avoid creating household waste in the first place.

Most of the learners (91,6%) indicated that their families do re-use items such as plastic bottles, ice cream containers and plastic bags. Plastics are disposed of most often (79.3%), while plastic is also one of the items that gets re-used and recycled a lot and this finding seems to be good practice. Recycling does take place in some instances, but the families do not recycle as a rule, and the respondents do not know why they don't do it. There seems to be a misconception that recycling takes up a lot of time. With a proper waste management system and marked dustbins, it should become second nature. Better knowledge of the recycling systems and options is therefore needed. The learners do realise, to some extent, that not all items are waste. Most of the waste items listed in Figure 4.12 can either be recycled or reduced. Most of the households do not sort their waste before it is disposed of and the most common reason for this finding is that they do not have the time to sort waste or take it to a collection point or drop-off point. Many of these items from the household waste are collected by informal waste pickers, as seen from Section 2.5 in the literature review. It would be possible to sort these items from the other household waste before it gets disposed of and end up on the landfill site. In smaller towns like Parys, valuable recyclable waste is available to informal waste pickers. This provides them with an opportunity to earn an income by collecting, sorting and selling waste. Recyclable waste provides an income for those who do not have any other means (Muller & Scheinberg, 2003:16; Ullah, 2008:2).

#### 5.2.4 Section 4: Household waste behaviour – willingness

A number of learners indicated that they are willing to sort and recycle waste because they feel it is their waste (11,3%), so they should be responsible for its sorting. They know that excess waste can cause environmental problems. A system is needed that

does not take up a lot of time, and easier ways of sorting and recycling should be provided. The willingness amongst the students must be encouraged by introducing a sorting and recycling initiative from the eco-school projects. When learners see that their peers are involved in such activities it will be easier for everyone else to become involved as well. This can be seen as a type of 'lead by example' act.

The implementation of incentives, such as payment for glass bottles, will bring quick results, while a change in the household waste behaviour will result in a more permanent solution to reduce household waste creation (Kirakozian, 2016). Learners feel that one person cannot make a difference in the management of waste. The school can initiate competitions between classes with regard to the amount of recyclables learners bring to school on a weekly or monthly basis. This idea must also be integrated with environmental education or cultivating an environment that encourages households to become more responsible. Motivation for learners to handle household waste more responsibly would be to incentivise both the sorting and the recycling of household waste. Although it would be desirable to get something in return for doing the right thing, it would be more sustainable to implement a longstanding recycling programme and environmental education (EE). The longstanding recycling programme could create the desired change in the households' behaviour and have a knock-on effect.

There is currently participation in alternatives such avoidance, re-use, recycling and treatment. The learners indicated (in Question 4.3) what would motivate or inspire them to handle household waste more responsibly in future. The learners indicated that the process of participation in recycling should be made easier and more accessible to them. Many indicated that incentives such as payment would also motivate them to recycle more. Therefore, learners seem willing to participate in waste management alternatives, but certain obstacles need to be overcome through the introduction of incentives. Households will be more willing to participate in waste management activities such as recycling, if incentives were given to them, as well as if the recycling

process were more convenient, e.g. kerbside recycling (Miliute-Plepiene *et al.*, 2016). The less household waste is produced, the less the cost of removing the waste. This in itself will influence the willingness to avoid and reduce household waste.

### 5.3 Answering of research questions

1. Learners do understand what household waste is. They indicated that it is all the waste that ends up in the dustbin in the kitchen.
2. Learners do participate in some recycling activities that do not require a lot of effort. They indicated that they would rather get paid for participating in recycling. A lot more can be done to encourage learners to recycling household waste.
3. Learners are willing to reduce, recycle and use providing that the process is made easier and incentives are given.
4. The demographic profile of the learners did not indicate much significance, Gender and income did not prove to have any relationship. Rich or poor, this variable did not have any significant effect on household waste.

### 5.3 OVERALL CONCLUSION

High school learners from Grade 8 to 11 were involved by filling in a questionnaire aiming to answer four research questions. A literature study revealed a steady and rapid increase in the amount of household waste produced globally (Adenrele, 2013; Webster, 2012 & Yoda, 2014). Household waste volumes are expected to increase to 2.2 billion tonnes of household waste by 2025 (Hoorweg & Bhada Tata, 2012). There is not only an increase in the amount of household waste created, but also in the complexity of the household waste (Webster, 2012).

The two possible reasons for the continuous growth in household waste are accelerated population growth and advances in technology (Cimen & Yilmaz, 2015). The problem

arises when household waste is not properly managed and it becomes an environmental problem (Adenrele, 2013). If waste is not managed correctly, it can lead to illnesses, degradation of land, polluted areas, global warming and a general decline in quality of life (Miller, 2000).

In South Africa, the increased household waste problem is characterised by insufficient removal of refuse, prohibited disposal of waste in certain areas, household waste activities that are illegal, waste sites that are not properly managed and misused as well as the lack of implementation of the waste hierarchy principles (Muzenda, 2013). South Africa has proper regulation in place, but because of improper guidelines and a lack of skilled technical personnel, implementation remains a challenge (Okalebo *et al.*, 2014). During this study, a number of other reasons were also identified for waste not being dealt with responsibly at household level.

The study found that learners have some awareness of household waste management and are willing to participate in alternatives such as avoiding, re-using, recycling and treatment of waste. Learners indicated that they would participate in future if incentives were implemented, such as getting paid to recycle, as well as if the process were made easier. In other countries or regions, people do get paid for their effort to recycle household waste.

The study also indicated that, of all the demographic factors that can influence household waste behaviour, the most significant were the age of the youth and the ethnic group to which they belong. These two factors had the highest tendency to be practically significant, in other words having the highest tendency of all the factors to be the most influential. The youth group aged 15 to 24 is mostly responsible for the creation of household waste, and educating the youth about household waste can assist with more sustainable household waste management practices (Quested *et al.*, 2013). The young people are the future and how they participate towards proper household management is crucial. The need arises to increase awareness amongst the youth

because they will be the future citizens and if they can manage household waste more responsibly, less visible waste will end up on landfill sites.

A long-term recycling and waste management programme needs to be introduced at school level in Parys.

#### **5.4 THE WAY FORWARD: RECOMMENDATIONS**

There should be an increase in environmental awareness by both the Government and the public to minimise environmental problems (Awoso & Tariwo, 2010). Although it appears that level of education does not ensure the practical implementation of better practices, ecological education remains is the key to sustainable change. More efforts should also be focussed on creating a culture of more sustainable waste practices. They know about the waste problem but they may not know or care, or don't have the time, to do something about it. Every household produces waste, so every household should be a part of the solution.

A long-standing recycling programme and environmental education will lead to a strong internal locus of control to do the right thing (Botetzagias, *et al.*, 2015). A much more positive behaviour towards the environment will surely lead to an improvement towards household waste creation (Niaura, 2013). Parkour *et al.* (2014) indicated that awareness campaigns and public education about the issue of household waste are effective ways to minimise the amount of household waste created in the first place. The awareness campaigns must be designed to show high school learners how household waste management practices could be made simpler and less time consuming, and perhaps that sorting waste at household level will assist the informal waste pickers with their important role in the household waste management cycle.

Two groups of researchers, namely Miliute-Plepiene *et al.* (2016) and Chan and Bishop (2013), spoke of incentives and argued that it is very costly to recycle in terms of time and effort. They respectively concluded that households would be more willing to

recycle if incentives were given and if recycling could be made more convenient in terms of the ease of the recycling process.

An incentive could be for the government to implement such a strategy – those who waste the most, will be charged the most. They could also incentivise recycling by providing coloured recycling plastic bags free of charge to ease the formal waste picker system.

## **FUTURE RESEARCH**

Topics for future research are waste management in townships or practical involvement of parents and the environmental specialists in addressing the uninvolved attitude of some citizens.

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## ANNEXURE A

## Questionnaire amongst the youth of Parys

Name and surname: \_\_\_\_\_

Please answer the following questions as honestly as possible.

**Section 1 - Demographic information**

- 1.1 Gender ☐ Male ☐ Female
- 1.2 Age ☐ 14 ☐ 15 ☐ 16 ☐ 17 ☐ 18 ☐ 19 ☐ older
- 1.3 Ethnic group ☐ Black African ☐ White ☐ Indian ☐ Coloured
- 1.4 Home language \_\_\_\_\_
- 1.5 Residential area \_\_\_\_\_
- 1.6.1 Are your parents working? ☐ Yes ☐ No
- 1.6.2 If yes, indicate please ☐ Father ☐ Mother ☐ Both
- 1.6.3 What careers are they pursuing?  
\_\_\_\_\_

- 1.7 The total amount of people in your household?  
☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ more than 8
- 1.8 How many children in the household? (younger than 18 years)  
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ more than 4

**Section 2 - Defining household waste** (Household waste can be described as all the waste people throw away in the kitchen bin)2.1 Do you know what household waste is? ☐ yes ☐ no

2.2 Name 5 things you as a family mostly throw away at home in the kitchen dustbin.

☐ peels ☐ tins and cans ☐ plastic like bottles and wrapping ☐ paper like newspaper, boxes, scrap paper ☐ old food ☐ egg shells ☐ bones

Other, specify  
please \_\_\_\_\_

### **Section 3 -Waste hierarchy** (a set of priorities for the efficient use of resources)

#### **3.1 Avoid** (e.g. buy products that are recyclable and refillable with less packaging)

3.1.1 Does your family avoid creating household waste? ☐yes ☐no

If yes, how?

- ☐ we use a shopping list to buy goods
- ☐ We buy fresh fruit and vegetables to limit packaging
- ☐ We don't buy things we don't need
- ☐ We have a strict budget
- ☐ We grow our own vegetables

If no, why not?

- ☐ We do not have time.
- ☐ We don't know how.
- ☐ It is not important.
- ☐ We buy what we want.
- ☐ Not sure why not.

#### **3.2 Reduce** (the use of less packaging, e.g. fresh veggies instead of packed, frozen veggies)

3.2.1 Does your family reduce household waste? ☐yes ☐no

If yes, how?

- ☐ we use a shopping list to buy goods
- ☐ We buy fresh fruit and vegetables to limit packaging
- ☐ We don't buy things we don't need
- ☐ We have a strict budget
- ☐ We prepare just enough food not to waste

If no, why not?

- ☐ We do not have time.
- ☐ We don't know how.
- ☐ It is not important.
- ☐ Not sure.

### 3.3 Re-use (e.g. mayonnaise bottles to use as storage like jam)

3.3.1 Does your family re-use household waste? ☐yes ☐no

If yes, what articles are you re-using at home?

- ☐ Shopping bags
- ☐ Ice-cream containers for storage
- ☐ Re-use oil
- ☐ Give food to animals

If no, why not re-use any articles instead of throwing it away?

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**3.4 Recycle (The collection of paper, bottles and plastics to be taken to a recycling site)**

3.4.1 Does your family recycle any household waste? ☐yes ☐no

If yes, how often? ☐always ☐sometimes ☐rarely ☐occasionally

If no, why not?

- ☐ I don't know.
- ☐ We know about it, but there are no facilities.
- ☐ My family don't have time.
- ☐ It does not make a difference anyway.
- ☐ My family don't know how to recycle.
- ☐ We don't get paid for recycling

**3.5 Treat (e.g. using perishable goods as compost or as animal feed)**

3.5.1 Does your family have a compost heap? ☐yes ☐no

If no, why not?

- ☐ We don't have time.
- ☐ We don't have space.
- ☐ We don't know how.

- ☐ We don't use it.
- ☐ It reeks and attracts flies.

### 3.6 Dispose (waste ending up on a landfill site)

3.6.1 How many black bags from the kitchen waste, does your family throw out weekly?

- ☐ one   ☐ two   ☐ three   ☐ four   ☐ more than four   ☐ not sure

3.6.2 Does your family sort the waste from the kitchen before they dispose of the bags?

- ☐ yes   ☐ no

If yes, how do they do it? \_\_\_\_\_

\_\_\_\_\_

If no, why not?

- ☐ It takes too much time.
- ☐ We don't have space to keep it.
- ☐ Don't know why not.

## 4. Household waste behaviour

4.1.1 How important is recycling to you?

- ☐ very important   ☐ important   ☐ moderate   ☐ not

4.1.2 What type of waste do you mostly recycle?

- ☐ plastic
- ☐ Paper and newspaper



- ☐ Glass
- ☐ Fabric
- ☐ Other, name \_\_\_\_\_

4.2.1 Do you sort household waste? ☐yes ☐no

4.2.2 If yes, why?

- ☐ I see other doing it.
- ☐ I know that sorting will reduce environmental problems.
- ☐ I have seen it on the news and television.
- ☐ It is my waste, I need to sort it.

4.2.3 If no, why not?

- ☐ It is not important.
- ☐ It does not make a difference anyway.
- ☐ We don't have time.
- ☐ Not sure

4.3 What would motivate or inspire you and your family to handle household waste more responsibly?

- ☐ Easier ways to sort waste.
- ☐ Easier ways to recycle.

☐ Getting paid for recycling.

☐ Other, specify \_\_\_\_\_

## ANNEXURE B

### ***Annexure to accompany the questionnaire***

#### 1. Introduction

During the test week in September 2018 learners will be writing in their register classes. The register teacher will be administering the filling in of the questionnaires. The classes are all individually handled by the teacher which can assist and explain difficult questions. Learners' consent must be asked and the importance of being honest stressed. This study is very important because it contributes towards data collected for a master's degree at North West University.

Household waste can be described as solid waste that originates from private homes during normal household activities (Mbande, 2003:2). This study wants to determine the household behaviour of young people in Parys. By changing their behaviour and mindset about waste, the amount of waste that ends up on landfills could possibly be reduced in the future.

The questions are in English and explained in Afrikaans if necessary, to ensure that learners understand each question. Learners must write their names on the questionnaire so that they do not get the opportunity to corrupt any of the answers in the questionnaire. The completion of the questionnaire is an instruction from an educator, failure to do so, could result demerit at school. The best option will be to accompany the learners' question by question to ensure the reliability of information.

#### 2. Demographic information

This section is the start of the questionnaire. It consists of seven questions. Learners must indicate their gender, age, home language, residential area, careers of parents and household size. The idea is to establish the obvious in terms of gender and age and then also to make certain conclusions as to the income per household. Learners would not necessarily know the income of the household, so by asking the careers of parents, only an assumption can be made. This information proves to be relevant reading through the literature on household waste behaviour in Chapters 2 and 3.

#### 3. Defining Household waste

Apart from the definition on household waste in the literature, the question was posed to the learners to say what they regard as household waste by simply answering yes or no. The following question is focusing on five common items that are thrown away in the kitchen dustbin. Learners form an idea of what it is. The answers will also be valuable to determine a definition on household waste by analysing the answers.

#### 4. Waste hierarchy

New information will be introduced and time will be allocated to explain this concept before learners attempt to answer the questions. It is best to make a drawing to the learners and explain each of the 6 levels of the waste hierarchy namely, avoid, reduce, re-use, recycle, treat and dispose. At each level the question is asked if the family do that and to explain yes or no answers. Options are given as answers at recycling to ensure learner's responses are useful.

At the dispose level the idea is to determine the amount of waste created on a weekly basis by asking them how many black bags the family are throwing away. The concept of sorting is also introduced at the dispose level. If then the family throws out garbage, do they at least sort it first?

#### 5. Household waste behaviour

Learners are asked about the importance of recycling and also what they recycle the most. Again, in this section the question wants to determine how and why sorting is being done by the family if they do sort their waste.

The questionnaire concludes with an open-ended question to determine what would motivate learners to be more responsible with their household waste.

#### 6. Conclusion

The time allocated to for the completion of the questionnaire would be about 45 min. Adequate time must be allocated to explain the purpose and every question that learners need to answer. It is important to stress the importance of filling out the questionnaires correctly so that the correct information can be obtained. Enough higher order questions are included to ensure the depth of the questionnaire is reached.

## ANNEXURE C

**Consent letter from parents and learners**Epos: [leonie.kotze@yahoo.com](mailto:leonie.kotze@yahoo.com)

Tel. nr. 079 677 1961

Posbus 276

Koppies

9540

Geagte ouer/voog

18-09-2018

Ek is tans 'n finale jaar M-student aan die NWU te Potchefstroom. Ek doen 'n studie oor huishoudelike afval en –bestuur en ondersoek die jeug se invloed rondom hierdie aspek. Ek nader u om toestemming te verleen, soos deur die Onderwys Departement versoek, sodat u seun/dogter 'n vraelys mag invul. Die uitslag van die ondersoek sal daartoe bydrae om huishoudelike afval in Parys beter te verstaan en ook om beter bewusmaking daar te stel. Die vraelys is vrywillig en u kind se deelname sal baie waardeer word.

Hiermee verskaf ek, \_\_\_\_\_ (ouer/voog) toestemming dat \_\_\_\_\_ (leerder se naam) aan die studie mag deelneem.

---

 Ouer/voog

---

 Leerder

*Dear Parent/Guardian*

*I am currently a final M-student at NWU in Potchefstroom. I am doing research about household waste and –management and investigate the youth's involvement in this matter. I approach you, as required by the Education Department, for permission so that your son/daughter may fill in the questionnaire. The results of the study will contribute to a better understanding of household waste in Parys and to ensure better awareness about the issue. The questionnaire is voluntary and your child's participation will be highly appreciated.*

I, \_\_\_\_\_ (parent/guardian) give my consent that \_\_\_\_\_ (name of learner) may participate in the research.

\_\_\_\_\_  
Parent/guardian

\_\_\_\_\_  
Learner

Byvoorbaat dank/ *Thank you in advance*

**AJ Kotzé NWU student 10098054**

## ANNEXURE D

Permission letter from Head Office Free State Department of Education in Bloemfontein

Enquiries: KK Matshum  
 Ref: Research Permission: P. J. KOTZE  
 Tel: (051) 404 8243 / 9221 / 067 434 1519  
 Email: K.Matshum@education.gov.za



education

Department of  
 Education  
 FREE STATE - P.O. BOX 600

AJ KOTZE  
 Wag'n Bietjiesbos  
 PO Box 276  
 KOPPIES, 9540

079 6771 961

Dear Mr Kotze

# **APPROVAL FOR AN EXTENSION TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION**

1. This letter serves as an acknowledgment of receipt of your request to conduct research in the Free State Department of Education.

**Research Topic:** Investigating the household behavior with respect to household waste management amongst the youth in Parys, Free State.

**Schools:** Parys High School Fezile Dabi District.

**Target Population:** 60 learners per grade from Grade 8-12.

2. **Period:** From date of signature to 30 September 2018. Please note the department does not allow any research to be conducted during the fourth / academic quarter of the year nor during normal school hours.
3. Should you fall behind your schedule by three months to complete your research project in the approved period, you will need to apply for an extension.
4. The approval is subject to the following conditions:
  - 4.1 The collection of data should not interfere with the normal tuition time or teaching process.
  - 4.2 A bound copy of the research document or a CD, should be submitted to the Free State Department of Education, Room 319, 3<sup>rd</sup> Floor, Old CNA Building, Charlotte Maxeke Street, Bloemfontein.
  - 4.3 You will be expected, on completion of your research study to make a presentation to the relevant stakeholders in the Department.
  - 4.4 The ethics documents must be adhered to in the discourse of your study in our department.
5. Please note that costs relating to all the conditions mentioned above are your own responsibility.

Yours sincerely

  
 DR JEM SEKOLANYANE  
 CHIEF FINANCIAL OFFICER

DATE: 25/09/2018

RESEARCH APPLICATION KOTZE /J PERMISSON ELS 19 SEPT 2018

Strategic Planning, Policy & Research Directorate

Private Bag #20600, Bloemfontein, 9300 - Room 319, Old CNA Building, 3<sup>rd</sup> Floor, Charlotte Maxeke Street, Bloemfontein

Tel: (051) 404 3783 / 9221 Fax: (086) 5578 676



ANNEXURE E

**Permission letter from principal**

2018-09-18

The Director  
Strategic Planning, Policy and Research  
Room 319, 3<sup>rd</sup> Floor  
Old CAN Building  
Bloem Plaza  
Charlotte Maxeke Street  
BLOEMFONTEIN  
9300

Mrs Betha Kitching

**RE: Research study for Masters in Environmental Management**

Approval is hereby granted to Mrs A.J. Kotzé (Student number 10098054) and an educator at the Parys High School to involve grade 8-12 learners at Parys High School in the completion of a questionnaire regarding above mentioned study.

The approval is subjected to all prescripts determined by the Department of Education Free State.

Yours faithfully

A handwritten signature in black ink, appearing to be 'Mrs A.J. Kotzé', is written over a light grey rectangular background.

Principal

Parys High School

ANNEXURE F

**NWU Ethics**



Ms. Leonie Kotze  
Unit for Environmental Sciences and Management  
North-West University  
Potchefstroom Campus

15 August 2018

Dear Ms. Leonie Kotze

**Ethics consideration for Ms. L. Kotze, student nr 10098054**

The Scientific Committee of the Environmental Management Research Group (EMRG) in the Unit for Environmental Sciences and Management has carefully considered your research proposal. The scientific committee has found that your project proposal entitled: 'Household behaviour towards waste management – A case study amongst the youth of Parys, South Africa' under supervision of Mrs. Carli Steenkamp, is in accordance with the scientific method and adheres to the required standards as set out in the Academic Rules for Master's and Doctoral Students at North-West University. The proposed methodology does not pose any ethical risk to human participants, hence exemption from ethical approval is recommended for the study.

Your proposal is regarded as satisfactory and is therefore recommended for acceptance by Board of Faculty.

Yours sincerely

**Francois Retief**  
Chair of the review committee

**Scientific Committee:**

Prof. Francois Retief, Mrs. Carli Steenkamp, Dr. Claudine Roos, and Dr. Dirk Gilliers