

Developing Standards for Household Latrines in Rwanda

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List of Abbreviations

ANS	American National Standard
ANSI	American National Standards Institute
BoQ	Bill of Quantity
BSI	British Standards Institution
CAQDAS	Computer Aided Qualitative Data Analysis Software
CATS	Community Approaches to Total Sanitation
CBEHPP	Community Based Environmental Health Promoting Programme
CHC	Community Health Club
CHW	Community Health Worker
CLTS	Community Led Total Sanitation
CPAF	Common Performance Assessment Framework
EDPRS	Economic Development Poverty Reduction Strategy
GLAAS	Global Annual Assessment of Sanitation and Drinking Water
IEC	International Electrotechnical Commission
IRC	International Water and Sanitation Centre
ISO	International Standardisation Organisation
IWA	International Water Association
JMP	Joint Monitoring Programme
MDGs	Millennium Development Goals
MININFRA	Ministry of Infrastructure (Rwanda)
MIS	Monitoring and Information System
MoH	Ministry of Health
NGO	Non-governmental organisation
NISR	National Institute of Statistics Rwanda
NPSWSSS	National Policy and Strategy on Water Supply and Sanitation Services
OECD	Organisation for Economic Cooperation and Development
PNEAR	Programme National d'Alimentation en Eau potable et Assainissement en milieu Rural
RBS	Rwanda Bureau of Standards
REMA	Rwanda Environment Management Authority
RHA	Rwanda Housing Authority
RWF	Rwandan Franc
SEI	Stockholm Environmental Institute
SuSanA	Sustainable Sanitation Alliance
UNECA	United Nations Department of Economic and Social Affairs
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	US Dollars
VIP	Ventilated Improved Pit Latrine
WASH	Water, Sanitation and Hygiene
WHO	World Health Organisation
WSP	Water and Sanitation Programme (World Bank)
WSSCC	Water Supply and Sanitation Collaborative Council
WTO	World Trade Organisation

Abstract

The issue of standards for household latrines is complex because discussions related to standards for latrines in literature from the water, sanitation and hygiene (WASH) sector tend to focus on the negative aspects of standards and highlights cases where the misapplication of standards in the past has caused problems. However, despite concerns about the constraints that standards can seemingly impose, there is an acknowledgement that standards can play a more positive role in supporting efforts to increase access to household latrines.

The World Health Organisation has long established and widely recognised standards for water supply quality and quantity but there are no equivalent standards for sanitation services and there is currently no guidance that deals with the topic of standards for household latrines. Household latrines are a small component of the wider sanitation system in a country and by considering how standards for household latrines operate within this wider sanitation system the aim of this research is to understand what influences standards can have on household latrines and explore how the negative perceptions about standards and latrine building can be overcome. The development of guidance on how to develop '*well written*' standards is the core focus of this research.

This research explores the factors that can influence the development and use of a standard for household latrines in Rwanda using three data collection methods. Document analysis using 66 documents, including policies and strategies, design manuals and training guides from 17 countries throughout Sub-Saharan Africa was used in conjunction with the Delphi Method involving an expert panel of 27 from Rwanda and 38 semi-structured interviews.

The research concludes that perceptions about standards for household latrines are fragmented and confused with little consensus in Rwanda on what need a standard should meet and what role it should play. The study has found that the need for a standard must be considered in the context of the wider sanitation system otherwise it can lead to duplication of efforts and increased confusion for all stakeholders. The study also found that there is an assumed link between standards and enforcement of standards through regulation and punishments which creates the negative perceptions about standards in Rwanda. However, despite this aversion to standards, there are still intentions to promote

the standardisation of latrine technologies and designs, led by national government in Rwanda and in other Sub-Saharan African countries.

The contribution to knowledge of this research includes a decision process presented at the end of the study which can be used by decision makers who are interested in developing a standard for household latrines. The decision process acts as a tool for outlining how a standard can operate within the national sanitation system. This understanding provides decision makers with the basis for continuing the debate on what a 'well written' standard looks like in the national context and supports the development of a standard that is fit for purpose and provides a positive contribution to the sector. The findings can be generalised to countries with a similar context.

Key words: *standards, household latrines, sanitation, Delphi method, document analysis, semi-structured interviews, Rwanda*

1. Introduction

1.1 Research context

Building household latrines is considered a household matter and a household expenditure (Forster and Briceño-Garmendia, 2010, p.323; Morella *et al*, 2008, p.6; UN Water, 2008a, p.13). However, improving sanitation and hygiene at the household level, which includes household latrines, can have benefits beyond the household by improving public health. Sanitation is therefore considered a public good (Bartram *et al*, 2012, p.499). This creates an interesting dynamic between households and national governments which needs to be considered.

Developing countries receive aid and development assistance from various sources including international organisations, donors and Non-Governmental Organisations (NGOs). Some of this assistance is used to improve sanitation services, with a particular focus on latrines. The Millennium Development Goals (MDGs) are internationally recognised targets against which increases in the availability of improved latrines is measured. Sanitation is included under MDG 7: ensuring environmental sustainability, with a target to 'halve by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation' (United Nations, 2012, p.52).

The terms improved and unimproved are used to describe different states of latrines. For MDG monitoring, an improved sanitation facility is defined as one that hygienically separates human excreta from human contact (World Health Organisation and United Nations Children's Fund, 2013, p.12). In this context, the term 'sanitation facility' refers to a method of safely storing excreta, e.g. a toilet or latrine. Unimproved latrines are less likely to provide adequate separation between people and excreta and are therefore considered undesirable.

Unimproved latrines are the most widely used option for on-site sanitation in Sub-Saharan Africa (Forster and Briceño-Garmendia, 2010, p.323; Morella *et al*, 2008, p.2). The differences between unimproved and improved latrines are often represented on a 'sanitation ladder' with the most desirable types of latrine found at the top of the ladder. For households which are not connected to sewerage networks, on-site sanitation is the first step on the sanitation ladder (Trémolet *et al*, 2010, p.vii). The sanitation ladder and the MDGs are discussed further in section 2.4.1.3. Achieving the Millennium Development Goals is both a global and a national challenge with progress measured in terms of the percentage of households with access to an improved latrine. Many governments in Sub-Saharan Africa are working towards achieving the MDGs. Levels of access are assessed using different types of latrine technologies as proxy indicators for access to corresponding levels of service. Only improved latrines are counted in estimations of increased access, therefore, if households choose to build an unimproved latrine rather than an improved

one the levels of access to improved latrines will not increase and the MDG targets will not be met at either the national or global level.

It is anticipated that the MDG target of halving the number of people without access to basic sanitation will be missed by 13 percent and if current trends continue there will be 2.5 billion people without access by 2015 (UN, 2012, p.55). The scale of this problem has been recognised and is referred to as a 'sanitation crisis' (UN Water, 2008a, p.6; Lenton *et al*, 2005, p.4; Evans *et al*, 2004, p.11). National governments cannot afford to build a latrine for every household that does not currently have one. Therefore, sanitation policy tends to focus on behavioural change education which aims to encourage the adoption of better hygienic practices, including the use of a latrine. This is where the discussion about standards for household latrines becomes relevant. The World Health Organisation (WHO) has long established and widely recognised standards for water supply quality and quantity (see WHO, 2006) but there are no equivalent standards for sanitation services or technologies and there are currently no frameworks or guidance that deal specifically with the topic of standards for household latrines.

Discussions related to standards for latrines in literature from the water, sanitation and hygiene (WASH) sector tend to focus on the negative aspects of standards and highlights cases where the miss-application of standards in the past has caused problems and has placed constraints on increasing access to latrines. Section 2.4.3.1 in the literature review presents a more detailed analysis of how standards are perceived as constraints. However, despite concerns about the constraints that standards can seemingly impose; there is an acknowledgement from some authors that standards can play a more positive role in supporting efforts to increase access to household latrines. Evans (2005, p.26) states that 'we know well written norms and standards can facilitate the appropriate use of least-cost and effective solutions to sanitation problems' which is followed by a call on the international community to develop 'normative guidance' in standard setting similar to the work of WHO on drinking water quality standards (*ibid*). A similar call is made by Lenton *et al* (2005, p.88) who suggest that the international community should encourage the adoption of appropriate standards in countries that want to increase access to sanitation.

To get an idea of the impact and importance that standards have in all of our lives it should be understood that standards are in use all over the world all of the time. There are many different types of standard and the definition of a standard can be expressed in different ways, depending on the document being read. Section 2.3 in the literature review explains what standards are, what roles they play and how they are developed, but the overall aim of a standard is to make our lives safer and more convenient (ANSI, 2012, p.1).

1.2 Research question and research objectives

There is a significant body of knowledge from international standard development organisations that outlines good principles for developing and using a standard in any context and it can be argued that nobody would want a standard that is not ‘well-written’. However, the fact that standards for household latrines are perceived as a constraint on increasing access to latrines indicates that current standards are not well written or are not fit for purpose.

Understanding what influences standards can have on household latrines and exploring how the negative perceptions can be overcome through the development of guidance on how to develop a ‘well written’ standard is the core focus of this research. The aim of this research is to explore how different stakeholders view standards for household latrines, what the key motivations for developing them are, what factors are considered in their development and how the influences from the sanitation system can affect the overall development of a standard for household latrines.

Countries can have several standard making bodies who respond to the needs in different sectors using their specialist knowledge. Consequently, it can be expected that guidance on developing a standard for household latrines should be found within WASH sector literature. However, the literature review conducted for this study will demonstrate that this knowledge is currently lacking. Consequently, the main question addressed by this research will be; ‘*How to develop standards for household latrines in Rwanda?*’

There are three sub-questions which each address a research objective. The sub-questions and research objectives are as follows;

Sub-Question 1 and Research Objective 1

SQ1: How are standards viewed, discussed and presented in existing documents?

RO1: To understand what information on standards already exists, how that information is used, where it can be found, how it is communicated and what it looks like.

Sub-Question 2 and Research Objective 2

SQ2: Is there a consensus between stakeholders in Rwanda about the need for a standard, the role it can play and how it can be used?

RO2: To establish what levels of consensus exist between stakeholders in Rwanda and identify areas where gaining consensus could pose a particular challenge.

Sub-Question 3 and Research Objective 3

SQ3: How does a standard for household latrines fit into the current situation in Rwanda?

RO3: To understand stakeholder’s perceptions on standards for household latrines and how a standard fits into the current sanitation system

1.3 Original contribution to knowledge

It is acknowledged that nobody would want a standard that is not 'well-written'. However, the fact that standards for household latrines are perceived as a constraint on increasing access to latrines indicates that current standards are not well written or are not fit for purpose. There are currently no frameworks that deal specifically with the topic of standards for household latrines so using a conceptual framework developed specifically for this study, this thesis takes a new approach to the discussion of standards for household latrines and opens the debate to explore and understand how standards can play a more positive and constructive role. The conceptual framework can be used to understand how a standard for a household latrine functions within the sanitation system of a country where a standard already exists and how a standard could function within the sanitation system where a standard does not currently exist.

The research highlights and explains how different elements from the sanitation system interact to influence and be influenced by standards for household latrines and demonstrates that it is not enough to just identify the need for a standard in isolation, the complexity of the system within which it operates should be considered so that the standard developed works with the system, not against it. As part of this process this thesis presents a review of standards in policies, strategies, guidelines and manuals for Sub-Saharan Africa and corresponding quick reference tables which provide a useful contribution to other researchers and interested parties who may also want to consider the role of standards in household level sanitation in Sub-Saharan Africa. The thesis also provides previously unavailable guidance on how to develop a 'well-written' standard in the form of a 'decision process' which has been developed as a result of this research.

This research comes at a time when the need for standards in sanitation generally is being more widely recognised by both international and national stakeholders as a way to increase access to sanitation in general, of which household latrines are a significant focus because of their nature as a public good. Ensuring that households (i.e. the consumers of latrines) are placed at the centre of decision making processes regarding their own levels of access to a latrine or toilet is a core focus of approaches such as CLTS, CATS and Sanitation Marketing. The development of a standard using a consensus based approach therefore compliments the existing activities of the WASH sector both internationally and nationally.

The use of standards is also gaining significance in the debate between donors about how to move forward with approaches such as CLTS and CATS which have previously resisted the use of standards because of their negative connotations. Standards can also play a positive role in social learning and the development of social norms which is an important part of the behaviour change activities used to increase demand for latrines using approaches such as CLTS, Sanitation as a business, CATS and sanitation marketing. In addition to these considerations, there are also implications for standards within the context of sanitation as a human right, particularly the adoption of a 'minimum standard' for latrines in countries that want to support greater equity in levels of access.

1.4 Structure of the thesis

This thesis is presented in eight chapters. Chapter 1 introduces the context and main themes of the research. Chapter 2 provides a review of existing literature, primarily from the WASH and standard development sectors, which focuses specifically on the development of standards and the role of standards for household latrines, the influences that standards can have and the elements within the sanitation system that can influence standards. As a result of the literature review, a conceptual framework is developed which provides the agenda for the research design and data collection phases in Rwanda. Chapter 3 presents an overview of how research methods are informed by philosophical understandings and provides a brief summary of the different philosophical positions which can be associated with development studies research. The second part of the chapter identifies research methods applicable to the research questions and discusses in detail those selected as being most suitable for meeting the research aims and objectives. The data collection and analysis processes used in the study are described and a critique on their suitability, limitations and overall use is given.

Chapters 4, 5 and 6 present the findings from the research and the contributions to the conceptual framework that can be made from the results of the data analysis under each research objective. Chapter 7 is a synthesis chapter that brings together the findings from the three methods used and presents the decision process developed as a result of this research.

Chapter 8 presents a summary of the key conclusions of the research and considers the future implications of this research with suggestions for further study. Chapters and sections are cross-referenced throughout for ease of reference between concepts which run throughout the thesis and across different sections.

2. Literature review

2.1 Chapter outline

Section 1.1 in chapter 1 outlines the context of this research and draws attention to the negative perceptions of standards for household latrines that are prevalent in WASH sector literature. Standards are not all created equal and developing a standard is a specialised process which is explained more fully in section 2.3.3. However, as a general rule, a standard should be established by *consensus*, be *documented* and contain information that can be used *consistently*. In terms of national or international standards *approval* by a *recognized body* is also critical. The type of standard developed depends on the need identified and the function or role it needs to perform. Identifying the initial need for why the standard should be developed and the role it is intended to play is therefore a critical stage in the development process. As stated in section 1.1, these early stages of the process are the core focus areas of this research.

Household latrines are a small component of the wider sanitation system in a country. The concept of sanitation as a system is explained in section 2.2. The purpose of this literature review is to highlight and assess the different elements from the wider sanitation system that have the potential to influence the development of a standard for household latrines and what influences a standard for household latrines could have on the wider sanitation system. The focus of the review is primarily on latrines in Sub-Saharan Africa rather than other developing regions because the field work was conducted in Rwanda, East Africa.

The first part of this chapter, section 2.3 presents an overview of what standards are and how they are developed using information from key international standard making bodies including the British Standards Institute (BSI), the American National Standards Institute (ANSI) and the International Standardisation Organisation (ISO).

The second part of this chapter, section 2.4 combines discussions on standards and sanitation to consider how the sanitation system can influence the development of standards for household latrines and how developing standards for latrines could influence the sanitation system. The four key elements of a sanitation system are identified as society, nature, process and device (Winblad and Simpson-Hébert, 2004, p.6). The chapter ends with the development of a conceptual framework, presented in section 2.7.

2.2 Sanitation as a system

One of the fundamental views of the author is that sanitation must be considered as a system. A system is defined in this thesis as ‘an interconnected set of elements that is coherently organised in a way that achieves something’ (Meadows and Wright, 2009, p.15). There are many different types of system and it is also important to acknowledge that a system can operate within a system.

The word sanitation means different things to different organisations and people. In this thesis, 'sanitation' will only be used when referring to discussions about the sanitation sector in general, which is understood to cover a full range of services including;

- 'Safe collection, storage, treatment and disposal/re-use/recycling of human excreta (faeces and urine);
- Management/re-use/recycling of solid wastes (trash or rubbish);
- Drainage and disposal/re-use/recycling of household wastewater (often referred to as sullage or grey water);
- Drainage of storm water ;
- Treatment and disposal/re-use/recycling of sewage effluents;
- Collection and management of industrial waste products; and
- Management of hazardous wastes (including hospital wastes, and chemical/ radioactive and other dangerous substances).'

(UNICEF *et al*, 2008, p.1)

Each of these services can be considered as systems in their own right, for example, a solid waste system or a drainage system, but they are also interconnected and categorised under the umbrella of sanitation systems because they deal with sanitation related services as opposed to another system such as education. A national sanitation system is service based, but it relies on the use of technologies to provide those services. Latrines are one example of a technology that forms part of the wider sanitation system and are the focal point of this research. Latrines are referred to throughout this thesis as '*household latrines*' which includes both individual household and shared latrines where the shared latrine is owned and managed by the households whom share it, not a third party.

For the purpose of this research, the term *latrine* will be used in general discussions to represent all types of household latrines. The different types of latrine technologies will be referred to by their common names where necessary and a differentiation between household, institutional and public latrines will be made when needed. The term *toilet* will be used to refer to flush-toilets where appropriate.

Winblad and Simpson-Hébert (2004, p.6) identify the key components of a sanitation system as 'nature, society, process and device' where 'nature' refers to climate, water and soil; 'society' refers to settlement patterns, attitudes, habits, beliefs, taboos and economic status of the community; 'process' refers to the physical, chemical and biological process through which human excreta is turned into a non-harmful product and; 'device' refers to the onsite structures built for defecation and urination. Winblad and Simpson-Hébert (2004) are predominately promoting the adoption of ecological sanitation as a 'closed-loop system'. In a perfect closed loop system, there are no waste products because waste products are re-classified and re-appropriated as useful resources. In defining this system, they recognise it is necessary to consider sanitation as a system which operates within the context of a wider system which includes elements from society and nature.

In the Wateraid Sanitation Framework, toilets are considered just one component of the sanitation system (Wateraid, 2011, p.22). Factors from the wider system that need to be considered in the framework include, population density, access to pit-emptying services, access to cash in cashless economies and household demand for facilities (Wateraid, 2011). Exploring the context in which the system operates helps to highlight the links and interactions with other systems. These interactions between sanitation systems and the wider systems within which they operate is a key theme running throughout this research. The four key components of nature, society, process and device (Winblad and Simpson-Hébert, 2004, p.6) are explored, elaborated and developed further throughout this chapter in order to provide a comprehensive overview of how standards operate within the sanitation system.

2.3 Understanding standards

2.3.1 What are standards?

The definition of a standard can be expressed in many different ways, depending on the document being read. The British Standards Institution (BSI) uses at least two different explanations. According to BSI a standard is ‘an agreed, repeatable way of doing something. It is a published document that contains a technical specification or other precise criteria designed to be used consistently as a rule, guideline, or definition’ (BSI, 2011a). A standard can also be a ‘document defining best practice, established by consensus and approved by a recognized body, such as BSI’ (BSI, 2006, p.1).

The International Organisation for Standardisation (ISO) define a standard as a ‘document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context’ (ISO and IEC, 2003, p.5). The American National Standards Institute (ANSI) uses a shortened version of the ISO definition ‘a standard is a document, established by consensus that provides rules, guidelines or characteristics for activities or their results’ (ANSI, 2013).

Although the wording is different, the key elements of what defines a standard are common throughout these definitions. These key elements can be summarised as follows. A standard should be established by *consensus*, be *documented* and contain information that can be used *consistently*. In terms of national or international standards *approval* by a *recognized body* is also critical.

2.3.2 What do standards do and why do we need them?

To get an idea of the impact and importance that standards have in all of our lives it should be understood that standards are in use all over the world all of the time. The aim of a standard can be very general, for example by specifying a mode of best practice within a sector, or it can be very specific, for example specifying the exact dimensions that a product

must have in order for it to be approved for use by people. Overall, the main aim of a standard is to make our lives easier, safer and more convenient.

To list every aim of each standard would be an unmanageable task, but in general terms, the aims of standards can include:

- Establishing technical specifications of products e.g. size, shape, weight.
- Defining terms/vocabulary to avoid mis-understanding during use of the standard
- Defining the management of systems e.g. environmental and pollution, traffic flow
- Certification for specific roles e.g. a driving licence
- Construction standards e.g. for roads, buildings
- Performance standards e.g. minimum safety requirements, reliability
- Consistent delivery of services to all e.g. minimum service levels

(ANSI, 2012a, p.1; BSI, 2011b, p.8; ISO and IEC, 2003, p.10).

The aims of a standard can be inter-related, for example, by defining technical specifications it can be possible to set specific performance standards which may then result in the consistent delivery of services. This is particularly true for latrines, because different technologies are linked to different levels of service. This concept is discussed further in section 2.3.7.

2.3.3 Developing standards

The exact mode of developing standards can differ between the organisations responsible for their development but in general the process followed is:

1. Identification of a need
2. Establishment of a committee (usually a technical committee) drawn from a range of stakeholders including; public and private sector representatives, academia, NGOs and consumers who together, agree on the scope of the standard and through consultation, produce a draft standard.
3. The draft standard is reviewed by a higher or parent committee.
4. The draft standard is put out for wider consultation and in some cases passes through a voting process before being adopted.

(ANSI, 2012a, p.2; BSI, 2011b, p.8; ISO and IEC, 2003, p.5)

Standards are generally reviewed, updated or withdrawn as necessary to keep them current and in line with changing circumstances. The type of standard developed depends on the need identified and the function it needs to perform. Table 1 outlines the main types of British Standards in use by BSI and indicates the type of information that would be found within each of them.

Table 1 Definitions of the main types of British Standards

Standard	Definition
Specification	Sets out detailed requirements for a product, material, process, service or system and the procedures for checking compliance. Highly prescriptive, most commonly used when safety or a high degree of certainty are required.
Method	Gives a complete account of how an activity is performed (including relevant equipment and tools) and how conclusions are reached with an appropriate degree of precision. Highly prescriptive, commonly used when repeatability is required.
Guide	Gives broad information about a subject with relevant background information which reflects current thinking or practice amongst experts. Less prescriptive.
Vocabulary	Definitions of terms used in a particular sector, field or discipline
Codes of Practice	Recommendations for accepted good practice as followed by practitioners which brings together the results of practical experience and acquired knowledge for ease of access and use of the information. Provide reliable benchmarks whilst retaining some degree of flexibility in application.

(Adapted from BSI, 2013)

Standards are not always developed by a single body in each country. Many countries have several standard making bodies who respond to the needs in different sectors using their specialist knowledge. Some of these bodies will be accredited by the national standard body, i.e. the standards they develop will be *approved*. For example, the ANSI does not develop standards, but it oversees the development and use of over 100,000 standards across different sectors in the United States of America (ANSI, 2012a, p.1). In order for a standard to be accredited by ANSI and documented as an American National Standard (ANS) the standard developing organisation must adhere to a strict development process, explained further in section 2.3.4. Standards created outside this process cannot be accredited as national standards.

The ISO makes a distinction between *formal* regional, international and national standards and *private standards*. Formal standards are those which have been developed in accordance with the 'Code of Good Practice for the Preparation, Adoption and Application of Standards' from the World Trade Organisation (WTO) Committee on Technical Barriers to Trade (ISO, 2010, p.8). Private standards do not necessarily follow the same process. ANSI refers to private standards as 'consortia' or 'de-facto' standards (ANSI, 2010, p.6).

Irrespective of the term used to describe them, private standards may not necessarily comply with the development processes required by the standard accrediting body (e.g. ISO, ANSI) and consequently cannot be accredited as formal standards. However, private standards still play an important role and respond to specific needs within a sector or organisation. Examples of private standards include those used within an organisation or company, for example standard operating procedures for a piece of machinery or management system or in sectors where organisations voluntarily come together to define codes of best practice which are then used to self-regulate their activities.

The MDGs are an example of a private standard within the development sector. The eight MDGs set out a code of practice which has been voluntarily adopted on a global scale. They continue to have a significant influence on programmes, projects and activities within the

field of international development. Section 2.4 discusses the role of standards in household latrines. The MDGs and their influence on international development is also discussed in more detail in section 2.4.4.

2.3.4 The importance of consensus

It was stated in section 2.3.3 that ANSI has a strict development process which must be followed in order for a standard to be adopted as a national standard. All standard developing bodies in the United States must ensure that their process is open, balanced, follows due process and is based on consensus (ANSI, 2012a, p.2). The importance of consensus in developing standards is also highlighted by ISO and BSI in their definitions of what constitutes a standard, as discussed in section 2.3.1.

ANSI defines consensus as 'when substantial agreement is reached by directly and materially affected interests. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and that an effort be made toward their resolution' (ANSI, 2012b, p.24). A majority is considered to be approval by at least two thirds of the voting body after abstentions (ANSI, 2012b, p8).

ISO defines consensus as 'general agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments' (ISO and IEC, 2003, p.5). BSI, as a member of ISO, uses the same definition of consensus (see BSI, 2011b, p.4).

By striving for a consensus based development process, standard making bodies try to ensure that the interests of one group do not outweigh the interests of another. The role of consensus in upholding and regulating standards is discussed in section 2.3.6. The methods used for the data collection phase of this research also take consensus into consideration given its importance in the process of developing a standard. Data collection methods are discussed in detail in section 3.9.

2.3.5 Involving stakeholders in developing standards

In the definition of consensus given by ISO in section 2.3.1 the phrase 'concerned interests' is used to refer to any person or persons whom may be affected by the creation of a standard in a particular area (ISO and IEC, 2003, p.5). In this thesis, the term 'stakeholder' represents a person or persons whom have an interest in or could be affected by the creation of a standard for household latrines in Rwanda. This can include but is not limited to representatives from government, business, academia, NGOs, donor organisations, religious organisations, communities and government parastatals.

During the development of standards, especially those for consumer products and services, standard making bodies are recommended to involve consumers in the process and elicit their views. This has a two-fold effect, it ensures that the product or service meets the needs of the consumers and it builds general awareness of the appropriate standards for that product or service within the consumer community. Once consumers are aware of the standards which should be met, demand for products and services which meet these standards is created (ISO and IEC, 2003, p.2). The consumers for a household latrine are the members of the individual household in which that latrine is built.

For a company making a product, being involved in the development of a standard can ensure that their product does not have a fundamental design flaw which could be expensive to rectify or cause the product to be ignored by consumers. In competitive markets, standards can help promote innovation and development as companies compete to provide the best product to consumers (BSI, 2006, p.8). In an industry where certification is a common practice, fully understanding the standard development process can give companies a better insight into the requirements for future certification (World Standards Corporation, 2011). The 'company' in the context of this research would be sanitation entrepreneurs, builders and technicians who are trying to sell their services and or products to householders.

Where standards are used to support public policy, especially policies which require regulation, it is important to include those responsible for both public policy decisions and regulatory functions in the development of a standard (ISO, 2010, p.5). In the context of this research, national and local governments would be responsible for public policy on sanitation and health. Those in charge of regulation could also be from national or local government level. There may also be more locally based people such as community health workers or environmental health officers. The importance of establishing consensus and involving a range of people during the development of a standard becomes clear in light of the way that standards can be regulated, which is discussed in section 2.3.6.

The concept of involving a wide range of stakeholders in the standard development process has particular implications for this research which is considering the process of standard development rather than the outcome. The ability to include a wide range of stakeholders during the data collection phases will influence the choice of methods used. The research methods used in this study are discussed in detail in chapter 3.

2.3.6 Regulating standards

A standard by itself is designed to be used voluntarily. The understanding is that if the standards are produced through consensus, they should reflect the needs of all parties affected by the standards more accurately than if one group has a dominant voice. This level of acceptance by all parties makes the standard more likely to be voluntarily followed. In order for a standard to become compulsory, compliance with a specific standard must be enforced through laws or regulations (BSI, 2011, p.10; ISO, 2003, p.4). One of the most common ways to regulate a standard is to develop technical regulations which are legally binding technical requirements. Technical regulations would usually be produced with the

specific aim of protecting public health, ensuring safety, including the prevention of personal injury or protecting the environment (ISO, 2010, p.4). The technical regulation can reference or copy verbatim, in whole or in part, the contents of a standard, which in effect makes compliance with the standard mandatory in order to comply with the regulation. For organisations which have signed up to the WTO agreement on technical barriers to trade which includes the code of good practice discussed in section 2.3.4, technical regulations and their regulatory criteria must not be allowed to create unnecessary obstacles for international trade (WTO, 1997, p118).

The production of a technical regulation requires the corresponding development of regulatory measures. Regulators must decide if the standard will be the only option permitted or be one of several options permitted, i.e. if compliance with one of several standards is sufficient or if all standards must be complied with. The regulator must also decide if the standard will be used in whole or in part, what checks will be put in place to assess compliance and the criteria against which those bound by the standard are judged, which is known as conformity assessment (ANSI, 2010, p.9; ISO, 2007, p.10; BSI 2006, p.5). All of these considerations have additional financial, time and personnel implications.

There is a trend in the UK to move away from the regulation of standards and rely more on their voluntary acceptance. The BSI considers the best standards for this approach to be flexible and outcome orientated. If they are overly rigid they can be the same as or worse than regulation in terms of time and bureaucracy (BSI, 2006, p.8). Making sure that the standard is developed in accordance with all the necessary processes and ensuring that a wide range of interested parties are involved in its development is therefore crucial to the success of this approach.

2.3.7 Linking standards with latrines

Section 2.3.2 outlines some of the different generic roles that standards can play. In terms of household latrines, standards are most likely to be either technically or service oriented, rather than defining terms or defining the management of a system. The difference between a technically oriented standard and a service oriented standard can be identified by establishing the role that the standard is designed to play. A technical standard can be more prescriptive in terms of specifications (e.g. dimensions of the pit, slab, building materials) whereas a service standard is more concerned with achieving a given level of performance e.g. eliminating human contact with faeces. In reality, the service standards are closely linked to the technical standard, which is demonstrated by the sanitation ladder discussed in section 2.4.4. A technical standard may outline the specifications for a specific technology like a ventilated improved pit latrine (VIP). A service standard may state that everyone must have and use a latrine and not practice open defecation but it would not specify a type of latrine to be built. If a technical standard is adopted there are direct implications on the levels and types of service provision. For example, if a country decided to adopt the flush toilet as their technological standard for households, this would have direct implications on the standard of service which the households could expect in terms of connection to sewerage systems and treatment of waste.

Standards can be applied to a wide range of elements associated with a household latrine, including, the type of latrine which can be built, material choices, dimensions, positioning and construction methods. These elements could be encompassed within a single standard or may be divided between two or more standards. For example, one standard could specify the type of latrine to be built in a specific area whilst another would specify the positioning in the household plot. Identifying which elements of household latrines already have standards applied to them and if there are any contradictions in these standards will be important during the data collection phase which is discussed in chapter 3.

2.4 The role of standards in household latrines

This section is divided into the four key elements of a sanitation system; society, nature, device and process as identified by Winblad and Simpson-Hébert (2004, p.6). During the analysis of the literature, the following two questions are considered;

- What elements from the sanitation system can influence standards for household latrines?
- What influences can standards for household latrines have on the sanitation system?

Based on the analysis and the insights provided by these questions, the section concludes with the development of a conceptual framework for this study, presented in section 2.7.

2.4.1 Society

2.4.1.1 The right to sanitation

In 2010, the UN General Assembly recognised the right to ‘safe and clean drinking water and sanitation as a human right’ (United Nations General Assembly, 2010, p.1). However, the debate about a rights based approach to water and sanitation pre-dates this recognition. Hadji Guissé (2005, p.6) outlines four key principles of sanitation as a human right, re-iterated again by Albuquerque (2009, p.23).

Everyone has the right to a water and sanitation service that is:

- Physically accessible within, or in the immediate vicinity of the household
- Of sufficient and culturally acceptable quality;
- In a location where physical security can be guaranteed
- Supplied at a price that everyone can afford without compromising their ability to acquire other basic goods and services.

In order to implement the right to sanitation, a manual has been produced with the intention of supporting countries who want to assess or improve their progress towards delivering sanitation as a human right. Developing standards and targets are considered one of the steps in developing a plan to implement the right (Centre on Housing Rights and

Evictions, 2008, p.31). CHORE *et al* (2008, p.22) state that governments need to establish standards, 'in order to make the right to sanitation meaningful', and that by-laws and standards should promote the construction of toilets. At the same time, it is stated that individuals have a responsibility to construct toilets which adhere to building and development standards where possible (CHORE *et al*, 2008, p.30).

The four key principles from the guidelines are not new, they are well established within the sanitation sector, and they do not refer to any particular models of latrine. Therefore they cannot be considered as setting a technological standard, however, they could be considered as setting the standard for the requirements of household latrines within a human rights context. For example, these could be adopted as 'minimum requirements' that a latrine would be expected to meet in a human rights context. Using the BSI standards presented in section 2.3.3 as a reference, the guidelines could be adopted as either a guide or a code of practice. Where countries want to recognise sanitation as a human right, the standards development process would need to take these four key principles into account.

2.4.1.2 The link between sanitation, health and economic benefits

In a review of 58 sanitation program evaluations carried out between 1980 and 1994 for the United States Agency for International Development (USAID) and UNICEF, it was found that there was no consensus on the importance of sanitation for improving health (Lafond, 1995, p.9). However, there is now a clearly established consensus on the inter-relationship between sanitation, hygiene and health (Jenkins and Sugden 2006; Evans *et al* 2004; Cairncross, 2003). In addition to the physical benefits gained through better health, gaining access to a hygienic latrine can have positive economic and social impacts both for the individual and nationally.

The primary economic benefits for individuals are derived from reducing expenditure on health related costs and increasing income through more productive uses of time (Banerjee and Morella, 2011, p.1; Trémolet *et al*, 2010, p.145; Brenneman and Kerf, 2002, p.108). For people who rely primarily on subsistence farming or the agricultural sector, production of compost and fertilisers from latrines has the potential to provide further economic benefits. These benefits are being studied by a number of researchers (see Katukiza *et al*, 2012; Jewitt, 2011). However, once households reach the level of an improved latrine and it is maintained and used correctly, there are diminishing health returns in continuing to move up the sanitation ladder (Forster and Briceño-Garmendia, 2010, p.324). Economic benefits gained through lower medical expenses and an increase in the productive time available are also reduced because the technologies higher up the sanitation ladder are more expensive. Research has found that health benefits are not necessarily key motivations for household decision making. Issues including privacy, status, safety, cleanliness and easier access have been found to be stronger motivators in households who make the decision to construct a latrine (Diallo *et al*, 2007, p.450; Jenkins and Sugden 2006, p.3; Cairncross, 2003, p.125).

The Economics of Sanitation Initiative under the Water and Sanitation Programme (WSP) from the World Bank has been working on quantifying the economic costs of poor

sanitation in different global regions. In Sub-Saharan Africa, data from 18 countries was analysed. In Rwanda the annual cost to the national economy was estimated at 54 million USD, equivalent to 0.9% of GDP (WSP, 2012a, p.2). However, the analysis is limited to losses due to premature deaths, healthcare costs, losses in productivity, and time lost through the practice of open defecation. Losses associated with the cost of epidemic outbreaks, trade, tourism revenue, environmental damage and early childhood development are harder to quantify economically (WSP, 2012a, p.1).

There are also many social benefits to increasing access to household latrines. These can include; increased levels of privacy from not having to share a public toilet, increased status or prestige and increased safety, especially for women and girls who can be at risk of attack when using public toilets or defecating in the open. However, these benefits are harder to quantify than economic ones and cannot be currently reflected in economic assessments of the impacts of poor sanitation.

These links between sanitation and its benefits can be considered as generally accepted knowledge within the development sector. This knowledge has the potential to influence the development of standards because in order to provide these benefits, especially the ones related to health, a certain level of service is required, it is not just about having access to a latrine, it is about having the *right kind* of access to the *right kind* of latrine which is where the debate around standards becomes significant. Section 2.3.7 discusses the intrinsic link between different types of latrine and the corresponding levels of service.

2.4.1.3 Measuring progress towards the MDGs

Developing countries receive aid and development assistance from various sources including international organisations, donors and NGOs. Some of this assistance is used to increase access to sanitation, with a particular focus on latrines. Section 2.3.3 highlighted how the MDGs can be considered as a code of practice because the eight goals have been voluntarily adopted on a global scale and are used as a basis for the planning and implementation of both donor and national led development programmes.

The WHO, UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation is the official United Nations mechanism for monitoring progress towards the MDG goals for water and sanitation. The target for the MDG goal referring to sanitation is to ‘halve by 2015 the proportion of the population without sustainable access to safe drinking water and basic sanitation’ (UN, 2012, p.52). The indicators used for monitoring progress towards the MDG are the proportion of the population using an improved drinking water source and an improved sanitation facility respectively.

For MDG monitoring, an improved sanitation facility is defined as one that hygienically separates human excreta from human contact. In this context, the term ‘sanitation facility’ refers to a method of excreta disposal, e.g. a toilet or latrine. Based on this definition the JMP calculates that 1.1 billion people have no access to latrines at all (UN, 2012).

The JMP uses the sanitation ladder to represent the different levels of household latrine adoption. Open defecation is considered the first rung of the ladder and the most

undesirable, leading up to the most desirable 'improved' options which includes composting toilets, pour-flush toilets, aqua privies and flush toilets. Each rung represents a higher cost but theoretically lower health hazards, providing the technology is used and managed correctly. The JMP indicator assumes that technologies classified as unimproved are inherently less safe and less hygienic than those which are improved (Lenton *et al*, 2005, p.28).

2.2.1.4 The JMP and technology choices

The sanitation ladder and the JMP estimations of access use technology types as a proxy indicator of access to corresponding levels of service. There is an underlying assumption that using technology of a certain *standard* will provide service levels of a desired *standard*, therefore by using a *better* technology higher up the ladder a *better* service can be achieved. However, as discussed in section 2.2.1.3 this is dependent on the technology being used and maintained correctly and recent findings from the WASHcost project under the International Water and Sanitation Centre (IRC) indicates that technically advanced latrines do not necessarily deliver significantly better levels of service despite their higher costs (Fonseca *et al*, 2014, p.160).

The JMP indicator is criticised for its focus on pre-defined technology options which are considered to be a restraint on developing innovative solutions. The technology options presented do not deal with issues of quality, reliability or sustainability (Kvarnström *et al*, 2011, p4). The indicator also cannot take into account the downstream consequences of incomplete or dysfunctional treatment schemes, and disposal of effluents (e.g. grey water) or social issues such as acceptance and willingness to pay (SuSanA, 2011a, p.1; Lenton *et al*, 2005, p.30).

However, the JMP indicator is constrained by the need for it to be comparable across countries, regions and periods of time, and for using existing household surveys to collect the data. It therefore uses cumulative totals which cannot take into account how many latrines are still functioning or how many are being used as intended. The percentage totals create an impression of progress but are not necessarily an accurate reflection of what is happening on the ground (Lenton *et al*, 2005, p.34; Evans *et al*, 2004, p.10).

Post 2015, the aim is for universal access to 'adequate sanitation at home', defined as 'an improved sanitation facility at home; shared between five households or less' (WHO and UNICEF, 2013, p.11). Progress will be measured using the same technology proxies, based on the sanitation ladder, that are currently used for the MDGs (WHO and UNICEF, 2013, p.12). The continued use of technology proxies means that service levels will remain intrinsically linked to technological choices and in order to achieve the universal access target, all latrines and toilets would need to be improved technologies.

The new targets have a longer timeframe, up to 2040. In terms of developing standards, time frames and anticipated progress are an important consideration. For example, a country could set a high standard and work towards it over the full length of time, or they could set incremental standards which are gradually updated as access levels improve and

new technologies or materials become available. The relationship between technologies, services and standards will be discussed further in section 2.4.3 onwards.

Internationally recognised targets like the MDGs and declarations like the right to safe and clean drinking water and sanitation can be considered as macro level rules of the game. These rules of the game may not explicitly influence the development of standards for household latrines at a national level but they do play a role in the wider international sanitation system and can consequently influence the policies, programmes and projects which take place at a national level. Sections 2.4.1.6 to 2.4.1.10 assess how society at the national level can influence the development of standards.

2.4.1.5 Population growth

Despite all the efforts that are going into increasing the number of improved latrines in Sub-Saharan Africa, population growth makes achievement of the MDGs more challenging. The MDG targets are based on population figures from 1990. In 1990 26% of the 516 million strong population of Sub-Saharan Africa was estimated to be using improved sanitation. By 2010 the figure had increased to just 31% but the population increased to 856 million, a 40% rise (AMCOW, 2012, p.11). In 2015 the population is estimated to reach over 949 million growing to reach over 1.3 billion by 2030 (UN Department of Economic and Social Affairs, 2013). Population growth therefore becomes an issue of scale and it is the scale of the problem that makes it difficult for countries to tackle. National governments cannot afford to build a latrine for every household that does not have one, especially when there is little or no budget for sanitation, which will be discussed as an issue in section 2.4.1.9.

Section 1.1 highlighted that building and maintaining a household latrine is considered to be a household responsibility. Consequently, sanitation policy tends to focus on behavioural change education which aims to encourage the adoption of better hygienic practices, including the use of a latrine. In countries where access to latrines is already low, achieving universal coverage with a universal level of service is unlikely. Therefore, there may have to be a compromise between the desired level of service and the level of service that is actually achievable. Given that service levels are intrinsically linked to latrine technologies, opting for a lower level of service changes the technology types likely to be promoted. Jenkins and Sugden (2006, p.30) argue that the most important step in the sanitation ladder is moving people from open defecation to using some sort of latrine, even if that latrine does not meet building standards. This is considered as a necessary trade-off to break the cycle of disease.

2.4.1.6 Population density

In conjunction with the problem of population growth, there is also a challenge posed by rapid urbanisation in many Sub-Saharan African countries. There are also a growing number of small towns and secondary or intermediate cities which bridge the divide between urban and rural areas which also need to be considered. Although sewerage networks are rare in Sub-Saharan Africa, in areas with high population densities, connections to off-site

sanitation systems can be desirable in order to meet the demand for services which can be difficult to deliver through on site options.

In areas of high population density, latrine and toilet based services can be limited by physical constraints including space for on-site latrines, proximity to water sources, terrain (e.g. mountainous, narrow or un-paved roads) making it difficult for emptying trucks to gain access, a limited number of operational emptying trucks and insufficient treatment facilities to accept and process waste (Katukiza *et al*, 2012, p.965; Plummer, 2003, p.69-70; Solo *et al*, 1993, p.5). Services can also be limited by financial constraints including, failure to charge for and an un-willingness to pay for sewerage or vacuum tanker services, high costs of operation and maintenance of off-site systems and equipment and limited capacity of operators and technicians (McGranahan, 2013, p.8; Cardone and Fonseca, 2006, p.11; Solo *et al*, 1993, p.9).

In rural areas, which are generally characterised by lower population densities, people are more dispersed, which makes centralised systems like a sewerage network difficult and expensive to install. On site systems are favoured which may also include the processing of excreta into non-harmful products through composting. The disparity in service levels between rural and urban areas has been highlighted as a major challenge with 72% of all people lacking access to improved sanitation living in rural areas (UN, 2012, p.56).

It is expected that service levels will be different between rural and urban areas. The levels of service expected or desired in each area can have a significant impact on any technical or service standards for latrines set at the national level and it is unlikely that one standard can be developed to cover the different situations. If a country chooses to adopt a single, universal high service standard with the corresponding technological standard, e.g. a flush toilet connected to a conventional sewerage network, the costs of implementing that choice for a growing population would be prohibitively expensive, even if a household contribution towards financing the implementation was collected. Conversely, if a country adopted a technological standard equivalent to an unimproved latrine it may be possible to achieve near universal access to some sort of facility despite population growth but the level of service would be compromised which could lead to serious health and environmental problems, especially in densely populated areas. There may also be problems with supporting what is perceived to be a 'lower standard' of latrine which are discussed in section 2.4.3.3. Balancing the needs of the population and the desires of government decision makers in terms of service level and technological standards is therefore a real challenge and one that should be considered during the development of a standard.

2.4.1.7 Sanitation related behaviours

The phrase 'sanitation related behaviours' covers a wide range of habits which can include those related to defecation e.g. sitting, squatting, method of anal cleansing; hand washing e.g. after defecation, before preparing food, before eating food; personal hygiene e.g. washing the body, washing clothes; cleaning the home and surrounding area; managing waste both solid and liquid e.g. burning, burying, public disposal, dumping and attitudes

towards animal husbandry. It is common for households, especially those in rural areas, to keep animals in the housing compound which requires the management of animal waste in addition to human generated waste (e.g. from cooking, cleaning or purchasing goods).

Taboos surrounding personal hygiene behaviours, particularly defecation, can be a challenge in encouraging the adoption of latrines (Jewitt, 2011, p.762; Albuquerque, 2009, p.5; Kar and Chambers, 2008, p.16; UN Water, 2008a, p.7). There are many different types of taboos, some examples include communities in Ethiopia who believe that people who bury their faeces are 'evil wishers' (Mesele, 2012, p.2) or in some areas of Kenya where the faeces of in-laws (especially fathers and daughters) should not mix (Bwire, 2010, p.92). There can also be resistance to building latrines, a problem highlighted in the National Sanitation and Hygiene Strategy from Ethiopia where men do not want to 'build a house for faeces' (Ministry of Health, 2005, p.12).

The role of unwritten, informal standards needs to be considered in conjunction with existing practices. Informal standards, also known as 'norms'; which may or may not be unwritten, are grounded in and based on people's experiences and beliefs, their tacit knowledge and as such can be widely known and followed. Taboos, like the ones discussed in this section, are a type of informal standard because they set social expectations about what is acceptable behaviour for the disposal of faeces. This has particular relevance for the development of a standard in cases where the new standard represents a significant change to existing behaviour, for example moving from open defecation to the use of a latrine. Latrines must be culturally acceptable and any standard developed must take cultural considerations into account. Cultural influences may be different in different parts of the country which could make the promotion of a single standard difficult. Under these circumstances, it would be important to establish how local adaptations can be included or accounted for during the development process.

2.4.1.8 Access to finance

Financial constraints are one of the most frequently cited challenges for increasing access to latrines. Given that household latrines are a household issue, a household's ability and willingness to meet the cost of building a latrine is critical. Subsidies, either financial or material, used to be a common approach for assisting households to construct latrines, however, there was a general recognition that subsidies were not producing the desired impacts so many programmes have since moved away from providing subsidies (Trémolet, *et al*, 2010, p.5; World Bank 2003, p.19). Subsidy programmes have been replaced by programmes which support sanitation as a business and sanitation marketing, as described in section 2.4.1.10.

The decision to invest in a latrine belongs with the household. The initial building cost of a latrine in proportion to the overall household income can seem unrealistic, especially if the latrine design uses materials which are better than the home (UN water, 2008a, p.12). Cash income may also not be readily available, making it difficult to pay the construction costs upfront (Trémolet *et al*, 2010, p.46; UN water, 2008a, p.12). In these instances, access to finance can be a greater barrier than the cost of the latrine. Improving access to finance can

include activities on both the supply and demand side. On the supply side, if builders are able to use locally available materials, bought in bulk they should be able to lower the cost of construction. On the demand side, the establishment of micro-financing, loans and savings groups can help households to have the money necessary to construct a latrine.

In terms of developing standards for latrines, financial influences can have a significant impact. The design of the latrine, the materials used and the building standard required will all influence the cost of a latrine. Considering the total cost of the latrine is not enough, the latrine needs to be affordable and affordability depends on the proportional cost of the latrine in relation to the household's income. The levels of household income can vary greatly within a country, therefore, it may not be appropriate to set one universal standard. Instead, it may be necessary to develop different standards for the same technology. For example, a VIP built in a rural area may use different materials to a VIP built in an urban area. To have different levels of standards in different areas may be practical from the construction point but there are arguments against promoting different levels of services in different areas which is discussed in section 2.4.3.3 and having multiple standards can make communication of the standard more difficult and more confusing.

2.4.1.9 WASH sector organisation

Sanitation is a cross-cutting sector and rarely the responsibility of just one institution. In many cases, clearly defined policies establishing the roles and responsibilities of institutions involved in sanitation are not available and there can be overlapping mandates (WHO, 2010, p.38; CHORE *et al*, 2008, p.30; Swann *et al*, 2007, p.17; Jenkins and Sugden, 2006, p.8; Scott and Cotton, 2005, p.2; Elledge, 2003, p.9; UNICEF, 1997, p.15). Inadequate or poorly organised funding arrangements can pose a significant challenge to the sector (Perez *et al*, 2012, p.26; Trémolet *et al*, 2010, p.48; Swann *et al*, 2007, p.16) and co-ordinating budgets across multiple sectors can be particularly challenging. In many cases sanitation does not have its own budget line, instead it is combined with water supply (Evans *et al*, 2004, p.6). As part of the eThekweni Declaration in 2008, African countries pledged to increase the budget allocations for sanitation to at least 0.5% of Gross Domestic Product (GDP), however, most countries are struggling to meet this commitment (World Bank, 2012, p.2).

Sector organisation or the lack of it can influence the development and subsequent use of standards for household latrines. If standards are developed in isolation, without co-ordination between institutions and without reference to the relevant policies, conflicts could arise which cause confusion for people wanting to use the standards (Kvarnström *et al*, 2011, p.6). For example, a sanitation policy may support the adoption of locally appropriate technologies but a planning policy may restrict the type of latrine that can be built in a specific location.

Where institutional roles are not well defined there may be no institution responsible for monitoring and assessing the impact of the standards and whether they are supporting or hampering progress. The roles between national and local governments need to be especially well defined. Sanitation activities are generally decentralised, therefore, if the national government is responsible for setting the standards, the role of local government

needs to be defined. For example, will local government be responsible for promotion, training, monitoring and regulating the standards and will there be any flexibility for local governments to adapt standards to their local needs where necessary or are the standards set by national government absolute. If local governments are given these responsibilities there will also be a need to make financial and human resources available at right levels to allow the local government to carry out their roles. Developing the standard in the first instance is only part of the process. Once a standard has been developed it needs to be communicated and used, therefore, establishing the roles and responsibilities amongst the different stakeholders is vital to the implementation and use of the standard.

2.4.1.10 Approaches used to increase access to latrines

There are many different trends in the WASH sector internationally and some of these are translated into national level programmes and activities. Those responsible for developing a standard should consider how these trends can influence its development and make sure that developing a standard compliments the programming and implementation approaches adopted for encouraging and increasing access to improved latrines.

In 2011 the International Water and Sanitation Centre (IRC) identified and reviewed 21 trends which were and are influencing the WASH sector (Smits *et al*, 2011). The focus of this review was on macro trends expected to have an impact on policy level decisions and included; governance, investment in WASH, aid effectiveness and water scarcity. Whilst the review provides interesting insights into how trends influence policy decisions it does not consider how those policy decisions are translated into programmes and projects for implementation. This section outlines some of the different approaches that are the most likely to have an impact on the development of a standard and discusses the role that standards can play within each approach.

Subsidies

For many years, subsidies were used to support the construction of latrines, however, the use of subsidy programmes declined due to several challenges. The programmes were financially unsustainable; subsidies did not always target the groups they were intended for and it stifled demand outside the programme as people waited for the next round of subsidies rather than investing in their own latrine (Trémolet *et al*, 2010, p.xii; Evans, 2005, p.26). The use of a 'standard model' latrine was common and section 2.4.3.1 discusses how this is one of the main reasons why standards for latrines are still considered as a constraint for constructing them. Standard model latrines are criticised for being over-designed and too expensive. However, by introducing conformity to the construction of latrines there is an element of quality control that is difficult to achieve when people are left to construct their own latrines and this ability to establish a level of quality control may be desirable in some contexts, for example, when it is necessary to protect a vulnerable habitat or ecosystem. Although there may be no intention to develop a standard model, there may be intentions to standardise the technologies or models used because, as discussed in section 2.4.1.3, if households build a latrine that is not an improved model it will not be

counted towards national progress on increasing the levels of improved latrines. The problems associated with faecal related diseases are also likely to persist.

Community Led Total Sanitation (CLTS)

Community Led Total Sanitation is a zero-subsidy approach that has been widely adopted and promoted by the international community. CLTS has no technological requirements, facilitators are actively discouraged from prescribing or promoting any model of latrine, instead, the community is encouraged to find their own alternatives to open defecation (Kar and Chambers, 2008, p.10). Latrines constructed as a result of CLTS triggering are unlikely to be considered improved, however, once people have built some form of latrine and have stopped openly defecating it is hoped that they will continue to progress up the sanitation ladder and improve their latrine over time. There are challenges with the sustainability of CLTS triggering with some households returning to open defecation and there has been a debate about the impact on individual human rights of the use of public shaming and social sanctions (see Bartram et al, 2012). However, one of the core principles of the CLTS approach is that it recognises that the construction of latrines should be a demand driven market, rather than a supply driven one and as such householders, as the primary investors in latrines, should be the key decision makers. There is a significant body of research looking at the issues of household decision making, behaviour change and increasing demand for latrines (see Jenkins and Scott 2007; Jenkins and Sugden, 2006; Rosenquist, 2005; Curtis *et al*, 1995).

Jenkins and Scott (2007, p.2430) identify a three stage decision process that households complete when deciding to install a latrine for the first time. The stages are preference, intention, and choice. At each stage there can be permanent and temporary constraints which delay or stop the intention to build a latrine. A permanent constraint could be a lack of space to build a latrine whilst a temporary one could be the availability of a builder to construct it, resulting in a delay to the construction. In terms of standards, the most important stage is 'choice'. Households have already decided that they want a latrine and have the intention to build one, but the choice of what to build is dependent on product choices which can include cost, materials, the availability of technical information and a builder, soil and water conditions (*ibid*, p.2437). Sections 2.3.1 and 2.3.2 discussed how one of the roles of a standard is to provide information to consumers in order to assist decision making and increase confidence in the products available. This is an area where the development of a standard could have a positive impact on the construction of latrines rather than a negative one, by acting as a guide or a code of practice to give householders consistent and relevant information that they can use to make a decision.

Community Approach to Total Sanitation (CATS)

UNICEF has adopted the 'Community Approach to Total Sanitation' (CATS) which is described as 'an umbrella term used by UNICEF sanitation practitioners to encompass a wide range of community-based sanitation programming' (Galbraith and Thomas, 2009, p.4). CATS is founded on nine 'essential elements' which are considered 'non-negotiable' (*ibid*, p.5). Standards are referred to in element five;

‘CATS supports communities to determine for themselves what design and materials work best for sanitation infrastructure rather than imposing standards. External agencies provide guidance rather than regulation. Thus, households build toilets based on locally available materials using the skills of local technicians and artisans’(ibid).

This statement implies that if a government recognises and adopts the CATS approach there should be no use of standards or regulations. However, the quote highlights how standards are commonly perceived in WASH literature; that standards are *imposed*, rather than voluntarily adopted as they should be and that there is an assumption that they should be regulated.

In the same document, when discussing the case of CLTS uptake in Zambia the authors state that ‘the survey revealed that 99 per cent of toilets were in use and 88 per cent met national standards’ (Galbraith and Thomas, 2009, p.18). This implies that national standards in Zambia exist and are used to measure national progress towards increasing access to sanitation. Unfortunately there is no information given on the standards which exist and how they are used in Zambia, whether they act as guidance, as desired by UNICEF, or if they are imposed. It also does not state if the national standards represent improved toilets or not.

CATS is focused primarily on the eradication of open defecation through CLTS rather than the construction of improved latrines. The latrines built as a result of CATS activities are therefore not always well constructed and in a recent evaluation of the CATS approach it was found that the poor quality of constructed latrines in combination with a lack of follow-up monitoring are the main reasons that communities regress back to open defecation (UNICEF, 2014, p.80). In Mozambique, the standard of latrines built as a result of CATS interventions is evaluated in addition to the open defecation free criteria, in an attempt to promote the construction of latrines that will be more durable and less prone to collapse (ibid, p.82). Other countries in the study were also found to use the standard of latrines as an indicator for monitoring ODF status (ibid, p.74).

In order to tackle the challenge posed by communities reverting back to open defecation there are moves to integrate the post-certification phase into programme design through the use of a combined CLTS and sanitation marketing approach. One of the recommendations given as a result of the evaluation was to work at the national level on ‘appropriate standards for latrines’ (ibid, p.85). Therefore, standards for latrines are likely to have an increasing role to play in promoting more durable latrines which better align to JMP definitions of being ‘improved’.

Sanitation Marketing and Sanitation as a Business

Sanitation marketing and sanitation as a business are two approaches which focus on trying to improve the demand for household latrines and to support the supply of products and services at the local level, i.e. in local markets. Total Sanitation and Sanitation Marketing (TSSM) is another approach which combines CLTS and sanitation marketing with the aim of supporting households and entire communities to make the transition from open

defecation and to support the supply of improved latrine products e.g. latrine slabs, so that the transition process is more effective (Godfrey *et al*, 2010).

One of the key elements of these approaches is to encourage greater involvement of the private sector in the provision of latrine based services, including the construction and emptying of household latrines (SuSanA, 2011b, p.3; Water for People, 2010 p.1; Heierli *et al*, 2004, p.5). The idea is that as businesses gain revenue from providing these services they can re-invest them in the business in order to expand and provide more services to more households. By encouraging participation from the private sector, it is hoped that more creative and innovative solutions will be found for users and that the process remains financially sustainable without the need for substantial public investment. Standards in this context could play various roles and it is important to establish what those roles are. Section 2.3.1 outlined the main types of standards from BSI, although other types could be developed it is useful to consider how these main types could influence the potential to develop a business and marketing based approach.

A specification is a highly prescriptive standard which would set out detailed requirements for a latrine including materials, construction processes and checking compliance. A specification can be compared to the idea of a 'standard model'. Those who set the criteria for the standard model retain significant levels of control over quality which can ensure that desired levels of service are met but innovation is not encouraged. Businesses in this context would be expected to comply with the standard and there is likely to be monitoring and regulation of the businesses providing the services. Establishing a business in these conditions can be challenging as it is likely to require a formal registration and approval process prior to starting business.

A guide and a code of practice are more flexible standards which present relevant information and a synthesis of current best practice. These standards are an ideal way of supporting innovation because they can be used as benchmarks to define what the minimum requirements are, which would indicate that all new innovations should be at least as good as the minimum requirements, if not better. There could still be a process of monitoring and regulation if desired but ideally, the customers become the monitoring force because they demand products which meet their expectations and those businesses that cannot achieve that do not last. In this context, the use of a standard could support competition between businesses as producers strive to create the best product to meet their customer's needs, which would support local innovations. If governments want to retain some level of control over the technologies available they can create criteria for assessing the suitability of new products before they are released onto the market. Life cycle cost analysis is one of the criteria that could be used to assess suitability.

Life cycle cost analysis

When deciding what latrine to build it is important to consider both the initial investment and the ongoing costs of operation and maintenance. Calculating these costs can be achieved by applying life cycle cost analysis to the whole life cycle of the latrine. Life cycle cost analysis is defined as 'a systematic analytical process for evaluating various designs or alternative courses of actions with the objective of choosing the best way to employ scarce

resources' (Senthil Kumaran *et al*, 2001, p.262). This application of a life cycle cost analysis approach to household latrines could determine that specific latrine models or technical solutions are more cost effective over their life cycle than others. In cases where households are looking for longer term solutions, which should theoretically represent higher levels of service for users, the standard developed could take into account life cycle costs. The standard would therefore be formulated to promote the designs or solutions with the best life cycle cost performance. The next section presents how elements from nature can play a part in the sanitation system and how these can influence the development of standards.

2.4.2 Nature

The following three sections highlight how natural elements of the sanitation system can directly affect the type of latrine which can be used in a given location. In the definition of a sanitation system used by Winblad and Simpson-Hébert (2004, p.6) nature refers to climate, water and soil. Climate in this definition refers to temperature, humidity, rainfall and solar radiation, water refers to the amount available and groundwater levels and soil refers to soil stability, permeability and ease of digging. When developing a standard for household latrines it is important to consider not only how the users will interact with the latrine but also how the latrine will interact with its environment. Environmental implications have been added to the definition for consideration in this section.

Nature based influences have implications for the development of a standard for household latrines because the context specific nature of these different conditions makes it unlikely that one type of technology will be applicable across the whole country. If a universal level of service is required, it will have to be achieved using different technologies. This increases the complexity of the standard development process because the different needs have to be identified in the different areas.

2.4.2.1 Soil and water

A large proportion of the information related to the influence of natural conditions on latrines can be found in latrine building guides and manuals prepared for specific countries or programmes. Loose soil and high water tables are two of the main reasons why pits collapse (Practical Action, 2013, p.1; Centre for Affordable Water and Sanitation Technology, 2011, p.29; Nostrand, *et al*, 1983, p.41). Under these conditions, additional measures need to be taken to prevent collapse and prolong the life of the latrine, which can influence the type of latrine to be built, the construction processes, the materials used and the cost of construction.

The permeability of soil dictates if technologies can be used which require liquid components of the waste to be absorbed into the surrounding ground, for example, septic tanks and unlined VIP latrines (WHO, 1992, p.37; Mara, 1984, p.7). However, if the latrine is situated near a water source this infiltration of waste components into the surrounding soils can cause contamination of the water source and in areas of high population density the use of unlined latrines can lead to the transmission of soil based diseases.

The soil may also create difficult digging conditions if it is particularly rocky or rock based (e.g. volcanic rock). Rocky ground creates difficult digging conditions which can make achieving a suitable depth for the pit physically impossible with locally available tools or prohibitively expensive because of the time taken to dig. In addition to the soil conditions the topography of the land needs to be considered. Low-lying flood plains and steep slopes increase the challenges associated with constructing safe and stable latrines (UNICEF, 1997, p.48).

In the recent evaluation of the CATS approach by UNICEF it was found that in order to help households living in areas where it is difficult to construct latrines, the use of technical standards together with targeted subsidies are unavoidable (UNICEF, 2014, p.46). This has implications for the future role of standards in latrine based activities and programmes such as CATS.

2.4.2.2 Climate

Climate has a number of influences, some of which are more obvious than others. The climate affects pathogen survival and rates of faecal decomposition inside latrines (Winblad and Simpson-Hébert, 2004, p.15; WHO, 1992, p.33; Mara, 1984, p.6). Climate also affects the amount of faeces and urine excreted daily by individuals (WHO, 1992, p.33). Materials used to construct the latrine can be affected by climatic conditions, especially extreme heat, humidity or heavy rainfall which can cause metal to rust, plastics to become brittle and mud or clay based materials to disintegrate which all make the latrines more prone to structural failure. Seasonal rainfall can also influence surface water drainage and in some areas with poor drainage it can result in flooding and damage to the latrine.

Infrastructures of all types are vulnerable to natural disasters and extreme weather conditions. Household latrines in areas that are prone to flooding, earthquakes, landslides or tropical storms are at an increased risk of collapse. There is also the potential for the excreta in a latrine to be released into the environment, especially during flooding or landslides. Excreta from one latrine can be contained but if it happens to all the latrines in a community the health implications are severe. In areas prone to natural disasters, some technologies may be more resilient than others but building more resilient latrines is likely to cost more. Therefore, there may be a trade-off between what is affordable and what is preferable from a resilience point of view. Once again, this reflects the dynamic between households and government discussed in section 1.1. If a standard is developed to specify the use of a particular technology or construction method in order to mitigate the risk of damage caused by natural disasters but it is considered to be unaffordable for a majority of the households the government may have to consider providing additional financial support.

2.4.2.3 Environment

In some areas there can be an important balancing act between supporting the use of hygienic latrines which are acceptable and affordable to the users and protecting delicate ecosystems. The desire to protect vulnerable ecosystems from the effects of poor quality

latrines can lead to the imposition of excessive or unrealistic regulation (WHO, 2005, p.22). The result can be that either the regulation is ignored because it is not enforceable or the type of latrine required is unachievable for a majority of the households which forces them to resort to a more harmful practice like open defecation and the damage to the ecosystem continues.

As discussed in section 2.3.6, standards are supposed to be used voluntarily, however, in areas where the use of a particular latrine technology is unacceptable, additional actions may be needed. These could include, additional training and intensive educational campaigns to make people aware of the dangers of using the unsuitable technology, additional research to find a viable alternative, support in constructing an alternative option; especially if the cost is considerably higher, or the development of a regulation prohibiting the use of a specific type of latrine. If a regulation banning a specific type of latrine is to be used in conjunction with a standard it needs to be developed at the same time as the standard as discussed in section 2.3.6 and prohibiting the use of one technology is useless unless there is a viable alternative. Therefore, the alternative option would need to be developed and disseminated prior to banning and enforcing the ban on the use of unsuitable technologies. The influence of technological choices on the development of standards is discussed in the next section on process and device.

2.4.3 Process and Device

In the description of a sanitation system by Winblad and Simpson-Hébert (2004, p.6) process and device are two separate components. However, for the purposes of this review, process will be considered in conjunction with device because the process by which excreta is contained and transformed into a non-harmful product is dependent on the type of device (technology) used. Section 2.3.7 discussed how for latrines, technologies are intrinsically linked to service standards, and the notion of a 'standard model' latrine is most commonly found in literature which discusses latrine technologies.

The term 'technical standard' is not commonly used by standard making bodies to identify a standard as being related to a technology. However, when discussing standards for latrines; particularly in literature from the international development sector, authors most commonly use the terms 'technical standard' and 'technical norms and standards'. It is understood that this differentiation is made in order to differentiate between a service standard and one related to a technology. However, a technical standard must not be confused with the term 'technical regulation' discussed in section 2.3.6 which relates specifically to the regulation of a standard. The next section of this chapter reviews how standards for latrines are discussed in the sector literature.

2.4.3.1 Standards as constraints

It is generally accepted that water supply and sanitation services need to be considered separately to prevent sanitation being overshadowed by water supply. However, when discussing standards, the literature frequently reverts to a general discussion about standards for the WASH sector as a whole, identifying those related to latrines in particular

is more difficult. The standards discussed are usually focused on water supply. This is not surprising given that the WHO have long established and widely recognised standards for water supply quality and quantity (see WHO, 2006), but there is no equivalent for sanitation services, which includes latrines.

The confusion surrounding the use of standards for latrines is captured in this example of programming guidance from UNICEF in 1997. In the guidance it is recommended that ‘no particular set of technologies or technology should be prescribed, although unsafe or environmentally detrimental options should not be promoted’ (UNICEF, 1997, p.44). The guidance given is to not promote a standard model. However, in the same document it is recommended that innovations in existing technology options are encouraged and that new technologies be tested against health, technical and environmental standards with a view to supporting the development of manufacturer’s standards and advocating their enforcement so that new technologies can be used on a wider scale (ibid, p.47). Although there should be no standard model promoted, the use of standards to define the suitability of a technology is still expected. The role of the standard in this context is to promote wider scale uptake of new technologies.

Whilst the enforcement of standards is not anticipated in the early phases of programming it is clearly expected that standards will be developed in due course and will then be ‘enforced’, allowing use on a wider scale. There is no time frame suggested in which new standards should be developed and the recommendation of testing innovations against existing standards relies on the existing standards being up to date; fit for purpose; relevant for use on a ‘wider scale’ and still able to meet the needs of users in different locations. If the existing standards are outdated or even contradictory, identifying whether a new innovation is acceptable and appropriate will require a different method of validation. If no such method is available the innovation will either not be adopted or will be adopted without being validated which would be contrary to the proposed role of the manufacturer’s standard. The fact that the standard is expected to be enforced highlights the assumed link between standards and regulation which was discussed in section 2.3.6.

Lenton *et al* (2005, p.87) argue that there is a general acceptance by experts that in terms of technical innovations in sanitation, there is a full range of technologies available for the provision of safe and reliable sanitation in almost any setting, but that planners are not able to make full use of the technologies available due to various constraints. These constraints include standards, rules and guidelines which can be found in policies, planning regulations, building regulations, technical norms and standards, conventions, design manuals, laws, by-laws and standard bills of quantities (IWA, 2006, p.18; Evans, 2005, p.26; Lenton *et al*, 2005, p.87; Heierli *et al*, 2004, p.34). According to the literature, standards can act as constraints on increasing access to latrines in a number of ways;

- Technical standards adopted without modification from another country can be too high for the national situation
- In programmes where a ‘standard’ latrine is designated, it may not be affordable for all those who need one
- If standards focus on ‘state of the art’ technologies they may be unaffordable

- Standards can limit the possibilities for innovation and can hamper private sector involvement
- Technologies are designed to meet a specification not a cost.
- By limiting the number of technology choices permissible in a given situation or location
- By promoting or demanding inappropriate designs without reference to user requirements (including: cultural acceptability, affordability, availability of materials or knowledge for building)
- In areas of rapid change standards can become obsolete
- Exacting standards can prevent phased improvements which can be made as and when household finances allow for them
- Where standards are used as a regulatory or monitoring tool technologies not specified in the regulation may not be authorised for use

(Hawkins *et al*, 2014, p116; Kvarnström *et al*, 2011, p.5; Jenkins and Sugden, 2006, p.30; Evans, 2005, p.26; ; Lenton *et al*, 2005 p.87; Heierli *et al*, 2004, p.11; Cairncross, 2003, p129; Snell, 1998, p.7).

Some of the same authors referenced above do provide suggestions for how technologies, standards and regulations can be more supportive and what they should be like;

- Technologies should be designed based on cost and affordability rather than a technical specification.
- Designs should promote household level decision making, e.g. through providing a range of options to choose from.
- Technical standards should promote innovation and flexibility.
- Governments should set adequate safety standards to protect the environment from pollution.
- Regulation should be 'supportive rather than policing'
- Governments should provide 'appropriate regulations' and provide technical support

(CHORE *et al*, 2008, p.28; Lenton *et al*, 2005, p.87-88; Heierli *et al* 2004, p.11; Cairncross, 2003, p.129)

However, implementing these suggestions is not necessarily straightforward because each one is open to different interpretations or could require compromises to be made. In the first suggestion, if a latrine is designed based on cost and affordability but the only affordable option provides a lower level of service than the one preferred, it could involve a trade-off between preferred service levels and an affordable technology as discussed in section 2.2.1.4. The second suggestion of providing a range of options for households to choose from is included in both lists and is therefore considered both as a constraint and as a positive step. By providing a list of options a focus on just one option is avoided but if there is no flexibility in the options provided there is the potential for each one to become a standard model for that particular type e.g. a standard VIP model or standard ecosan model.

In the third suggestion the term technical standard is used and as stated in section 2.3.6 a technical standard is not a commonly used term by standard making bodies so it is difficult to understand what is meant by the term. It could imply a specification, which by its nature is not flexible, or it could refer to minimum technical requirements such as pit depth which could be used in conjunction with more flexible standards on less technically critical elements such as the shape of the superstructure. The fourth suggestion relates to a specific role for the standard, which is to ensure safety with a focus on environmental protection. In this case the standard could be used to set minimum criteria in order to ensure environmental protection, this could take the form of either a service based standard or a technically based one. For example, in order to protect the environment the standard could promote the use of a latrine without specifying a type but once again this may result in other compromises on service levels being made or the promotion of a standard that whilst protecting the environment, promotes a latrine that is unaffordable. This problem was discussed in section 2.4.2 on influences from nature.

In the final two suggestions there is an assumed link between standards and regulation and in both suggestions it is understood that it is the regulation that causes the problem rather than the standard. Unfortunately the suggestion that regulation should be supportive rather than policing can be difficult to achieve because regulations are something to be followed and by their nature enforced, rather than being created for guidance. If a regulation is developed it should be based on and preceded by the standard and if a regulation is not going to be enforced it does not need to be created. The development of 'appropriate' regulations is also difficult because how appropriate the regulation is depends on what it is trying to achieve. The difference between standards and regulations was discussed in detail in section 2.3.6.

Standards are commonly confused with rules which must be followed and authors use language such as 'prescribed standards' or 'norms and standards' with no clarification as to whether they are discussing formal, private or informal standards. Establishing what standards and regulations already exist and understanding stakeholder views about the roles of both will be an important component of the data collection phase of this research.

Section 2.3.3 discussed in detail the best practice process for developing standards which included involving all interested parties in the process and the importance of building consensus for the new standard. When a standard is acting as a constraint it must be assumed that these standards were not developed using best practice processes found in literature from standard development bodies or that they were not developed to respond to the right need.

Evans (2005, p.26) states that 'we know well written norms and standards can facilitate the appropriate use of least-cost and effective solutions to sanitation problems'. Lenton *et al* (2005, p.88) calls on the international community to encourage the adoption of appropriate standards in countries who want to increase access to sanitation and Evans (2005, p.26) calls on the international community to develop 'normative guidance' in standard setting similar to the work of WHO on drinking water quality standards.

It can be summarised from this section that standards for latrines are considered as a necessary evil and that the miss-application of standards in the past has caused problems which has given standards a negative name. However, despite the fact that the role of standards in improving services and technologies for latrines is accepted, there is no guidance on how to develop a *well-written* standard within WASH sector literature. This is one of the key knowledge gaps that this research addresses.

2.4.3.2 Standards and tacit knowledge

When authors in the WASH sector write about standards for sanitation services and technologies, the word *norms* is commonly used in conjunction with the word *standards*. A norm, although not a type of formal standard, still reflects a common approach or a normal way of doing things. However, unlike a formal standard, a norm is more likely to be based on common or repeated application and can reflect a social norm rather than a formal standard. For a standard to be formally recognised it should be in a documented format and accredited by an established national or international standards body (e.g. BSI, ISO, ANSI). However, unlike formal standards, norms and informal standards can be unwritten. Known as rules of thumb, these unwritten norms are particularly difficult to identify and people may not even be aware that they are using them (Gigerenzer, 2007, p.4; IWA, 2006, p.17).

Repeated or widespread use of an unwritten norm can cause people to get fixated on a certain way of doing something e.g. digging a pit to a particular depth, or the use of a particular technology. Technologies may also be misunderstood, with people believing that a particular design is more complicated or perhaps less desirable than it really is. As new latrine designs and models are developed, promoted and adopted, they become part of the established set of latrines available. This can be seen with the introduction and adoption of the ecosan model. Ecosan latrines have become the favoured technology for many internationally led latrine based programmes and projects and has become part of the sanitation ladder as discussed in section 2.4.1.3.

Evans (2005, p.26) highlights how the subsidy led programmes would promote 'standard' latrine designs which were overdesigned and artificially expensive, pricing out poorer households. These standard designs represent particular models of latrine and whether or not these subsidy supported latrines were intended to become a 'national standard' or not, they can become entrenched as the 'established way' of constructing a latrine and set an informal standard for what a latrine should be like. This can make it difficult to persuade people and households to opt for an alternative possibly 'sub-standard' technology, or one that is viewed as second class (Paterson *et al*, 2006, p.905; Lenton *et al*, 2005, p.88). In cases where this has happened it is an important point to consider during the development of a new standard. If a new standard is adopted which promotes a different latrine design, construction method or mode of use, people's reactions to the new approach must be understood and considered, especially if it is perceived to be a lower quality option. There may be resistance from people not happy to settle for less and who would rather wait to be able to have the better option. It is not to say that these perceptions about lower quality

could not be overcome but it would require additional resources and time to reassure people that they were not making a bad choice.

When developing standards for household latrines, identifying current norms and informal standards whether written or unwritten is a critical step in the process. It is also important to understand what information is already available and how people interpret and use that information. Behaviour change education programmes for WASH frequently include the use of some sort of manual or guideline in order to provide information to households. Over the years, a large number of manuals, how to guides, guidelines and technical specifications for latrines have been produced. For simplicity, the term *manual* will be used to represent all documents of this type related to the construction or use of household latrines. These manuals are a presentation of knowledge. The type of knowledge presented, how it is used and interpreted will influence activities taking place in the sector. For example, if a manual contains information about latrine construction and is considered to be a 'rule book' on how to build this will have implications on the way that new or different information is accepted.

One of the knowledge gaps addressed by this study will be to review different types of manuals available which present information to households related to the construction of latrines. A review of this sort has not yet been carried out, but there is a need to do it in order to understand the type of information available to households to help them make decisions on their choice of latrine.

2.4.3.3 Changing standards

Changing standards or introducing new ones can be challenging for a number of reasons. As discussed in section 2.4.1.3, standards for latrines can be found in standards, rules and guidelines which can be found in policies, planning regulations, building regulations, technical norms and standards, conventions, design manuals, laws, by-laws and bills of quantities and they can relate to different aspects of the latrine. In some cases the standards may overlap or even contradict each other, in these cases, changing a standard becomes more complicated. There may also be standards from sectors unrelated to WASH activities which may impact on a standard for a household latrine. For example, a building code which applies to any construction activity or a planning policy that prevents the construction of services in informal settlements. Consequently, it is important to fully understand the contents and implications of existing documentation which could influence how a standard for latrines can be changed or developed.

Whether the existing standards have been formally recognised or not, a change in a standard for a latrine will usually necessitate a change in behaviour. This could relate to all sorts of factors including latrine siting, construction methods, modes of use and the materials used. Behaviour change is not limited to the latrine users, it can also apply to professionals including government decision makers, planners, engineers and builders who are involved in activities such as policy setting, programme design and implementation and latrine construction. For those whose training is rooted in old approaches and standards, there may be an unwillingness to re-train if standards are changed (Evans, 2005, p.26;

Saywell and Cotton, 1998, p.27). Changing behaviour takes time and that will influence the speed with which standards can be introduced. Snell (1998, p.7) highlights the example of how a community association in Faisalabad, Pakistan refused to use the high standard of concrete sewer specified in the government contract in favour of a more affordable system. However, this type of action is brave and requires those responsible to accept a certain level of risk in their choice. There is less risk in following a recognised standard, therefore, decision makers at government level tend to favour established, conservative standards (Paterson, *et al*, 2006, p.904; Lenton *et al*, 2005, p.88). Whilst these statements are made about standards in general rather than about standards for latrines in particular, the impact of choosing to adopt established standards can be seen in cases such as Zimbabwe where the Blair VIP has been considered the 'national standard' for many years and continues to be viewed as such.

In countries where a formal standard is wanted but an informal one is well known and widely used it may be possible to formalise the informal standard, especially if it is already fit for purpose and meets the required need. In other cases where the informal standard is not fit for purpose, the development of a formal standard or the modification of the informal standard may require people to change their current practices, which takes time and resources.

Section 2.3.5 discusses how standards are supposed to increase consumer confidence and improve consumer goods, making sure that they are safe and user friendly. By developing a standard for latrines, or changing an existing one to make it more applicable, the levels of risk for all stakeholders would be reduced, providing that the technologies are properly tested before being adopted and that consumers are involved in the development process. This is an area where the use of standards has the potential to make a positive contribution to latrine construction rather than a negative one. Decision makers can be confident that they are not promoting a design which could be viewed as *sub-standard*, builders can be confident that what they are building will be acceptable and wanted by users and the users can be confident that their investment in a latrine is worthwhile.

2.4.3.4 Standards and innovation

In section 2.4.3.1 there is a quote from Lenton *et al* (2005, p.87) stating that experts in the sector agree that there is already a full range of technical innovations available for the provision of safe and reliable sanitation. However, there are also repeated calls for supporting and encouraging technological innovations throughout WASH sector literature.

The Bill and Melinda Gates Foundation launched the 'Reinvent the Toilet Challenge' in 2010 with the aim of making a stand-alone unit without the need for water, a sewer connection or an electrical input (Bill and Melinda Gates Foundation, 2010, p.3). The prototypes resulting from this challenge will represent highly engineered solutions applicable in different global settings. This type of innovation requires the input of tremendous resources but has the potential to solve challenges on a global scale. Small scale innovations in latrines, which solve specific problems in a specific area are on-going, some innovations have been well documented and are well known, for example ecological

sanitation models. Other innovations in construction methods or the use of alternative materials in a village may remain undocumented and will only be found in localised knowledge.

Over the years, different latrine technologies have been designed to solve particular problems, for example, the VIP was designed to reduce odours associated with traditional pit latrines and more recently composting toilets have been designed to turn human waste into a useful product. The VIP and ecosan latrines are essentially still a pit latrine, in that the waste is collected onsite, below where the user sits or squats. However, both are considered to be 'innovations' in latrine design. Innovation in this context is created by changing the design of the device and the process of use. In another context innovation may focus on making the latrine cheaper to build and improving its affordability. The process would stay the same but the design of the device would be changed. In section 2.4.3.1 standards are highlighted as a constraint on innovation, whereas section 2.3.5 discusses how standards, when properly designed, can support innovation. The role of standards in supporting innovation therefore merits further elaboration.

One of the negative ways in which standards can be perceived to constrain innovation is through the transfer of technologies from one context to another. Following the conventional technology transfer route means that technologies which were used to solve a problem in one context are transferred to another context without being re-designed for the new context (Murphy *et al*, 2009, p.162). If this new technology subsequently becomes a formal or informal standard then it could prohibit the adoption of other innovative solutions. Giving people a choice about the type of latrine they want is highly recommended because it allows the range of models offered to be more in line with what people can afford and are willing to pay (Potter *et al*, 2010, p.10; Briceño-Garmendia *et al*, 2004, p.27). Therefore, if a technology such as a latrine is being transferred from one context to another the input of local users is vital to make sure that it meets their needs (Davies-Colley and Smith, 2012, p.2; Murphy *et al*, 2009, p.165; Jenkins and Sugden, 2006, p.11). This corresponds with the understanding that standards should be developed through consensus involving as many interested parties as possible as discussed in section 2.3.4.

Limited availability of technical knowledge for the design and construction of latrines and a lack of key building materials being available in local markets have been highlighted as significant challenges facing households wanting to construct latrines (Ramani *et al*, 2012, p.682; Rosensweig *et al*, 2012, p20; Banerjee and Morella, 2011, p.263). In theory, standards should be useful in supporting both the supply side and the demand side. On the demand side standards support the spread of information and knowledge, helping people with decisions and providing a level of security so that people feel comfortable about what they are choosing to invest in. On the supply side, standards can help to standardise the use of materials so local suppliers know what to stock and in what quantities to best support the market. In this way, standards have the potential to shape local markets.

As discussed in section 2.2, the concept of sanitation as a system is fundamental to this research. Lopes *et al* (2007, p.301) argue that system innovations cannot be achieved

through technological innovations alone, but that institutional and socio-cultural changes are needed as well. This is especially true in a complex system like sanitation that includes socio-economic, cultural, political, natural and technological elements. Technological innovations that require behaviour change are effectively replacing one set of practices with another, in this situation the innovation is disrupting the existing practices and the power of the status-quo should not be ignored (Brewer, 1980). This links directly to section 2.4.3.2 which discusses the influence of tacit knowledge in household sanitation and technological acceptance.

Learning alliances have been adopted as a new approach by some development practitioners as a way of supporting innovation (Murphy *et al*, 2009, p.161; Smits *et al*, 2007, p.3). Learning alliances are defined as 'a series of interconnected multi-stakeholder platforms at different institutional levels aiming to speed up the process of identification, development and scaling up of innovations' (Smits *et al*, 2007, p.3). Innovations are not limited to new technologies, it includes innovations in service delivery, approach or adaptations and improvements in existing approaches or technologies. The aim of a learning alliance is to develop locally appropriate innovations, build capacity for innovations by mobilising knowledge through social learning and scale up the solutions by institutionalising them. Srinivas and Sutz (2008, p.133) argue that good local knowledge which remains isolated from the general body of knowledge is a constraint on innovation in developing countries. Lenton *et al* (2005 p.101) identify local innovation as being particularly important to increasing levels of access to hygienic latrines.

Standards are designed to make our lives easier and one of the ways that happens is by providing information to users about the levels of service to be expected from consumer products, as discussed in section 2.3.5. Koskinen and Vanharanta (2002, p.58) consider how different types of knowledge are related to problem solving and note that when people attempt to solve problems they are guided by their previous experiences and existing knowledge. They also highlight that people rely on their friends or colleagues for knowledge and advice.

This understanding of innovation, knowledge use and knowledge transfer has particular relevance to the construction of household latrines. Many programmes implemented by both international and national organisations rely on the identification of 'sanitation champions', 'natural leaders' or 'early adopters' to help peer-to-peer learning. If people build their own latrines without the input of new knowledge they are more likely to copy what they have done before so innovating and moving away from the 'expected approach' is difficult. Therefore, during the development of a standard for a latrine, the importance of social learning needs to be considered both in terms of supporting innovation and in terms of contributing to the knowledge pool which people can use to make decisions and produce further innovations.

Knowing where to find the appropriate knowledge and how to use it is also important (Srinivas and Sutz, 2008, p.136; Koskinen and Vanharanta, 2002, p.59). Consequently, once the standard has been developed it needs to be effectively communicated to the people who need to use it. In some cases, existing channels of information could be utilised e.g.

radio or print media but in other cases, if the information to be conveyed is lengthy or complex, trainings or specific capacity building approaches may be needed. Any approach used will need the allocation of resources in terms of people, budgets and time and should therefore be considered during the standard development process. Section 2.5 summarises the key points highlighted in the literature review.

2.5 Summary of key points from the literature review

This literature review highlights the complexity of sanitation systems and how many of the individual elements specifically related to standards for household latrines are interwoven with each other. Section 2.5.1 summarises the key points from sections 2.2 and 2.3 which discuss what standards are, the roles they can play and how they can be applied to household latrines. Section 2.5.2 summaries in tabular form the key points from section 2.4 which discusses the different elements of the wider sanitation system and the potential influences they can have on standards for household latrines.

2.5.1 Understanding standards

- Household latrines are the focus of this research (section 1.1)
- Building household latrines is considered a household matter and a household expenditure, however, achieving the MDGs is a national challenge (section 1.1).
- Sanitation must be considered as a system (section 2.2).
- A standard should be established by *consensus*, be *documented* and contain information that can be used *consistently*. In terms of national or international standards *approval by a recognized body* is also critical (section 2.3.3).
- Standards take different forms depending on their purpose and the identified need (section 2.3.3).
- Standards can be private or formal. Private standards may not necessarily comply with the development processes required by the standard accrediting body (e.g. ISO, ANSI) and consequently cannot be accredited as formal standards. The development of private or formal standards depends on its purpose and the need identified (section 2.3.3)
- Consensus is a vital part of the standard development process for any 'formal' standard (section 2.3.4).
- Involving stakeholders in the development of standards can support consumer understanding, promote competition and innovation and support public policy decisions (section 2.3.5)
- A standard by itself is designed to be used voluntarily, in order for it to become compulsory, compliance with a specific standard must be enforced through laws or regulations (section 2.3.6).
- For household latrines, standards are most likely to be either technically or service oriented, but service standards are closely linked to technical standards (section 2.3.7).

- Standards could be applied to a wide range of elements, including, the type of latrine which can be built, material choices, dimensions, positioning and construction methods. These elements could be encompassed within a single standard or may be divided between two or more standards (section 2.3.7).

2.5.2 How standards for latrines fit into the sanitation system

There are currently no frameworks that deal specifically with the topic of standards for household latrines. Consequently, the purpose of this literature review was to highlight and assess the different elements from the wider sanitation system that have the potential to influence the development of a standard for household latrines and what influences a standard for household latrines could have on the wider sanitation system. During the analysis of the literature, the following two questions were considered;

- What elements from the sanitation system can influence standards for household latrines?
- What influences can standards for household latrines have on the sanitation system?

These different elements have been brought together in Table 2 to summarise how they can influence the development of standards for household latrines and what influence the development and use of standards could have on the sanitation system in which they are adopted. Table 2 presents the main element (society, nature, process and device) in conjunction with a very short summary of the influences both on and of a standard which have been discussed throughout section 2.4 of this literature review.

Table 2 Elements from the sanitation system and the influences on and of a standard for household latrines

System element		Influence of the system on a standard	Influence of a standard on the system
Society (international)	Sanitation as a human right	Criteria could be adopted as minimum requirements to be met in a HR context	Meeting criteria would set a minimum service level nationally
	Economic and health benefits	To get the economic and health benefits needs the <i>right kind</i> of latrine	Establishing what the ' <i>right kind</i> ' of latrine is could set a minimum service level nationally
	MDG progress & monitoring	Certain technologies required to meet the MDGs	International targets shape sector norms. Service levels are linked to technological choices.
Society (national)	Population growth	Makes achievement of a universal level of service much more challenging	Compromise between desired level of service and the level that is achievable
	Population density	In high density areas there can be challenges from physical and financial constraints.	Difficult to adopt a single standard. Compromises in the service levels achieved in different areas
	Sanitation related behaviour	Cultural acceptability should be considered. May need local adaptations to standard	Standard could represent a significant change to existing behaviour/social norms
	Access to finance	Develop different standards for the same technology to reflect different levels of affordability	Households may need additional support e.g. the establishment of micro-financing, loans and savings groups
	WASH sector organisation	Conflicts can arise if standards are developed in isolation/without co-ordination between institutions	Could help identify roles and responsibilities of stakeholders and reduce confusion created by lack of co-ordination
	Approaches used to increase access	Decide role the standard will play – how much control is wanted, what are the key motivations for having one	Could reduce confusion created by lack of co-ordination
Nature	Soil and water Climate Environment	The type of technology which is most suited to use in specific areas	Trade-off between affordability and preference from a resilience/target achieving/ political point of view
Process and Device	Standards as constraints	No single standard will suit every household	May need to be a compromise on role of standard
	Standards and tacit knowledge	Informal standards create an established way. Can be difficult to persuade people to choose an alternative	May need to be a compromise on role of standard
	Changing standards	Changing standards can mean changing behaviour which takes time	Cannot expect a standard to have immediate results and make quick improvements
	Standards and innovation	Social learning and innovation, information needs to be presented in a useful way and made accessible	Standards can support decision making and shape local markets

2.6 Knowledge gap to be addressed

It is acknowledged that standards play a role in the sanitation system but as yet that role is viewed from a negative perspective where standards place constraints on progress. This is contrary to the role that a standard is supposed to play. Despite concerns about the constraints that standards can impose there is an acknowledgement from some authors that standards can play a more positive role in supporting efforts to increase access to household latrines and as such there have been suggestions to provide guidance on how to develop 'well-written' standards. It can be argued that nobody would want a standard that is not 'well-written'. However, the fact that standards for household latrines are perceived as a constraint on increasing access to latrines indicates that current standards are not well written or are not fit for purpose.

The most significant knowledge gap to be addressed by this research is the lack of clarity on what is meant by a 'well-written' standard for a household latrine, with a specific focus on Rwanda. There is a significant body of knowledge from international standard development organisations that outlines good principles for developing and using a standard in any context. Section 2.3.3 discussed that standards are not always developed by a single body in each country. Countries can have several standard making bodies who respond to the needs in different sectors using their specialist knowledge. Consequently, it can be expected that guidance on developing a standard for household latrines should be found within WASH sector literature. However, as highlighted by the literature review, it is currently lacking. Consequently, the main question addressed by this research will be;

'How to develop standards for household latrines in Rwanda?'

The literature review has highlighted the key challenges which may need to be considered when developing a standard for household latrines. The data collection and analysis sections of this study will identify which of those elements are the most relevant in the case of Rwanda and what that means for the development of a standard. Section 2.7 presents five concepts identified as being relevant to the research and a conceptual framework which provides the outline for an exploratory study.

2.7 Developing a conceptual framework

A conceptual framework helps the researcher to selectively identify the important features of the research problem and to highlight the perceived relationships between them (Robson, 2011, p.67; Miles and Huberman, 1994, p.18). It creates a 'tentative theory' of the phenomena under investigation (Maxwell, 2005, p. 33). A conceptual framework can be built on inputs including, previous research, pilot studies, a researchers own knowledge, relevant theories and intuition.

As a result of the literature review and using the principles of good standard development as a template, five key concepts have been identified which are considered to have a bearing on the development of a standard for household latrines. The principles of good

standard development discussed in section 2.3.3 were that the standards is developed through *consensus*, is *documented* and is *approved*. The concepts are defined as follows;

- Consensus: consensus between stakeholders on key concepts
- Role: the role of a standard and factors which effect its role
- Use: the use of a standard and factors which effect its use
- Regulation: the regulation of a standard and factors which effect it
- Development: the development of a standard and factors which influence it

The conceptual framework in Table 3 begins to construct the relationships between the five concepts identified and provides an outline for unbundling standards from the wider sanitation system and exploring stakeholder perceptions about them in more detail. The conceptual framework provides the outline for an exploratory study as it contains predominately 'how', 'why' and 'what' questions. This reflects previous practical training of the author and a desire to explore; in greater detail, long held questions.

In order to help answer the main research question, three sub questions will be used. The sub –questions are as follows:

1. How are standards viewed, discussed and presented in existing documents?
2. Is there a consensus between stakeholders in Rwanda about the need for a standard, the role it can play and how it can be used?
3. How does a standard for household latrines fit into the current situation in Rwanda?

The aim of this research is not to create a standard for household latrines, the focus of this research is the process behind developing a standard, not the standard itself. This is reflected in the three sub-questions which are designed to prompt an exploration of how standards operate within the Rwandan context. The purpose of this conceptual framework is to understand how a standard for a household latrine does function within the sanitation system of a country where a standard already exists and how a standard could function within the sanitation system where a standard does not currently exist. The conceptual framework will be used to determine the most appropriate data collection and analysis methods in chapter 3.

Table 3 Conceptual framework for this study

Concept	Consensus	Role	Use	Regulation	Development
Consensus		Do stakeholders consider role of standards differently?	Where should standards be used?	Levels of regulation?	What if views on standards are very different?
Role	What do stakeholders consider when developing a standard?		What role do existing standards play?	How are standards viewed?	What role do stakeholders want standards to play?
Use	Intended users?	What need do standards meet?		Are standards constraints?	Are informal standards known and recognised?
Regulation	Is regulation required?	Voluntary or mandatory?	How is the regulation done?		Where are standards found?
Development	Who is involved in the process?	Type of standard?	What do standards look like?	Process of monitoring or checking?	

To read the framework and see how different concepts interact with each other, choose two concepts to explore e.g. role and use. By reading down the role column, and across the use row the reader is led to the question ‘what need do standards meet’. The role of a standard and the way it will be used interact to shape the need to be met by the standard.

Concept	Consensus	Role
Consensus		Do stakeholders consider role of standards differently?
Role	What do stakeholders consider when developing a standard?	
Use	Intended users?	What need do standards meet?

2.8 Chapter summary

The first part of this chapter, sections 2.1 to 2.3 presented an overview of what standards are and how they are developed using information from key international standard making bodies including the British Standards Institute (BSI), the American National Standards Institute (ANSI) and the International Standardisation Organisation (ISO).

The second part of this chapter, section 2.4 combined discussions on standards and sanitation to consider how the sanitation system can influence the development of standards for household latrines and how developing standards for latrines could influence the sanitation system. The four key elements of a sanitation system are identified as society, nature, process and device (Winblad and Simpson-Hébert, 2004, p.6). The chapter concludes with the presentation of a conceptual framework which will be used in the subsequent chapters on research design, data collection and data analysis.

3 Methodology

3.1 Chapter outline

Research is one way of increasing the knowledge we, as society, have. The Frascati Manual defines research and experimental development as ‘creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications’ (OECD, 2002, p.30).

The approaches used to increase our ‘stock of knowledge’ (OECD, 2012, p.30) through research are directed by different research paradigms which should be understood and acknowledged by researchers so that each study can be informed by what we know philosophically. This in turn directs the research strategies and methods adopted in order to collect and analyse data needed for the study.

This chapter begins with an overview of research paradigms with a brief discussion on the different philosophical paradigms found in development studies research. Sections 3.5 onwards detail the research design process, including methods chosen for data collection and analysis, ethical considerations and a review of how the data collection was performed. Section 3.6 provides the background and context to the research location of Rwanda and identifies the researcher’s prior knowledge relevant to this study.

3.2 Research paradigms

Paradigms, or world views can be broadly defined as a set of beliefs which influence a researchers approach to their research (Bryman, 2012, p.630; Denzin and Lincoln, 2011, p.12; Creswell, 2007, p.19). These beliefs influence choices including, the problem, the paradigm used to guide the problem, the theoretical framework used, the process of data gathering and analysis, context, treatment of values within the research and the format for presentation of findings (Lincoln *et al*, 2011, p.99; Creswell, 2007, p.19).

The problem upon which the research question is based is at the heart of the knowledge creation process. Smyth and Morris (2007, p.423) argue that a weak epistemological base for research leads to a weak knowledge base for developing the research and conducting the field research, which in turn affects the knowledge created by the research. The ways in which paradigms can influence a researchers approach will be explored in greater depth using an example of two traditionally opposing paradigms, positivism and interpretivism presented in Table 4 and discussed in section 3.3.

3.3 Epistemology, ontology and the research process

Table 4 Overview of the differences between positivism and interpretivism

	Positivism	Interpretivism
Epistemological position	Methods from the natural sciences can be applied to study social reality	People and their institutions are fundamentally different to natural sciences. Researchers must interpret subjective meaning of social action
Ontological position	Belief in a single identifiable reality which can be measured and studied	Belief that reality is socially constructed and continually re-constructed by social actors so there is no single reality
Relationship to theory	Deduction Theory leads to hypotheses and testing. Purpose is to develop established laws or facts	Induction Observations and findings lead to theory development
Research design	Prescribed and fixed	Open and flexible
Process of data collection	Quantitative Grounded in 'hard sciences', standards based research Methods include: laboratory experiments and surveys	Qualitative Participant observation, ethnography, interviews, histories
Process of data analysis	Looking for 'cause and effect' linkages which can be generalised. Statistical analysis (with or without the use of computer software).	Data is generally presented as text and interpreted. Methods include, content analysis, thematic, narrative, conversational analysis, grounded theory
Understanding of context	Decontextualization – removing or ignoring possible effects of context	Understanding context and its interactions on the people or phenomena being studied is critical
Values	Researcher remains 'value free', distanced from the subject	Researcher acknowledges potential influence of values and bias on research outcomes

Table 4 gives a brief overview of the differences between positivism and interpretivism, which if considered on a linear scale would be at opposite ends. Two key concepts which underpin each paradigm are epistemology and ontology. Epistemology is the theory of how things can be known (Robson, 2011, p.525). In essence it means what claims can be made about the knowledge created through the research and is that regarded as acceptable knowledge within a given discipline (Bryman 2012 p.27; Creswell, 2007, p.16). Ontology is the theory about the type of fundamental entities that exist (Robson, 2011, p.529). Creswell (2007 p.17) explains it through the question 'what is the nature of reality?'. This defines for the researcher if the social world can be viewed in isolation from the actors within it or if the actors within it are continuously re-shaping reality (Bryman, 2012, p6).

Each paradigm makes assumptions about the relationship between theory and research, which consequently influences how the research is conducted, how the data is collected, analysed and understood. Positivism assumes that the social world can and should be

studied in the same way as the natural world (Bryman, 2012, p.28; Lincoln *et al*, 2011, p.99). It is assumed that there is a single reality in which social phenomena can be measured, studied and discussed as tangible objects in isolation from their context and the existence of social actors. This links to the concept of 'decontextualizing' the research so that there is no need to interact with the people or phenomena being studied. Consequently, the researcher is expected to remain value free and distanced from the research (Lincoln *et al*, 2011, p.99; Robson, 2011, p.19)

Quantitative research is based on measurement and quantification using scientific method, leading to the production of quantitative numerical data. Quantitative methods include the use of laboratory experiments where variables can be strictly controlled and surveys which can be used to establish quantifiable relationships between two or more variables. A deductive approach to the research is adopted in which the researcher will start with a theory, develop a hypothesis and test it, either, confirming, rejecting or modifying the original hypothesis.

Interpretivism is a direct contrast to positivism. It assumes that reality cannot exist independently of social actors and that it is continually being re-shaped by those actors. Interpretivism adopts a qualitative research process. Qualitative research focuses on human beings in social situations and tends to be non-numerical. Qualitative methods are used by researchers to collect qualitative data in context, which can include text, videos and visual images, which need to be interpreted by the researcher (Berg, 2007, p.304). The values and biases of the researcher therefore have the potential to influence the outcomes of the research and as such should be made explicit in the presentation of the research (Creswell, 2009, p.18). An inductive approach is adopted with a focus on building theory rather than theory testing.

There are many other paradigms which can be adopted by researchers which fall in between positivism and interpretivism. There can also be confusion and areas of overlap between each paradigm which can make identifying the epistemological position of an author challenging if it is not made explicit. In one example, Barkin (2003, p.334) claims that 'an argument can be made that most current constructivist theorists working in the united states are in fact liberal idealists'. The adoption and use of different paradigms has changed over time as paradigms 'interbreed' (Denzin and Lincoln, 2011 p.97). The boundaries between paradigms are becoming more blurred and there is a growing acceptance that researchers can use multiple compatible paradigms in their research (Dainty, 2008, p.8; Creswell, 2007, p.19) which can lead to the use of both quantitative and qualitative methods in the research design. Mixed method research will be discussed further in section 3.6.1.

3.4 Philosophical paradigms within development studies research

Sanitation, as a study discipline, sits within the field of Development Studies (also referred to as international development studies or third world development studies). 'Development Studies' is a multi-faceted, highly complex field of study with a number of philosophical

positions, academic disciplines, research approaches and available expertise. Development Studies is recognised as being cross – disciplinary, operating at the interface between social and physical sciences (Leach *et al*, 2008, p.733; Sumner and Tribe, 2008, p751; Harriss, 2002, p.494).

For the purpose of this overview, Development Studies is defined in broad terms as research and teaching which aims to improve people’s lives (Sumner, 2006, p.645). Development studies research can be based on a range of epistemological positions, influenced largely by the researchers understanding of what development studies is. Chambers (2008, p. xvi) states how ‘the transient fashions of development manifest not only in policies, words and concepts but also in methodologies’. It is unusual to find epistemological positions discussed in literature relating to development studies, however, sections 3.4.1 and 3.4.2 highlight specific authors who have entered into the debate and provides an overview of their views.

3.4.1 Positivism, relativism, post-positivism and constructivism

This section provides a brief overview of how different paradigms can relate to development studies and highlights how the choice of paradigm adopted is influenced by how the researcher views the purpose of development studies.

Sumner and Tribe (2008) discuss how three paradigms relate to development studies research. Historically, there was a tendency to consider the developing world as homogenous, with the understanding that economic development would lead to socio-economic growth as discussed in section 2.4.1. In this context, Sumner and Tribe (2008, p.755) argue that development studies could tend towards positivism as researchers searched for generalizable laws applicable across countries. Sumner and Tribe (2008, p.755) also argue that a position of relativism can be adopted when certain approaches to development studies are used as ‘instrumental points of departure’. For example, the use of participatory approaches as instruments for interpretation and critique in development studies research.

In order to reconcile these different epistemological positions in the cross-disciplinary context of development studies, Sumner and Tribe (2008, p.756) propose that post-positivism; which they refer to as a ‘humbler form of positivism’; could provide common epistemological ground for development studies and that knowledge claims from development studies research need not be closed and absolute. Based on this understanding, researchers from individual disciplines are encouraged to be more flexible in defining their boundaries, their expectations of research approaches and the type of knowledge claims which can be made in order to facilitate cross-discipline collaboration.

Wilson (2008, p.742) considers development in terms of the knowledge produced and describes how new approaches, like participatory development, which focus on cultural content and context turned the sector towards a constructivist epistemology during the 1990s. Harriss (2002, p.494) states that ‘research priorities should be set by the practical problems that development involves, more than by the puzzles that are generated out of

theoretical speculation'. Leach *et al* (2008, p.731) identify the focus of development studies as development which aims to 'influence change in progressive directions'. This focus on outcomes tends towards pragmatism which is the philosophical position held by the author and which is discussed further in section 3.4.2.

3.4.2 Pragmatism

Pragmatism is a philosophical position with a predominately American background. There are different variations of pragmatism (see Biesta, 2009; Campbell, 2007; Long, 2004; Cherryholmes, 1992 for discussions) but in general terms a pragmatist researcher is driven by the anticipated consequences of their research (Robson, 2011, p.28; Creswell, 2007, p.22; Cherryholmes, 1992, p.13). Pragmatists believe that scientific research (based on positivist beliefs) cannot be considered the only true reality of the world and the use of knowledge (its consequences) is an important component of pragmatist philosophy (Biesta, 2009, p.35; Rescher, 2005, p.354). Pragmatists understand that research takes place in context and that beliefs about reality are dependent on context and are continually changing (Creswell, 2007, p.23; Cherryholmes, 1994, p.16). Values are therefore critically important to pragmatic researchers (Robson, 2011, p.29; Cherryholmes, 1992, p.13).

Pragmatic research can use both qualitative and quantitative approaches, either separately or together in mixed method research (discussed further in section 3.6.1). For pragmatic researchers, this flexibility is seen as a key advantage in developing a research design based on the intended consequences of the research. This is generally referred to as the 'what works' approach (Denzin and Lincoln, 2011, p.247; Robson, 2011 p.171, Creswell, 2007, p.22). However, as cautioned by Robson (2011, p.171), researchers adopting a pragmatic approach must be careful not to adopt an 'anything goes' mentality but instead must ensure that their research has clarity of purpose, a well-developed conceptual framework and a feasible what or how research question. The importance of these elements in the research design process will be discussed in section 3.7.

3.5 Research location

When conducting research in the field there are several considerations which influence the choice of location. Arguably, the most important consideration is access. Without access, the proposed research cannot take place. Access can take several forms. In the first instance, in order to conduct research, it is often necessary to obtain a research visa or other form of permission, this may or may not require a previously established connection with a person, organisation or institution within the selected country. Ethical considerations and the future impacts of the intended research are critical in the planning process and may significantly affect whether or not certain types of research will be approved.

Having obtained the relevant permissions, the second level of access is to people, places and the information needed for the study. Gatekeepers are especially important in providing initial access to certain groups of people or types of information, without whom, the research may not be possible. There are also several practical considerations which need to be considered including personal safety, language barriers, travel to and transport around the country, time and financial constraints.

3.5.1 Background information on Rwanda

3.5.1.1 National context

Rwanda has been chosen as the research location. Rwanda is a commonwealth country located in the East Africa Region bordering Tanzania, Burundi, Democratic Republic of Congo and Uganda. Rwanda has a population of approximately 10.5 million people (National Institute of Statistics Rwanda, 2013, p.4). Rwanda is one of the most densely populated countries in Africa and the most densely populated country in East Africa with an average of 416 people per square kilometre. Kigali City exceeds 1500 people per sq.km (NISR, 2013, p.14). A majority of the population, 85.2%, live in rural areas. Percentage totals for those considered to be in poverty and extreme poverty are 44.6% and 24.2% respectively (NISR, 2012, p.22). Rwanda is divided into four geographically-based provinces, North, South, East, and West with the capital, Kigali City, considered separately. Figure 1 shows the different levels of national organisation. Decentralised governance is well established in Rwanda with local authorities and communities strongly encouraged to lead their own development and take an active role in the implementation of policies and programmes which influence them (Ministry of Health, 2009; Ministry of Local Government , 2008).

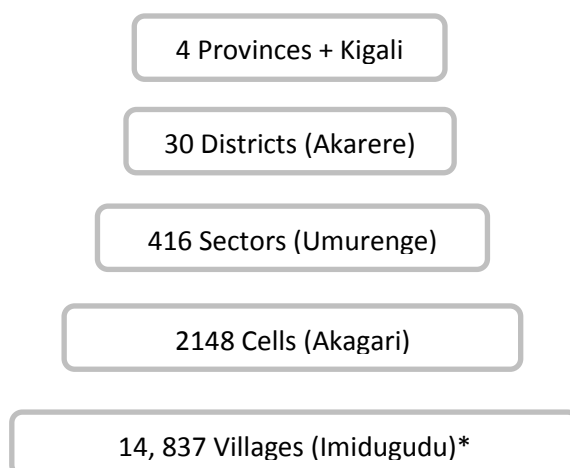


Figure 1 National organisation of Rwanda

(based on figures from NISR et al, 2010, p.2)

* Imidugudu is the plural form of Umudugudu which means village (singular)

3.5.1.2 Sanitation in Rwanda

According to preliminary figures from the national census conducted in 2012, 74.5% of households have access to improved sanitation (NISR, 2012, p.22). The original target for 2012 was 63% based on an initial baseline of 38% in 2006 (Government of Rwanda, 2013, p.8). The Government of Rwanda has set an ambitious target of achieving universal access to sanitation by 2017 under the Economic Development Poverty Reduction Strategy

(EDPRS) round two framework (Government of Rwanda, 2013, p.54). Table 5 shows more detailed percentage breakdowns of household access to sanitation based on figures from the most recently available Demographic and Health Survey (NISR *et al*, 2010, p.20).

Table 5 Percentage of households with access to sanitation facilities in Rwanda

Type of toilet/latrine facility	Households	
	Urban	Rural
Improved not shared facility		
Flush/pour flush to piped sewer system	3.1	0.1
Flush/pour flush to septic tank	0.3	0.0
Flush/pour flush to pit latrine	1.7	0.1
VIP	1.8	1.4
Pit latrine with slab	42.2	56.8
Composting toilet	0.1	0.4
Shared facility¹		
Flush/pour flush to piped sewer system	0.1	0.0
Flush/pour flush to septic tank	0.0	0.0
Flush/pour flush to pit latrine	0.0	0.0
VIP	1.2	0.3
Pit latrine with slab	36.7	12.8
Composting toilet	0.1	0.1
Non improved facility		
Flush/pour flush not to sewer/septic tank/pit latrine	0.3	0.4
Pit latrine without slab/open pit	10.7	25.1
Bucket	0.0	0.0
No facility/bush/field	0.9	1.5
Other	0.5	0.8
Totals	99.7	99.8

(based on figures from NISR *et al*, 2010, p.20)

¹Shared facility of an otherwise improved type

From the figures in Table 5 it can be seen that the most common type of facility in Rwanda is a pit latrine, with or without a slab. Open defecation, especially near households, is culturally unacceptable in Rwanda and whilst it does happen the practise is primarily limited to people defecating on their farm land during the working day when other facilities are not available. In these instances, a separate area is designated for each person, a shallow pit is dug and used until full when it is covered and a new area is designated. The WSP (2012b, p.2) makes the following estimates about the economic cost of poor sanitation in Rwanda;

- Annual cost of poor sanitation to national economy: 54 million United States Dollars (US\$)
- National economic loss as % of GDP: 0.9%
- Annual cost of open defecation: 3.9 million US\$
- Number of latrines needed to eliminate open defecation (approx.): 70,000

According to the figures in Table 5, in both urban and rural areas, toilet or latrine coverage is at almost 100%. However, this figure includes shared and unimproved latrines. The

quality of available data used to assess levels of coverage, especially for private household latrines has been criticised (Ministry of Infrastructure, 2013, p.9; Sano, 2013, p.3; WSP, 2012, p.17). However, the problem is acknowledged in the National Policy and Strategy for Water Supply and Sanitation Services (NPSWSSS) (MININFRA, 2010, p.7) and there are renewed attempts to harmonise the data being used, including the introduction of a Monitoring and Information System (MIS) for the sector (MININFRA, 2013, p.45).

Rwanda therefore presents an interesting case. Households have latrines, but in many cases they are not considered improved when the JMP definition of an improved latrine is considered. Therefore, the challenge is to move people up the sanitation ladder towards more improved technology choices. Households are recognised as the primary investors in latrines, whilst the government's role is promotion and education (MININFRA, 2010, p.21).

Improved technologies are available but they are considered expensive and out of reach for many households in rural areas (WSP, 2012, p.25; MININFRA, 2008, p.7). The National Strategic Plan on Sanitation states as a specific objective that there should be a 'definition of norms and standards at different levels (urban, semi-urban and rural) and ensure their compliance' and the activities 'definition of minimum standard for latrines' and 'development of sanitation guidelines for buildings' are given as priority areas (MININFRA, 2008, p.10).

This is supported by an action in the NPSWSSS which states that 'the joint sanitation programme shall promote systematic research and development of affordable hygienic onsite individual sanitary solutions, including the provision of manuals' (MININFRA, 2010, p. 96) and that the Rwanda Bureau of Standards (RBS) 'shall be involved in the standardization of sanitation technologies' (MININFRA, 2010, p.22). In 2011, 'Guidelines of Latrine Technologies Usable in Rwanda' were developed (MININFRA, 2011). At the time of the field research in May to August 2012 the document had not been officially published. The guidelines on latrine technologies are recent, available to study, developed by the government in consultation with other stakeholders and the stakeholders who participated in their creation were available to participate in this research.

In both the National Strategic Plan on Sanitation and the NPSWSSS the need to develop standards is recognised and actioned. However, in the standard operating procedures from UNICEF Rwanda which relate to a programme in the northern and western provinces of Rwanda it is stated that 'at present there are real limitations in the capacity of the water supply and sanitation sector to develop a set of national standards and codes of practice for infrastructure development works' (UNICEF, 2010, p.137). Developing a framework to support the standard development process for household latrines in Rwanda is one of the key outcomes of this research.

In practical terms, Rwanda is a small country so it is relatively easy to travel to the different provinces (and geological regions), nowhere is more than one days travel and many places can be visited within a day. The capital city, Kigali, is at the centre of Rwanda and most organisations operating in the WASH sector have a presence in the city. These are important considerations given the methods chosen for this study (discussed further in

section 3.7.3) which involve significant levels of researcher – participant interaction. Previous experience of working in Rwanda is discussed in section 3.5.2.

3.5.2 Acknowledgement of previous experience from Rwanda

The author has previous experience of living and working in Rwanda and the topic of this research has been developed in response to questions formulated during that time in Rwanda. According to Maxwell (2005, p.38) explicitly incorporating a researcher's identity and experience into the research has gained theoretical and philosophical support in recent times.

Having an established network in Rwanda eases issues related to access but it does not negate them. The research approval process for non-biomedical related studies is relatively recent in Rwanda, but it was still necessary to obtain research permission from the Directorate of Science, Technology and Research in the Ministry of Education. Personal networks are also fluid and dynamic, people change roles, positions and locations, so whilst it is beneficial to have a range of contacts in country it is also necessary to form new ones during the research process. By conducting research in a familiar environment the other practical considerations such as personal safety and language barriers are not removed but the researcher is more aware of the potential challenges and can be better prepared to deal with them. The field work in Rwanda was carried out over three months from May 2012 to August 2012.

3.6 Selecting research methods

The research question should '*define the project, set boundaries, give direction and define success*' (Robson, 2011 p.59). The research question is therefore central to the research design. Yin (2009, p.26) describes the research design as a '*logical plan for getting from here to there*'. Based on the research question, the research design should outline what data is relevant to the study, how that data can be collected and how it can be analysed to answer the original research question.

As discussed in section 3.3 there are two approaches to collecting data; quantitative and qualitative, both of which can be carried out from a range of philosophical positions (Barbour, 2008). Within both quantitative and qualitative approaches is a range of methods which can be used to collect different types of data. Quantitative methods include experiments and survey based methods such as, structured interviews, questionnaires and structured observation. Qualitative methods include interviews (both semi-structured and open), focus groups, ethnography and participant observation.

The choice of method should be dictated primarily by the research question, not the other way round (Robson, 2011, p.59; Yin, 2009, p.9; Hakim, 2000, p.11). As the purpose of this research is exploratory, any method could be used. Therefore, the aim of selecting a research method or methods is to avoid 'gross misfits' (Yin, 2009, p.8) where a different method would be more advantageous than the one selected. Yin (2009, p.8) adds two

subsequent considerations which are the required levels of control of behavioural events and whether the research is focussing on contemporary or historical events.

In conjunction with these overarching decisions, it is also important to consider the practicalities and constraints of conducting the research. These include, budget, time, location, levels of access required, researcher capabilities, size of research team, ethical considerations and other practical constraints such as language.

3.6.1 Mixed methods research

In addition to quantitative and qualitative research processes, mixed methods research is gaining recognition as the 'third' research approach. Mixed methods research combines both quantitative and qualitative approaches but there is an ongoing debate about a definition of mixed methods. Mixed methods can be used to address different aspects of the same research question or sub-questions or could be used at different stages of the research where one type of method is more appropriate than another. For example, qualitative methods can be used to help in the design of a large survey tool which is then used to collect quantitative data or qualitative methods can be used to explore and explain anomalous results from quantitative data collection. Tashakkori and Creswell (2007, p.4) identify some of the ways in which studies are considered mixed when utilising quantitative or qualitative approaches:

- 'Two types of research questions (with qualitative and quantitative approaches),
- The manner in which the research questions are developed (participatory vs. pre-planned),
- Two types of sampling procedures
- Two types of data collection procedures (e.g., focus groups and surveys),
- Two types of data (e.g., numerical and textual),
- Two types of data analysis (statistical and thematic),
- Two types of conclusions (e.g. objective and subjective)'

Overton and Dierman (2003, p.38) argue that development fieldwork often produces some quantitative data, even if the main focus of the study is based on qualitative data collection. One advantage of using multiple methods is that it allows for triangulation, described by Berg (2007, p.5) as 'multiple lines of sight directed towards the same point'. Each method provides a different view of the phenomena being studied which leads to a more substantive view of the overall picture. Triangulation is discussed further in section 3.7.2.

There are different levels of integration between the methods and subsequent analysis. In some cases, researchers may use mixed methods but then treat the quantitative and qualitative components as separate results and not integrate the findings (Bryman, 2007, p.10). Practical constraints on integration can include writing for different audiences, methodological preferences, research project structure and time available. Therefore, researchers must be clear about how the methods chosen can or cannot be integrated

within the context of their research and to what extent the methods may or may not contradict each other.

3.7 Research design

The research question is central to the design of the research. The research question for this study is '*How to develop standards for household latrines in Rwanda*'. The sub-questions are linked to the three research objectives as follows;

Sub-Question 1 and Research Objective 1

SQ1: How are standards viewed, discussed and presented in existing documents?

RO1: To understand what information on standards already exists, how that information is used, where it can be found, how it is communicated and what it looks like.

Sub-Question 2 and Research Objective 2

SQ2: Is there a consensus between stakeholders in Rwanda about the need for a standard, the role it can play and how it can be used?

RO2: To establish what levels of consensus exist between stakeholders in Rwanda and identify areas where gaining consensus could pose a particular challenge.

Sub-Question 3 and Research Objective 3

SQ3: How does a standard for household latrines fit into the current situation in Rwanda?

RO3: To understand stakeholder's perceptions on standards for household latrines and how a standard fits into the current sanitation system in Rwanda

Section 3.7.1 provides a general overview of the data collection and analysis methods which would be suitable for meeting these three research objectives. The methods selected for meeting each research objective are then discussed in greater detail in section 3.9 (sub sections 3.9.1 to 3.9.3).

3.7.1 An overview of data collection and analysis methods suitable for meeting the research objectives

Research objective 1

To understand what information on standards already exists, how that information is used, where it can be found, how it is communicated and what it looks like.

One of the knowledge gaps identified in chapter two (section 2.6) is that there has been no review of the different types of documents available which present information to households related to the construction of latrines. Section 2.4.3.1 identifies a number of sources where standards can be found including in policies, planning regulations, building

regulations, technical norms and standards, conventions, design manuals, laws, by-laws and standard bills of quantities.

The purpose of the review would be to analyse how standards are presented in these different documents with a view to gaining a greater understanding of how standards are perceived, whether there is a link to regulation and monitoring and if there are existing norms that can be identified across countries and regions. Barbour (2008, p.15) notes that a 'substantial amount' of qualitative research relies on pre-existing materials as sources of data. Documents are one such example of readily available data. Barbour (2008, p.16) also highlights that document analysis, when used as part of a mixed methods approach, can help to place interventions in the broader policy context. Placing this research on Rwanda in the wider context of sanitation in Sub-Saharan Africa is a strong motivation for using document analysis in this study.

Data collection for this research objective can be achieved through the collection and analysis of secondary sources. Documents form an important component of the data collection process (Yin, 2009, p.101; Creswell, 2007, p.129) however, it would not be feasible either financially or in terms of time to travel to each country and collect the available documents, therefore, this process will be completed as a desk study.

This research objective can be carried out on two levels. By using sources specific to Rwanda it will be possible to provide a detailed view of the Rwandan context which can be used in conjunction with the data collected under research objectives 2 and 3 in order to corroborate information gathered by other methods (Yin, 2009, p.103; Overton and Dierman, 2003, p.39). Using sources from other Sub-Saharan African countries will provide a more general overview of how standards are presented which will help to address the knowledge gap in WASH sector literature identified as a result of the literature review in chapter 2.

Yin (2009, p.103) cautions that any inferences made from documents should only be used as prompts for further investigation, not as definitive findings. The aim of this section of the study is to analyse the documents in relation to specific topics and to present that information in a consolidated format which adds depth to the existing body of knowledge and in doing so addresses a specific knowledge gap. Therefore, content analysis using a pre-determined framework of themes and sub-themes will be used to categorize the different phenomena of interest within each document (Bryman, 2012, p.579).

Research objective 2

To establish what levels of consensus exist between stakeholders in Rwanda and identify areas where gaining consensus could pose a particular challenge.

The importance of developing consensus during the development of a standard was discussed in chapter two (section 2.3.4). Establishing levels of consensus can be achieved through a number of methods. A survey could be used to elicit opinions about what influences standards or interviews could be conducted with different stakeholders.

However, there are also group based methods which can be considered. Two of the most common methods are Nominal Group Technique (NGT) and the Delphi Method.

Nominal Group Technique is a structured decision making technique using experts. A group of experts with specific knowledge of the study topic generate ideas individually, share and debate all the ideas generated with the group and then work individually again to refine or revise their ideas which are then aggregated to present a group view (Graefe and Armstrong, 2011, p.185; Robson, 2011, p.364). Traditionally the group phase would take place as a face-to face meeting, however, due to the difficulties of convening experts in a single location, the use of computer-based meeting platforms is increasing (Lago *et al*, 2007, p.278).

The Delphi Method is also a structured decision making technique using experts (Dalkey and Helmer, 1963, p.458). The approach uses questionnaires delivered in rounds to an expert panel. During the process the experts do not meet, all questionnaires are completed anonymously. Methods of analysing the Delphi Method will be discussed in greater detail in section 3.9.2.

Research objective 3

To understand stakeholder's perceptions on standards for household latrines and how a standard fits into the current sanitation system in Rwanda.

Quantitative and qualitative methods could both be used to collect data for this portion of the study. As discussed in section 3.4.2, researchers who adopt a pragmatic view of research can be flexible in their choice of methods. In terms of quantitative methods, the use of experiments would not be appropriate for meeting the research objective but a survey based method could be used. For qualitative methods, interviews and or focus groups would be the most appropriate choices rather than the use of ethnographies or narrative methods, in order to allow the researcher to focus on topics related specifically to the research objective.

Survey methods include the use of questionnaires and structured interviews. Surveys can be used to measure a wide range of characteristics, opinions and attitudes (Robson, 2011, p.242; May, 1993, p.65). Where resources allow, surveys can be administered to a total population but it is more common to use samples as representatives of the total population. The use of surveys would represent a fixed research design as there is no flexibility in either the administration or analysis process. Data collected from survey methods would be numeric and would therefore be analysed statistically.

Interviews as qualitative methods can take three main forms; semi-structured, un-structured and group interviews (also known as focus groups) (Bryman, 2012, p.471; Robson, 2011, p.279; May, 1993, p.92). Semi-structured interviews are used to elicit responses to fairly specific topics. The interviewer usually works from a list of questions but there is flexibility to modify questions, ask new ones or probe further into answers as the interview progresses (Bryman, 2012, p.478; May, 1993, p.93). The interviewee has a great deal of flexibility in how they choose to reply to questions. Bryman (2012, p.471) highlights

that semi-structured interviews are useful in showing how the interviewee understands the topic, what they view as important and how they frame the issue.

Un-structured interviews are similar to conversations where the interviewer may ask an initial question and then follow up points as they come up during the interview. The interviewee can respond freely to the question in any way they choose which can entail moving away from the original topic. May (1993, p.94) considers the discovery of individuals interpretations of meanings attributed to different events to be the most important benefit of this approach.

Focus groups or group interviews can be based on structured, semi-structured or un-structured interview methods. The size of group is debated but numbers typically range from 6 to 12 participants and a moderator or facilitator (Robson, 2011, p.295; May, 1993, p.94). Focus groups are beneficial in eliciting views from people who may not feel comfortable participating in one-to-one interviewing and in some cases can support the discussion of difficult topics which people feel more comfortable addressing as a group (Barbour, 2008, p.48). However, good facilitation requires experience and individual responses get lost within the group context so it is more difficult to follow up individual views.

Semi-structured, un-structured and focus group interviews result in text based data which can be analysed in a number of ways including grounded theory, analytic induction, thematic coding, content analysis and narrative analysis.

Content analysis is considered a quasi-statistical approach in which categories are established and the number of instances when each category appears in the text is counted (Robson, 2011, p.467; Silverman, 2011, p.64). Thematic coding is a useful approach for reducing large amounts of unorganised qualitative data into more discrete categories. During an interview, several topics may be discussed, by applying codes to sections of text and then grouping similar codes into themes it is possible to break up each interview into its thematic groups. Codes are developed by the researcher to represent topics of interest within the text. The themes developed can then be used for further data analysis or interpretation (Robson, 2011 p.476; Maxwell, 2005, p.96).

Narrative analysis is most commonly used for data which focuses on people's interpretations of phenomena being studied, through life histories for example. The focus of this study is the process of developing standards rather than people's interpretations of it so narrative analysis would not be a suitable approach to data analysis in this research. Analytic induction requires a hypothesis to analyse against and grounded theory builds a theoretical framework through the process of data collection and analysis which leads onto the development and testing of a hypothesis (Bryman, 2012, p.567; Robson, 2011, p.326). Both analytic induction and grounded theory are not suitable methods for analysing the data in this study. The nature of this research is exploratory so there is no hypothesis to test through analytic induction and the development of a conceptual framework to define the boundaries of the data collection process is not compatible with a grounded theory approach.

3.7.2 Reliability and validity in research designs

Reliability and validity are both closely associated with quantitative research conducted from a positivist perspective. Reliability is concerned with consistency in measuring and validity is concerned with whether the indicator used to measure a concept really does measure that concept or not (Bryman, 2012, p.169). Qualitative research does not aim to measure concepts in the same way as quantitative research, therefore, the use of these traditional views of reliability and validity in qualitative research is questioned. Creswell (2007, p.202) states that 'many perspectives exist regarding the importance of validation in qualitative research, the definition of it, terms to describe it and procedures for establishing it'. Instead of using reliability and validity, Creswell (2007, p.208) outlines eight strategies for validation which can be adopted by qualitative researchers. These are; prolonged engagement in the field; triangulation; peer-review and de-briefing; negative case analysis; clarifying researcher bias from the outset; member checking; rich thick description and external audit. Some of the strategies are more relevant to specific approaches than others, for example, prolonged engagement in the field helps to give ethnographic research validity but time spent working in Rwanda prior to conducting this research is also useful in building trust with participants and being aware of likely cases of misinformation which can be verified.

For the methods discussed in section 3.7.1 the key strategies identified would be triangulation, clarifying researcher bias, member checking and rich thick description. Triangulation was discussed briefly in section 3.6.1 in relation to mixed methods research. There are different types of triangulation but the predominant aim is to produce more knowledge at different levels than could be achieved through a single approach (Flick, 2007, p. 41).

Qualitative researchers accept and acknowledge the role of a researcher's values and possible biases and the potential influences they could have on the research. Mellor (2007, p.191) highlights that researchers bring their own disciplinary knowledge, cultural knowledge, beliefs and political framework to their research so framing the research within a wider context is beneficial for reducing the influences of biases. Reflexivity is an important part of qualitative research, where the researcher openly critiques the results based on the research methods used and considers the influence that the study may have on participants, readers and the phenomena being studied (Dainty, 2008,p.8; Creswell, 2007, p.179).

Member checking or respondent validation involves asking the participants to review and provide opinions on the data collected (e.g. in the form of interview transcriptions), the analysis, interpretations and conclusions (Creswell, 2007, p.208; Maxwell, 2005, p.111).

Rich thick description or rich data provides detail to the study and contributes to the overall picture and context in which the research is taking place (Maxwell, 2005, p.110). The collection of detailed data also assists in the reliability of qualitative research, for example, taking and keeping good field notes, including transcriptions (Creswell, 2007, p.209). Miles and Huberman (1994 p.242) discuss the importance of recording 'decision rules'

throughout the data analysis process. Decision rules represent the ways in which data is analysed and interpreted so it is important to ensure that a researchers decision rules do not change during the study. Using memos is also an important part of qualitative data analysis because they can both capture and stimulate analytic thinking about the data (Maxwell, 2005, p.96).

The choice of research methods directly influences the steps which need to be taken in order to maximise reliability and validity in the research process. The three research objectives require the use of different methods for data collection and analysis. Based on the understanding of mixed methods research presented by Tashakkori and Creswell (2007, p.4) in section 3.6.1, this research is adopting a mixed methods approach and a flexible design because it combines three types of data collection procedures, two types of data (numerical and textual) and three types of data analysis. Section 3.7.3 includes Table 5 which provides a brief summary of the data collection and analysis methods chosen for this study. The methods are elaborated further in section 3.9 which discusses the data collection process in more detail.

3.7.3 Research and analytical methods chosen

Table 6 Overview of research methods chosen

Research objective	Aim	Methods selected	Key benefits of methods	Researcher's experience using method	Reliability and validity checks	Potential challenges
1	Review of documents	Content analysis using a deductive approach	<ul style="list-style-type: none"> • Allows for comparison between documents of different types • Provides a framework to prevent over-analysis of too many phenomena 	Experience gained through use in previous academic and non-academic assignments	Development and use of a framework for analysis	Availability of documents on-line
2	Explore levels of consensus amongst stakeholders	Delphi method using qualitative content analysis and Kendalls Coefficient of Concordance (W)	<ul style="list-style-type: none"> • High levels of involvement from participants • No requirements for a group meeting • Anonymity of participants 	No previous experience	<ul style="list-style-type: none"> • Member checking of results • Statistical tests for consensus 	<ul style="list-style-type: none"> • Recruitment of experts • Drop-out rates between rounds
3	Elicit stakeholder views of standards	Semi-structured interviews analysed with qualitative content analysis using an inductive approach	<ul style="list-style-type: none"> • Allows interviewer to focus questions on pre-defined topic • Can focus on individual views • Flexibility in interview process 	Experience gained through use in previous academic and non-academic assignments	<ul style="list-style-type: none"> • Recording of interviews (where possible) • Member checking of transcripts • Development and use of coding scheme and memos (or decision rules) 	Availability and or willingness of participants

3.8 Research ethics

Ethical principles are the foundation of good research practice and should be present in each stage of the study. The issues to be considered in this study are informed consent, anonymity and confidentiality. In addition, Scheyvens *et al* (2003, p.139) states that when conducting fieldwork in developing countries there is a need for the research to be mutually beneficial, sensitive and respectful. This argument relates directly to the issues discussed in section 3.4 about the purpose of development studies and through it, the purpose of development based research. Given that this study is pragmatic the idea that the research should be mutually beneficial is an important consideration.

In order to conduct research in Rwanda a research permit is required. During this process it is necessary to establish contact with an organisation or institution in Rwanda to whom the research is most relevant. In this case, the organisation was the Ministry of Infrastructure. The application also requires full details of the intended research including location, budget, timeframe, staffing and ethical considerations. The research permit should be presented to all participants on first contact but there is no obligation for people to participate in the research.

3.8.1 Informed consent and the right to withdraw

All participants were fully briefed on the objectives of the research, how the data was being collected and stored, how it would be used in the thesis, where the thesis would be available once completed and that they had a right to withdraw from the research at any time. There was no need for any type of deception in this research and vulnerable groups were not actively sought as participants. Participants were informed that they could ask questions at any time throughout the research process and local contact details for the researcher were given to each participant.

For the Delphi process and the interviews, participants were informed of the anticipated time required. For the semi-structured interviews, participants were asked for permission to make an audio recording. If an audio recording was not permitted, participants were asked permission to take written notes. For interviews conducted in Kinyarwanda using a translator, she also presented her 'credentials' and her role in the research, as is expected by local customs.

3.8.2 Anonymity and confidentiality

All participants were assured of their right to anonymity and it was explained that there would be no personal identifiers used in any publications written as a result of this research. A small number of participants indicated that they would be happy to be identified but the majority were pleased that anonymity was the default option. All transcripts, notes and audio recordings are stored using numeric identifiers which are known only to the researcher, they are stored on a password protected computer and will be destroyed within six years of completion.

The dataset for this study comprises; an analysis of documents; questionnaires from the Delphi Method with subsequent statistical analysis and audio recordings, notes and transcriptions from the semi-structured interviews with subsequent analysis. There is also a research diary kept by the researcher and some photographs. The documents used for the content analysis section are all already in the public domain. Therefore, whilst they form part of the dataset for this study, they do not need to be destroyed.

3.8.3 Sensitivity, respect and dissemination

Immediately after arriving in country, a courtesy call was made to the Ministry of Infrastructure and to the Ministry of Education to inform them that I was in country ready to conduct the research. This research relied on the assistance of 'gatekeepers' at different levels. In the first week there were courtesy calls to gatekeepers at the central level, who then provided access to additional gatekeepers at district or village level. Before travelling to a field site, arrangements were made with local gatekeepers and a courtesy call was made to the district office in each location to present my credentials. For participants from communities, further permission was sought from local leaders (Village or Cell leaders). National holidays were respected, appropriate clothing was worn and customary greetings were always used.

A copy of the thesis is to be given to the Ministry of Education and the Ministry of Infrastructure upon completion. The Delphi method includes the preparation of a report summarising the findings which was distributed to expert participants in January 2013.

3.9 Data Collection and analysis

3.9.1. Document analysis

3.9.1.1 Document collection

Documents of interest for this section included handbooks, manuals, design guidelines, technical specifications, policies and strategies, local by-laws, building or planning regulations which made reference to standards for household latrines. As discussed in section 2.3.1, the term standard is used to refer to specifications, methods, guides, vocabulary and codes of practice. Therefore, there was a wide range of documents to be collected. Locating these documents involved searches of all the online libraries and databases for organisations involved in sanitation activities in developing countries including; World Bank, African Development Bank, IWA, IRC, SuSanA, United Nations, WEDC, SEI, Wateraid, WSSCC.

National institutions where these types of documents could be found and which have a web presence were also searched, for example, government ministries with responsibility for health, infrastructure, water, planning or regulation, local NGOs and regional organisations. Where documents or websites made reference to the availability of other documents these links were followed up. A total of 66 documents from 17 countries were analysed.

3.9.1.2 Analysis process

There are a range of qualitative analytic strategies available for documents (Miller and Alvarado, 2005, p.350). The types of documents collected and the information within each varies considerably, therefore, a deductive approach to the analysis was adopted, using a pre-determined template structure. The purpose of this review was to analyse how standards are presented in these different documents with a view to gaining a greater understanding of how standards are perceived. The aim of using a template was to make it easier to compare specific themes within the documents. These themes were identified by the researcher as being particularly relevant to the research question based on the literature review and conceptual framework in Chapter 2 and on experiential knowledge.

The first pass of the documents was used to identify those with only a passing reference to standards or those which only made reference to standards for water quality. Documents which only made reference to standards for the water supply and sanitation sector as a whole were not included in this review because it was not possible to determine whether or not standards would be applied to latrines. The documents were divided into different categories according to their type allowing comparisons to be made between similar types of documents.

3.9.1.3 Limitations of the method

By completing this section as a desk study using documents sourced primarily from organisations with a web presence, there will be a bias in favour of national or regional

organisations in countries which have greater access to internet services and connectivity. Older documents, documents developed by smaller organisations, e.g. local NGOs, with limited web presence and documents that deal with specific areas e.g. bylaws are less frequently available online. In some cases the links to documents were broken, or documents were listed as being published but were unavailable online. Limiting the analysis to documents written in English, the researcher's primary language was a practical consideration, due to the costs involved in translation but it precludes the inclusion of documents from countries where English is not a national language.

3.9.1.4 Critique of the method

In some cases it was difficult to identify when documents were making reference to standards for latrines and when they were referring to standards for sanitation, including solid and liquid waste more generally. In these cases, where multiple elements of sanitation were bundled together, references to standards were not included in the analysis template as the researcher did not want to bias the results by inferring that the standards discussed would be applicable to household latrines.

The level of detail found in some of the documents provides a rich picture of national sanitation generally and household latrines in particular but in order to make the documents comparable much of the contextual data is overlooked in favour of the information required by the template. Document analysis is also a time consuming process. Documents ranged in length from a few pages to over 150 pages. However, using a template is a valuable tool in the process as it allows the researcher to focus on the specific information required in order to allow comparisons.

3.9.2 The Delphi Method

3.9.2.1 History of the Delphi Method

The Delphi method was developed by The RAND Corporation (Santa Monica, California) as a technique for obtaining 'the most reliable consensus of opinion of a group of experts' (Dalkey and Helmer, 1963, p.458). The Delphi Method is described by Linstone and Turoff (1975, p.3) as 'a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem'. The benefit of using a group communication process is the diversity of opinions which can be included. Group communication also means that the chances of overlooking an important element of the question being studied are minimised (Pill, 1971, p.57).

The Delphi method was originally used as a forecasting tool but has been adapted and modified since its creation and there are now several versions in use across different sectors including planning (including policy decisions), business analysis, health, risk analysis and education (Linstone and Turoff, 1975). Mullen (2003, p.38) provides an extensive list of the different types of Delphi study and the different names given to the method. Using the Delphi method in the water sanitation and hygiene sector is unusual, which gives this study a novel approach.

Although there are similarities between the designs of different Delphi studies there is no universally recognised format. Mullen (2003, p.37) states that 'many authors have attempted to define the one "true" Delphi. Although often contradicting each other, many dismiss studies that deviate from their prescribed path as not being true Delphis'. Linstone and Turoff (1975, p.3) state 'there are many different views on what are the "proper," "appropriate," "best," and/or "useful" procedures for accomplishing the various specific aspects of Delphi'. The aim of the researcher is to structure the group communication in such a way that they obtain a 'useful result for their objective' (Linstone and Turoff, 1975, p.3). Gordon and Pease (2006, p.322) support this by stating that 'the value of the Delphi method rests with the ideas it generates'.

Parts of the process that are agreed upon are the use of questionnaires, participation of experts (known as the expert panel), anonymity of participants, feedback of information between rounds and the opportunity to confirm or modify opinions throughout the process. Anonymity is considered as an important element because it reduces the effect of dominant individuals within the group (Robson, 2011, p.295; Pill, 1971, p.57).

3.9.2.2 Selecting the expert panel

Selecting the expert panel is one of the critical stages of the process. Experts are selected based on their knowledge of the nature and purpose of the questions being asked. Random sampling is therefore uncommon. Defining who is an 'expert' can be the first challenge. 'Expertise' can be assessed on any number of parameters, including years of experience, academic qualifications, notoriety or visibility in the field to name a few.

In Delphi's which seek consensus as an outcome (e.g. the original version of Delphi) homogeneous groups of experts are preferred. In Delphi's where consensus is not sought as an outcome (e.g. in a Policy Delphi) it is more common to form a group of experts with a range of possible views. The Policy Delphi originally described by Turoff (1975, p.80) states that the process 'seeks to generate the strongest possible opposing views on the potential resolutions of a major policy issue'. In these circumstances consensus may be actively inhibited.

The overall purpose of this research is exploratory and the purpose of this second research objective is to explore if there is consensus between stakeholders on the influences that can affect the process of developing a standard. Therefore, the aim of this Delphi exercise is to gather the views of as many different types of expert as possible with no efforts made to force a consensus amongst the expert panel. However, if a consensus develops naturally it will not be rejected.

The term 'expert' can be defined to include almost anyone. Pill (1971, p.58) defines an expert as 'anyone who can contribute relevant inputs'. Glaser and Laudel (2009, p.117) define experts as people who possess 'special knowledge' of the phenomenon being researched noting that 'expert roles in social settings are not limited to the professionals'. For the purposes of this Delphi, an expert is defined in these inclusive terms.

3.9.2.3 Criteria for the expert panel

After identifying a list of possible participants from Rwanda based on existing knowledge, the participants were placed into stakeholder groups to ensure that no groups were missed out. For example, if only participants from the Rwanda WASH sector were considered there would be no representation from the Rwanda Bureau of Standards (RBS) which comes under the national institute group. Table 7 outlines the stakeholder groups present in Rwanda and the potential experts which could belong to each group.

Table 7 Stakeholder groups and potential experts

Stakeholder group	Potential experts
Academia	Academic with experience in environmental health, community health, sanitary, environmental, civil or public engineering
Community health representatives	Community Health Workers Umudugudu leaders Community Health Club members WASH committee members
Builders/masons	Local builders or masons (those with formal training tend to call themselves builders, those without tend to call themselves masons)
Donor organisations	Project co-ordinators Engineers Officers (environmental health, WASH)
Government	Directors Engineers Advisors Project lead/co-ordinators
National Institutes	Directors Officers Heads of department
NGOs	Chairperson Officers Project co-ordinators
Private sector	Consultants Companies

Experts were selected for the panel based on the following criteria, with each criterion having the same merit:

1. A person or organisation mentioned by name (or position title) in a document from the Rwandan watsan sector or written about the Rwandan watsan sector (examples include; a government representative quoted in a report; academic research papers).
2. Author, co-author or contributor to a document or report from the Rwandan watsan sector or written about the Rwandan watsan sector (examples include; a newsletter from an NGO, a project review)
3. Some form of specialised knowledge related to sanitation or standards in Rwanda e.g. sanitation as a business, building latrines, WASH education initiatives.

In order to make the panel as inclusive as possible it was only necessary to meet one of the selection criteria. Some experts with greater experience could be recruited under any of the three criteria, others were recruited specifically for their specialist knowledge in one area. The second challenge regarding the selection of the expert panel is deciding on an appropriate number of participants.

3.9.2.4 Expert panel size

There are no fixed specifications which determine the size of a panel and recommendations vary considerably from single figures up to hundreds. Turoff (1975, p.82) describes a larger number of participants as being 'in the area of 20 or more' but groups could go up to 50 people. Frewer et al (2011, p.1518) conducted a study using an initial pool of 1931 experts, with 272 going on to complete the first round. The Delphi process is prone to experts dropping out between rounds. Aichozler (2009, p.262) recommends that there should be at least 10 experts remaining after drop outs. Loo (2002, p.765) recommends that the following criteria need to be taken into account; homogeneity of group, complexity of the problem, range of expertise needed to address the problem and the purposes of the study, but he does not give an indication of how these criteria influence the group size.

The aim of selecting the panel for this research was to focus on experts who have specific experience of the sanitation sector in Rwanda, rather than those with predominately water supply based experience. Nationality was also taken into account with the aim to recruit as many Rwandan nationals to the panel as possible as opposed to international staff. Of the 35 experts who agreed to take part just one was an international member of staff but they had over three years of experience in the Rwandan WASH sector and were recruited under all three selection criteria. However, in the end, this expert dropped out of the process during the first round leaving an entirely national panel. As discussed in section 3.5, access to participants willing to take part in the research is an important aspect of research design. Some of the potential experts identified in Table 7 were already personally known to the researcher and were therefore easier to contact. Community health experts and building experts who had experience of building latrines could only be identified once in country with the assistance of gatekeepers, as discussed in section 3.5.

The aim of the researcher was to find up to 40 participants, which was considered a manageable number given the resources available for this research. For those based at the community level the aim was to find participants from the different provinces (north, south, east and west) as each province has different geological features, which have the potential to influence latrine design, as discussed in section 2.4.2. The north and north west are characterised by hard volcanic rock which makes digging difficult and expensive. The west and south west have a combination soil of sand, clay and silt so digging is relatively easy and the pits are stable, but in some areas the bedrock is only 3m below ground level which makes it more difficult to dig deeper pits. In the south eastern and southern regions the soil structure is stable but the area has several rivers and large wetlands leading to a higher water table than in other parts of the country. In the central and eastern regions the soil structure is about 70% silt which makes digging very easy but the pits are unstable and prone to collapse (MININFRA, 2011, p.20).

Due to the large number of different stakeholder groups represented in the panel and the small number of experts from each group, it was decided to maintain the panel as a single group and assess the levels of consensus of the whole group rather than dividing the stakeholders into different groups and then assessing levels of consensus between the groups. There are practical considerations in increasing the panel size, especially when using a pen and paper study as opposed to a computer based one, but a larger panel size that allows for intra-expert group comparisons could potentially allow for an assessment of expert biases. For example, it may become possible to see if health professionals are making similar contributions to each other but different contributions to those from engineering professions. This is an additional level of analysis but may be useful for researchers considering larger studies. There is no such thing as the 'perfect' panel but by aiming to create a balanced panel with representatives from all the stakeholder groups the effects of one group biasing the results are reduced.

3.9.2.5 Anonymity for the experts

One of the key reasons why the Delphi method was chosen over Nominal Group Technique (discussed in section 3.7.1) is the fact that participants remain anonymous to each other. This is particularly useful in groups where there are significant power differences. In Rwanda the term 'big man' is used to refer to people in positions of power or denotes a certain social status relative to others in the same area. The term does not necessarily just apply to politicians. The 'big-man' in the village could be the one who owns a car or a brick built house. There is a natural deference to a 'big-man' and there can be unwillingness to publically disagree with a person in a higher social position.

Anonymity does not guarantee that participants feel completely free to express their opinions, it is still possible for participants to try and 'guess' what the researcher wants and to answer accordingly. The extent to which this happened in this research is not known. The researcher never attempted to place herself in a position of power and always spoke in terms of how the participants were assisting her with the research. Time was taken to build a rapport with participants and the community representatives especially appreciated the multiple visits to complete the different rounds of questionnaires. When seeing their responses appearing in the later rounds they said "we said that" or "yes, very important". Overall it is felt that anonymity was a useful factor during the process.

3.9.2.6 Recruiting the experts

Experts already known to the researcher were contacted via email and telephone to discuss the research. In cases where the expert was not identified but the organisation was known a meeting was arranged with the organisation to identify an expert who could participate. For the community representatives and builders, initial contact was made through local gatekeepers and an appointment was made to meet and discuss the research with the assistance of a translator. Informal conversations were had with over 60 potential participants. Once a tentative agreement to participate was received, a participation information sheet was sent, following which a formal invitation to participate was given. A total of 40 invitations were given to experts, 35 of whom subsequently confirmed their

agreement to take part in the research. Table 8 shows the number of participants recruited in each group and shows the selection criteria through which experts were qualified to be invited.

The selection criteria presented in section 2.9.2.3 are summarised as follows;

1. A named person in a document from the Rwandan watsan sector or written about the Rwandan watsan sector
2. An author of a document from the Rwandan watsan sector or written about the Rwandan watsan sector
3. A person with specialised knowledge related to sanitation or standards in Rwanda

Table 8 Participants recruited for the Delphi study by stakeholder group

Stakeholder group	Number of invitation to participate sent	Selection criteria met (1,2, 3 or all)	Participation agreed
Academia	2	1&3 (for both experts)	1
Builders	4	3 (for all 4 experts)	4
Community representative	4	3 (for all 4 experts)	4
Donor	6	All (for 2 experts) 1&3 (for 4 experts)	6
Government	8	All (for 1 expert) 1&3 (for 7 experts)	7
National institute	4	1&3 (for all 4 experts)	2
NGO	6	1 & 3 (for 3 experts) All (for 3 experts)	5
Private sector	6	All (for 1 expert) 1&3 (for 3 experts) 3 (for 2 experts)	6
Total	40	40	35

A majority of the experts were recruited under selection criteria 1 and 3. The number of sector related reports and documents attributed to specific authors is very limited, primarily because a majority of them are published under the name of the organisation or institution for which they were written rather than a named author. Experts from academia, national institutes and builders were the hardest groups to recruit. Recruiting the community representatives and builders required the efforts of several gatekeepers and would not have been possible without them. The number of government representatives recruited was initially higher than any other group, primarily because many of the key contacts for WASH in Rwanda (recruited under selection criteria 1) are government staff. However, they do represent a wide range of projects working in different geographical zones. Given that there was no obligation to participate people were not asked for a reason why they did not want to take part but when volunteered, the reason for not wishing to participate was always a lack of time.

3.9.2.7 Designing the process

Linstone and Turoff (1975, p.3) state that 'if anything is "true" about Delphi today, it is that in its design and use Delphi is more of an art than a science'. This is due to the fact that there is no universally accepted approach for using the Delphi Method. This study was

designed to be completed in a maximum of three rounds. The reason for this decision was primarily due to concerns over drop-out rates if the exercise continued for too long. Jilison *et al* (1975, p.132) note that there is usually a decrease in response rates for the second round of a Delphi study. Once an expert has dropped out, they are not able to re-join in later rounds. There were also practical considerations in terms of time and financial resources.

Before sending out the first questionnaire, there were several practical factors to consider. Rwanda has three officially recognised languages, Kinyarwanda, English and French. It was decided that the questionnaires would be made available in both Kinyarwanda and English but that further translation into French would be unnecessarily costly. Whilst the researcher has some knowledge of spoken Kinyarwanda, her written and reading skills are severely limited, therefore, all questionnaires completed in Kinyarwanda were translated back into English for analysis.

There are several ways of delivering and receiving back the questionnaires. A web-based application can be used, they can be emailed as word documents and emailed back or can be printed and either posted, faxed or hand delivered. There are also examples of researchers using interviewers to assist experts in completing the questionnaires (Mullen, 2003, p.45). The benefits of a web-based application are; that the responses to the questionnaires can reach the researcher quickly (once completed) and the web-based programme can be designed to prevent the incorrect completion of a questionnaire. For example, if the question says select five items and the respondent only selects four the computer can prompt the respondent to select another one before allowing them to proceed. However, not all of the experts in this study have access to a computer or the internet. Therefore, this approach was not used. An email-paper based system was adopted instead.

Questionnaires were delivered through a combination of email, hand delivery and face to face interviews as requested by each expert. The inclusion of face to face interviews had financial implications in terms of travelling and translation but it was an important part of the process to ensure that the panel could be as representative as possible. Community health workers and builders were assisted in completing the questionnaires. In all cases, the researcher was the one to travel to the expert to make sure that participation in the research did not cause people to incur any costs. Over half of the questionnaires in all rounds were completed on paper. Including community health workers and builders in the panel added significant costs to conducting the research due to the amount of travel required to each location. However, this was accounted for in the fieldwork budget and did not cause any problems during the field research. Throughout section 2.3.5, the importance of including users in the standard development process is strongly emphasised. The importance of including community voices in the design and implementation of development initiatives and activities is also strongly supported by literature from the development sector.

Prior to sending the first questionnaire to the whole panel, three experts were asked to complete the questionnaire and to provide comments on length, time taken, ease of

understanding and overall acceptability. As a result of the feedback, minor modifications were made to the wording of the questions. The questionnaires were kept short so that it would be possible to complete them in 25 to 30 minutes. The translated text for the participant information sheet and first round questionnaire were also sent to two additional translators with a request for comments on the acceptability of the translation. Several changes to the translated text were made until the translators were in agreement.

Round one

The questions for round one were based on the two main parameters used throughout the discussions in chapter 2; what influences standards and what can standards influence (see section 2.7). Open ended questions were used to capture as much information from the experts as possible. Loos (2002, p.765) refers to this approach as allowing panellists to 'speak in their own words'. If the first round is designed to be more like a survey (quantitative) based on categories which the researcher deems to be the most important, participants have a smaller role in shaping the study and 'setting the agenda' (Mullen, 2003, p.49).

In accordance with the protocol presented by Schmidt (1997), the panel were asked for a relatively high number of responses to the questions in order to capture as many ideas as possible. Participants were asked to list at least six responses and were asked to give a short description or definition in order to clarify their point and to highlight if the same idea was being expressed in different ways (Schmidt, 1997, p.769). The responses to each question in round one were consolidated into single lists. Items appearing multiple times in response to the same question were only listed once.

Round two

One of the challenges of doing a qualitative first round is that the researcher is not always certain of what type of information they are going to receive and in what quantities. Whilst the piloting provides some indication of data to be expected it is important to remain flexible during the analysis process.

It would not be feasible to ask the experts to rank every item in each of the lists for the different questions. Therefore, round 2 was used to pare down the lists to a more manageable size. Schmidt (1997, p.769) recommends that respondents are asked to select at least 10% of the issues as being most important, or more if the lists contain less than 100 items. Experts were asked to choose their top ten responses for each of the questions presented from the consolidated lists generated in round one. The top responses were those selected by a simple majority of the panel. It provides much shorter lists for questions in the third round in which participants were asked to rank the final list from highest to lowest priority. This ranking approach was adopted to allow for statistical testing of consensus.

Round three

In round 3 the experts were asked to rank the items presented in order of priority from highest (value of 1) to lowest. The Kendall Coefficient of Concordance (W) can be used as a

statistical test of consensus (Okili and Pawlowski, 2004, p.26; Schmidt, 1997, p.765). This is a non-parametric test that is able to determine the association between three or more sets of rankings. In this case, each respondent represents a single set of data to be tested. W expresses the degree of agreement amongst the respondents with values ranging between 0 and +1 (Siegel and Castellan, 1988, p.262).

Using the ranking system, it is possible to identify the issues that are considered to be of more importance than others. If there is perfect consensus, $W=1$, every item would be given the same rank by every panel member. Therefore, the most important issue would have a mean rank of 1, the second issue a mean rank of 2 and so on. In order to conduct the test, the data collected is tabulated and SPSS, a statistical software programme, can be used to run the test for W . Given the relatively small amount of data generated it is also possible to do the calculation by hand in circumstances where SPSS or similar software is not available. The calculation is presented in section 5.4.

It is also possible to test the significance of W using the chi-square test (χ^2). This can show if the agreement amongst respondents is related or independent. SPSS can be used to calculate the chi-square value but again, the calculation can be done by hand and is presented in section 5.4.

3.9.2.8 Limitations of using Kendall's Coefficient of Concordance

The Kendall Coefficient of Concordance (W) derives its solution from mean ranks. Mean ranks are a product of and influenced by the method used. Consequently a high value of W can indicate that the experts are applying the same or similar criteria for ordering the responses but it does not necessarily mean that the ordering of responses is 'correct' when viewed in conjunction with external criteria or considerations (Siegel and Castellan, 1988, p.271). However, this limitation is addressed as far as possible by using multiple methods to corroborate the findings from the Delphi process.

The Kendall Coefficient of Concordance is not able to consider the relative importance between the factors. Therefore, it is not possible to infer from the results if the highest ranked factors are considered significantly more important than those with lower ranks or if each factor is considered to have equal weight. To obtain this type of data, scaled responses would be needed in which experts are asked to rate the importance of each factor in relation to the rest. This type of exercise would require significantly more time to complete and it was felt that it could be detrimental to response rates in the final round. Round 3 provided a consolidated list of the factors considered most important to a majority of the expert panel, therefore, if needed in the future a single survey using the consolidated lists from round 3 and scale measures could be conducted with the expert panel or with a wider audience in order to ascertain the relative importance of each factor during the standard development process.

3.9.2.9 Follow up process

It is recognised that the Delphi process can be time consuming for experts and that without their continued participation throughout the rounds it would be an unsuccessful method. Therefore, following up the rounds of questionnaires with a report detailing the results of

the study is recommended (Landeta, 2006, p.480). The report included the results from the Delphi process but not the document analysis or semi-structured interview analysis. It was prepared and sent out to the expert panel in January 2013.

3.9.2.10 Reliability and validity in Delphi

Many variants of the Delphi method, including the one used in this study, result in the generation of quantitative data, the exception is the Policy Delphi which remains qualitative throughout. However, due to the nature of the way that the data is generated it is difficult to follow the scientific (positivist) understandings of reliability and validity. Hasson and Keeney (2011, p.1700) argue that trustworthiness, dependability, confirmability and transferability, which are usually associated with qualitative research, are more applicable to the Delphi method than reliability and validity. This is because Delphi results cannot be considered as indisputable facts, instead, the results show how a particular group of experts views a particular problem at a given time.

There are a number of strategies which can be employed to improve the trustworthiness, dependability, confirmability and transferability of the Delphi results. The criteria for selecting the expert panel should be carefully considered to make sure that it meets the nature and purpose of the study (Loo, 2002, p.767). The expert panel should also include a representative sample with a range of experts included (Hasson and Keeney, 2011, p.1700). Feedback to the panel and reporting results is a form of member checking which can support credibility. In a similar way to the use of rich-thick description in qualitative studies, providing a detailed description of the Delphi collection and analysis process can support confirmability (Hasson and Keeney, 2011, p.1700). Combining the Delphi method with other research methods is supported as a strategy for demonstrating transferability. This could include comparisons with published research or the use of interviews (Hasson and Keeney, 2011, p.1701; Okoli and Palowski, 2004, p.18). All of these strategies have been applied to the Delphi process used in this research.

Critique of the method

None of the members of the expert panel were familiar with the Delphi Method before taking part in this research. The researcher also acknowledged (in section 3.7.3) that she had no previous experience of using the Delphi Method, therefore, it was a learning experience for all involved. However, whilst it was challenging, it is also rewarding to try a new research technique.

In some cases the community health workers were joined by other leaders in the community including Umudugudu leaders and WASH committee members and they would complete the questionnaire as a group. Although the Delphi process is designed to be completed by individuals, the author did not consider group completion to pose any particular problems to this research. If anything, it is a positive development because the responses reflect the views of a greater number of community members, who would ultimately be the most affected by standards for household latrines.

Using the Delphi method is challenging and as stated by Pill (1971, p.58) a lot depends on the researcher conducting the study. The main challenge was assessing how best to analyse and consolidate the data between rounds. The researcher tried to strike a balance between continuing with the data collection and trying to minimise drop –outs between rounds. It was decided that, for this study, maintaining a good response rate was favourable to maintaining the same number of questions between rounds as this would have increased the time needed to complete each round. The response rate over the rounds remained strong, with 60% of the experts completing all three rounds. An overview of the response rates for each of the three rounds is shown in Table 9.

Table 9 Expert response rate by round

Stakeholder group	Participation agreed	Round 1 completed	Round 2 completed	Round 3 completed
Academia	1	0	0	0
Builder	4	4	3	3
Community Representative	4	4	4	4
Donor	6	4	4	4
Government	7	4	2	1
National Institute	4	2	2	1
NGO	5	4	4	4
Private sector	6	5	4	4
Total	35	27	23	21

The other challenge was incorrectly completed questionnaires which could not be included in the final analysis. It is clear that some respondents did not read the instructions properly. One respondent in the third round marked all responses as 1, meaning that every consideration was important. The researcher understood the respondent’s view, but was unable to include the data in the final analysis which is particularly unfortunate as the respondent had taken the time to participate in the study through all three rounds. In different circumstances, a web-based questionnaire would probably be preferable to prevent this type of thing from happening. However, as discussed earlier, it was not deemed appropriate for this study.

Frewer *et al* (2011) discuss in some detail the influences of conducting a Delphi using experts personally known to the researcher. They found that using personal networks or members of existing networks appeared to increase response rates to Delphi rounds (Frewer *et al*, 2011, p.1524). The author has openly acknowledged the fact that participants in the Delphi process were drawn from her professional network. The extent to which the use of existing contacts supported the success of using the Delphi method is unknown as there was no comparative exercise carried out with exclusively new contacts. Of the original 40 invitations sent to experts, 20 went to members of her professional network. Of those 20, six did not complete the first round. Of the 21 experts who completed all three rounds correctly, ten were from the professional network which represents just below 50% of the final respondents.

3.9.3 Semi-Structured Interviews

The aim of the interviews was to gain more in-depth views about stakeholder perceptions of standards, what influences standards and what influence they can have within the sector. Semi-structured interviews were selected because they can be considered as 'guided conversations' rather than 'structured queries' (Yin, 2009, p.106) which enables a flexible approach to be taken whilst still retaining a reasonable proximity to the research topic. In this way, interviewees are participants rather than respondents, who actively participate in the direction and substance of the interview (King, 2004, p.11).

A list of questions and prompts addressing different aspects of the research question were prepared in advance. These questions were developed as a result of the literature review, the development of the conceptual framework, experiential knowledge and careful consideration of the research question, aims and objectives. From the master list, questions asked in each interview can be tailored to the particular respondent in order to try and elicit personal experiences and insights (Rubin and Rubin, 2012, p. 132).

3.9.3.1 Recruiting participants

Participants were recruited from the same groups as those who participated in the Delphi study; academia, builders, community representatives, donor organisations, government, NGOs and the private sector. Participants were required to have some sort of 'special knowledge or expertise' (Berg, 2007, p.44) which would assist the researcher in meeting the research objectives. A purposive sampling strategy was therefore adopted.

Deciding how many interviews to conduct can be difficult, especially when using purposive sampling. Much depends on the availability of participants, time and resources (King, 2004, p.16). One aim when using purposive sampling can be to reach 'theoretical saturation', which occurs when there are repeated similarities occurring in the data collected meaning that no new data is being found for the category being studied. However, guidelines on how to reach theoretical saturation and tests for measuring its achievement are not well published (Guest *et al*, 2006, p.60). The researcher therefore aimed to interview people from the same stakeholder groups used in the Delphi study to ensure that the interviews captured as diverse a range of views as possible.

Experts who participated in the Delphi method were asked if they would be willing to participate in a semi-structured interview in addition to the expert panel. Experts who were invited to take part in the Delphi but declined were also asked to participate in the interview process. The remaining participants were identified through snowball sampling based on referrals from participants already identified. A total of 38 interviews were conducted. Nine additional participants were found as a result of snowballing, the other 29 had participated in or had been invited to participate in the Delphi study. Every participant was asked for referrals of other people who are involved in the sanitation sector and in most cases, the same two names were given, being described as 'the experts' in the sector. This demonstrates the small size of the professional sanitation sector in Rwanda. When people declined to be interviewed they usually provided contacts for a colleague in the same organisation. A total of six people declined the invitation to participate or

subsequently dropped out as the fieldwork progressed. Table 10 shows the groups represented by interview participants. The participants represent different levels of expertise from national level to community level with some of the participants having extensive experience of working at both levels.

Table 10 Stakeholder groups represented during the interview process

Stakeholder group	No. of participants
Academia	1
Community health representatives or communities	6
Builders/masons	3
Donor organisations	6
Government	8
National Institutes	1
NGOs	6
Private sector	7
Total	38

3.9.3.2 Conducting the interviews

Interviews were always arranged in advance and at a time and location convenient to the participant. The interviewer travelled to meet the participant in order to minimise disruption to their working day. Most interviews lasted for between 40 and 60 minutes. Participants were asked for permission to record the interview on a dictaphone. For those who did not want to be recorded, they were asked if note taking would be acceptable instead. In some cases the use of a dictaphone was not practical because the interviews were conducted outside or in a particularly busy environment. The interview began with a brief introduction to the research and a simple opening question such as a description of the participant's role in their organisation, institution or community in order to set the participant at ease (King, 2004, p.17). The remainder of the questions were taken from the master question list or were asked in response to information provided by the participant. The interview was closed with thanks and the opportunity to add any additional information or to ask any additional questions of the interviewer. The participants were informed that the interview would be transcribed (if recorded) or typed up (if noted) and would be sent to them for checking and for their records.

The interviewer made every attempt to avoid the use of leading questions or multiples questions which can be confusing, however, interviewing is a skill which is developed over time and requires practice. The availability of recorded interviews is particularly useful in identifying moments when the questions could have been phrased more clearly. The interviewer had a tendency in the first interview to ask multiple questions. However, this was identified quickly and the way that questions were asked was modified. The use of a research diary was invaluable during both the Delphi and interview processes in order to record thoughts, progress, personal critique and follow up activities.

In addition to the time required to conduct the interviews it is also necessary to consider the time needed for transcription and analysis. Transcribing each interview as quickly as possible and recording thoughts from each interview in the research diary was useful

because, towards the end of the planned interviews it became clear that the same information was being repeated by new participants. At this point the researcher felt confident that it was not necessary to continue recruiting more interview participants.

3.9.3.3 *Translating interviews*

Conducting interviews using an interpreter requires additional planning and preparation. The researcher and interpreter worked together, before any interviews were conducted, to discuss how the translation should be done, how the interpreter understood the key themes of the research and if there were any words or phrases that would be particularly difficult to translate and retain the same meaning.

When translating the interviews it was decided that the interpreter would provide a 'true' translation. Translating the content of what was said in as direct a form as possible was more important than translating the responses into well-formed prose. If a participant used a local colloquialism that could not be translated directly the translator provided an explanation of the context. As suggested by Rubin and Rubin (2010, p.186) translators should give a 'sense of the meaning in a cultural context, not just translate words'. One such colloquialism is the use of the word 'capacity' to mean money (or access to money). The actual word for money in Kinyarwanda is 'amafaranga' but this word was not used by participants. After each interview the interpreter and the interviewer provided a critique and checked through notes for mis-understandings or mis-interpretations.

3.9.3.4 *Qualitative analysis*

Qualitative data cannot be analysed in the same ways as quantitative data. Qualitative data, often in the form of words, needs to be interpreted in order to find the meaning within it. The aim of the analysis is to condense, transform and refine qualitative data into more manageable and presentable concepts which address the phenomenon being studied (Elo and Kyngäs, 2008, p.108; Maxwell, 2005, p.96; Miles and Huberman, 1994 p.10).

There are no fixed methods for performing qualitative analysis and the language used to describe the different steps is not always the same. However, in a standard content based approach, codes are applied to sections of text to assign that section with a meaning. Sections of text with the same or similar codes can be combined into higher-order codes or categories, which help to organise the text data into defined categories, providing a foundation for further interpretation (Maxwell, 2005, p.96; Dey, 1993, p.102). Rubin and Rubin (2012, p.192) state that 'seeing together the different angles presented on the same topic or theme suggests the complexity and richness of the real world'.

Using fixed pre-defined concepts and themes limits interpretation to the concepts deemed relevant by the researcher. In this research, an inductive coding process was utilised which allowed the researcher to identify concepts and themes both directly and indirectly related to research question. Themes which can appear irrelevant or 'off-topic' at first can become relevant when viewed in relation to other themes or concepts.

3.9.3.5 The coding process

It is recommended, as a first step in the process, that researchers re-familiarise themselves with the data collected (Robson, 2011, p.476; Maxwell, 2005, p.96; Dey, 1993, p.98). Transcribing the interviews and writing up interview notes was an excellent way to achieve this. For transcribed interviews local pronunciation and sentence structure was maintained but filler words (er, um etc.) were removed.

The first sweep of the documents was done manually with pen and paper. The aim of this step was to start developing a preliminary list of codes, identifying those which were descriptive and those which formed broad substantiating themes. Many of these themes were previously identified in the conceptual framework (section 2.7). These codes were transferred into a 'node list' in NVIVO 9. A node is the NVIVO term for a code. The second sweep was much more detailed and was used to extract as much coded information as possible with nodes developed throughout the process and continually refined (Dey, 1993, p.118). At the end of the second sweep, the node list was consolidated, re-arranged and pruned to produce the final node list. The third and final sweep of the documents was a checking phase to ensure that the text sections were coded correctly, were placed under the right theme and that the node list was complete.

The hierarchical presentation of nodes in the node list produced by NVIVO provides a useful starting point for the identification of relationships between concepts and themes which forms the basis of the discussions in chapter 6.

3.9.3.6 Using software for analysis

There are many forms of Computer Aided Qualitative Data Analysis Software (CAQDAS) currently available. They possess a variety of features designed to make the process of qualitative data analysis easier than if traditional manual techniques are used (Blismas and Dainty, 2010, p.457). Miles and Huberman (1994, p.44) state that 'the researcher who does not use software beyond a word processor will be hampered in comparison to those who do'. However, the use of CAQDAS cannot be taken for granted and needs to be carefully considered in each study. Dey (1993, p.55) and King (2008, p.138) both agree that the researcher must do the analysis, that it cannot be completed by the computer. With this understanding, CAQDAS is seen as a research tool rather than a method of analysis and as such, maintaining records of coding decisions made are an important part of the process (Blismas and Dainty, 2010, p.458).

Using the 'drag and drop' function in NVIVO was particularly useful for doing the final pass through the text documents because it provides a quick and easy way to assign text sections to the desired code. The annotations function was used for keeping a record of coding decisions which is useful because the annotations remain attached to the specific text section and can be easily reviewed at a later stage.

3.9.3.7 Critique of method

King (2004, p.17) states that 'flexibility is the single most important factor in successful qualitative interviewing'. The researcher found this to be true throughout all the data

collection methods but especially in terms of the interview process. Interviewee distraction was a significant challenge in some of the interviews conducted. Pausing the interview to allow a participant to answer a phone call was the main form of distraction. It disrupts the flow of the conversation and can move the train of thought onto a different topic, but it has to be dealt with as best as possible at the time, for example, by giving the interviewee a prompt if requested. Time constraints on some participants meant that some of the interviews could not go into as much depth as others and for interviews that were conducted through a translator the researcher had to be aware of fatigue on the part of the translator and the participant.

The interview participants represent a good cross-section of stakeholders who make up the Rwanda sanitation sector and recruiting them to take part was relatively straightforward. All participants had previous experience of taking part in some sort of interview or focus group. In order to address potential bias in interview data Yin (2009, p.109) argues that it should be corroborated with additional sources of information. The use of multiple methods of data collection in this study provides suitable sources for corroboration, with data from each method contributing to the larger dataset generated through this research (as discussed in section 3.8.2).

3.10 Chapter summary

Chapter 3 discusses the role of research paradigms in the research process and considers the different paradigms that can be associated with development studies research. Potential research methods suitable for addressing the overall research question and individual research objectives are discussed in section 3.6. The final methods selected are, document analysis, the Delphi Method and semi-structured interviews. In sections 3.7 to 3.9 the methods of data collection and analysis are further elaborated upon and discussed in greater detail. Research ethics are considered in section 3.8 as an integral part of the research planning process. Chapters 4, 5 and 6 will present and discuss the findings from the three phases of data collection.

4. Presentation of findings from the document analysis process

4.1 Chapter outline

In section 2.4.3.1 of the literature review, documents where standards can be found were identified. These include policies, planning regulations, building regulations, technical norms and standards, conventions, design manuals, laws, by-laws and bills of quantities. The research sub-question and research objective addressed by this chapter are;

Research sub question 1: *How are standards viewed, discussed and presented in existing documents?*

Research objective 1: *To understand what information on standards already exists, how that information is used, where it can be found, how it is communicated and what it looks like.*

The documents were divided into two categories; (1) policies and strategies and (2) guidelines, manuals and training manuals. The information contained in the two categories of documents was so different that it was not possible to apply the same framework for analysis to both. A separate framework of themes and sub-themes was therefore developed for each category. The framework for the policies and strategies is presented in section 4.2.1 and the one for guidelines, manuals and training manuals is presented in section 4.3.1. As the documents within each category vary in style and content, the framework provided a way of drawing out similar content from each document, allowing them to be analysed under the same themes. It also enables comparisons to be drawn between the documents from Sub-Saharan Africa and those related specifically to Rwanda.

The results of the analysis are presented in this chapter as a narrative. The results have also been presented in tabular form to provide a quick reference overview of all the documents in both categories based on the key themes and sub-themes. The tables are presented in annex two along with an additional bibliography of documents which were found but not included in the analysis.

In the second part of this chapter there is a review of documents specific to Rwanda. The third part summarises the key findings from the document analysis process. Section 4.8 demonstrates the contributions made to the conceptual framework by the document analysis process.

4.2 Standards in policies and strategies

4.2.1 What are policies and strategies?

The term policy can be used in a variety of different ways. In their text on policy analysis, Hogwood and Gunn (1984) outline a list of ten situations in which the term policy can be used. The original examples provided by Hogwood and Gunn (1984, p.11) to explain the different situations have been modified to reflect how the different terms might apply to policies for the WASH sector in a country. The ten situations are as follows;

- Policy as a label for a field of activity e.g. sanitation policy
- Policy as an expression of general purpose or a desired state of affairs e.g. to end open defecation and improve access to hygienic latrines
- Policy as specific proposals e.g. all households are to adopt hand washing at critical times
- Policy as decisions of government e.g. decision to make traditional pit latrines illegal
- Policy as formal authorisation e.g. an act of Parliament to establish a WASH sector co-ordinating body
- Policy as a programme (a specific sphere of activity with its own package of legislation, organisation and resources) e.g. school WASH education programme
- Policy as output (what has been delivered rather than what is promised) e.g. provision of piped water to every household nationally
- Policy as outcome (the impact of what's been delivered) e.g. better school attendance for children because they no longer have to spend time collecting water
- Policy as theory or a model (policies imply a theory of cause and effect) e.g. if latrines are built at schools more children will go to school
- Policy as process e.g. changing attitudes towards health and hygiene over a long period of time

In Rwanda, the Cabinet Manual sets out guidelines for preparing 'high-quality' proposals for consideration by Cabinet. According to the guidelines policies should 'have clear objectives; consider all options; be evidence based (including wide consultation); be deliverable; be joined up and be well communicated' (Ministry of Cabinet Affairs, 2009, p.45). A policy created in accordance with these guidelines cannot be a wish-list, it must be relevant, practical and possible to implement.

The term 'strategy' was originally used in a military context but has evolved to take on a broader meaning (Grant and Jordan, 2012, p.12; Swords and Turner, 1997, p.11). Chandler (1962, p.13) defined strategy as 'the determination of basic long term goals and objectives of an enterprise, the adoption of courses of action and the allocation of resources necessary for carrying out those goals'. Put simply, a strategy is a way in which an organisation or an individual can achieve their objectives. Swords and Turner (1997, p11) describe how a strategy is put together in terms of its Mission, Objectives, Strategy and Tactics (MOST). Mission includes purpose, vision, direction and values; objectives are based on the definition of the mission; strategy is about what needs to be done to achieve the objectives and the tactics are the set of actions needed to complete the strategy which in turn meets the objectives and fulfils the mission.

A strategy can be created without a policy because it should be created with its own goals and objectives, but a policy helps place the strategy within a wider context. For example, the policies from the sample used in this study all make reference to the fact that the WASH related policy is one of many policies which are expected to contribute to long-term national development objectives. In this context, policies and strategies are commonly created together so that they can complement each other. Using the definition of a strategy from Chandler (1932, p.13), the policy provides the long term goals and objectives

whilst the strategy provides the courses of action and allocation of resources for achieving the end objectives.

When considering the policy documents found for this sample, the purpose of the document can be used to identify which application of the term 'policy' is most relevant in each case. The countries in this study for which a policy was found are; Malawi, South Africa, Kenya, Ghana, Nigeria and Sierra Leone. In all cases, the policy documents can be said to be expressing a general purpose and a desired state of affairs because they are written with the intention of improving the current state of affairs by focusing on the WASH or environmental sanitation sector as a whole, countrywide. They go beyond just defining the sector which would place them under the category of 'policy to define a field of activity' and none of the policies focus on just one specific activity or outcome which would place them under one of the remaining policy situations.

Policies and strategies play a part in setting the 'rules of the game' for activities carried out in a specific sector. They are both closely linked to financial planning and budgets, with the argument being that if an activity does not contribute towards a policy objective and has not been outlined as an action in a strategy then it is not important enough to warrant the allocation of resources. If developing or using a standard for household latrines is considered important to meeting the overall objectives of the policy or strategy there is an expectation that some sort of reference would be made to them in these documents.

Table 11 shows the framework used for the analysis of the policies and strategies and Table 12 lists the countries for which a policy or strategy document containing references to standards for household latrines is available.

Table 11 Framework for analysis of policy and strategy documents

Theme	Sub-theme	Reason for inclusion
Overview	Year and title	Context
	Lead organisation/institution	In a multi-stakeholder sector it is important to see who has the lead on policy and strategy formulation as it can influence the content
	Household latrine mandatory or encouraged	To establish possible links between household latrines and standards with or without regulation
	Purpose of document	To see what role the document is playing in the sanitation system
	Terms used related to standards	Are there similarities in the terms used?
Technology choices	Key considerations in selecting latrine options	To look for similarities/difference between countries. Are there some 'norms'.
	Technologies specified	Are certain technologies 'recognised' or specified
	Approaches banned or discouraged	Context
	Technical specifications given	Technical specifications are one type of standard that could be presented
	Types or use of materials stated	Could be related to specifications or particular types of latrine
	Testing or approval of technologies proposed	If testing technologies is required why will it be done and how or by whom
	Research on latrine designs proposed	How/why/whom, are there specific problems to solve
Regulation and monitoring	Organisation responsible for setting standards	Who has responsibility and why
	Enforcement of standards expected	To see if there is a link between standards, regulation, monitoring and enforcement
	Responsibility for enforcing or monitoring standards	
	Methods of enforcing standards	
Education and training	Education and awareness raising activities proposed	What information will be shared and will standards form part of it
	Training on standards required	

Table 12 Policy and strategy documents analysed

Country	Document	Date	Lead institution/organisation
Ethiopia	National Hygiene and Sanitation Strategy	2005	Ministry of Health
Ethiopia	National Hygiene and Sanitation Strategic Action Plan for Rural, Peri-Urban and Informal Settlements 2011 – 2015	2011	Ministry of Health
Ghana	Environmental Sanitation Policy	1999	Ministry of Local Government and Rural Development
Ghana	Environmental Sanitation Policy	2010	Ministry of Local Government and Rural Development
Kenya	National Environmental and Sanitation Hygiene Policy	2007	Ministry of Health
Kenya	National Environmental and Sanitation Hygiene Strategy 2010 -2015 (draft)	No date	Ministry of Public Health and Sanitation
Malawi	National Sanitation Policy	2008	Ministry of Irrigation and Water Development
Namibia	National Sanitation Strategy 2010/11-2014/15 (second draft)	2009	Ministry of Agriculture, Water and Forestry
Nigeria	National Water and Sanitation Policy	2004	Federal Ministry of Water Resources
Sierra Leone	Water Supply and Sanitation Policy for Sierra Leone	2007	Ministry of Energy and Power (Author: UNECA)
South Africa	National Sanitation Policy	1996	National Sanitation Task Team

In addition to the documents listed in Table 12, there are more policy and strategy documents from other countries in Sub-Saharan Africa, but any documents with only a passing reference to standards; those which only made reference to standards for water quality; or those which only made reference to standards for the water supply and sanitation sector as a whole were not included in this review. The documents removed from the sample during the first pass and the reasons for their removal are as follows;

- **Ghana:** Rural water supply and sanitation sector strategy (1991)
No references to sanitation, focused entirely on water
- **Lesotho:** Water and Sanitation Policy (2007)
Focused entirely on water, sanitation is only referred to as part of the phrase ‘water and sanitation’
- **Namibia:** Water Supply and Sanitation Policy (2008)
Very general references to WASH services as a whole
- **Uganda:** National Environmental Health Policy (2005)
Very general references to WASH services as a whole

4.2.2 Document overview

4.2.2.1 Title and lead institution

In all but two cases the documents focus primarily on sanitation. Household latrines constitute one part of wider discussions on different aspects of sanitation including, solid and liquid waste management, maintaining water quality and hygiene behaviours. Two of the documents in the sample present a combined water and sanitation policy; Nigeria and Sierra Leone. The overall objective of the Water Supply and Sanitation Policy for Sierra Leone (UNECA, 2007) is 'to manage the water resources of Sierra Leone in an integrated manner to support social and economic development in the fields of health, agriculture, and energy and to maintain the productivity and integrity of the environment on a sustainable basis' (UNECA, 2007, p.6). Despite this focus on water resources management sanitation is also considered in some detail. The 2004 National Water and Sanitation Policy from Nigeria was developed in response to 'inadequacies' identified in discussions on sanitation, health and hygiene education in the earlier version of the same policy from 2000 (Federal Ministry of Water Resources, 2004, p.6). Sanitation therefore forms a significant component of the new policy.

The variety of lead organisations presented in Table 12 demonstrates the range of departments or ministries which can have responsibility for sanitation. Section 2.4.1.9 in the literature review discussed the challenge of providing effective co-ordination for sanitation activities when responsibilities are unclear or where there are overlapping mandates. For example, in the case of Sierra Leone, UNECA are listed on the title page as the authors but leadership is to be provided by the Ministry of Energy and Power (UNECA, 2007, p.57). This seems an unusual choice given that there is a Ministry of Health and Sanitation in Sierra Leone and no justification is given to explain the division of responsibilities.

4.2.2.2 Household latrines mandatory or encouraged

In most cases, the construction, ownership or use of a household latrine is encouraged or strongly encouraged but mandatory ownership is not made explicitly clear. The exceptions are Malawi and Nigeria where the mandatory ownership of a household latrine is clearly stated. The National Sanitation Policy for Malawi states that 'every household in Malawi shall be obliged to own a sanitary facility of some kind to reduce the potential of facilitating the transmission of water and sanitation related diseases' (Ministry of Irrigation and Water Development, 2008, p.9). In Nigeria the National Water and Sanitation Policy states, 'each household must own and have access to a safe sanitary facility' (Federal Ministry of Water Resources, 2004, p.7).

In the 1999 version of the Environmental Sanitation Policy from Ghana all households were required to have toilet facilities (Ministry of Local Government and Rural Development, 1999, p.v) but the statement is not re-iterated with such force in the 2010 version which instead adopts the view that households must take responsibility for all aspects of both household and community level environmental sanitation which includes the safe disposal

of excreta. In the cases of Malawi and Nigeria it is clearly understood that households are expected to have a latrine, however, in some of the other cases, although the need for latrine ownership is not explicitly stated, it is implied through the stated intentions for monitoring, regulating and enforcing standards, an issue that will be considered in more detail in section 4.2.5.1.

4.2.3 Understanding how standards are discussed

Section 2.3.1 in the literature review discussed the breadth of the term 'standard' and the different types of standard that can be developed. References to standards in the sample documents are intertwined with promoting access to improved latrines, monitoring and in some cases regulation and enforcement of latrine ownership or use. There are also references to both service and technological standards. Understanding how standards are referred to in policies and strategies will help to identify the roles that standards are expected to play and whether or not they are perceived as being useful.

4.2.3.1 Service standards

Two documents from the sample make reference to service standards. In the National Sanitation Policy from South Africa a VIP is considered a necessary requirement to meet a basic level of service (National Sanitation Task Team, 1996, p.3). In the National Water and Sanitation Policy from Nigeria, minimum levels of service in rural, semi-urban and urban areas are given. These are; an upgraded pit latrine in rural areas, a sanplat latrine with appropriate super-structure matching other buildings in the area in semi-urban areas and 'at least' a pour flush toilet in urban areas (Federal Ministry of Water Resources, 2004, p.7). These two cases highlight the intrinsic link between a specific technology and a certain level of service as discussed in section 2.3.7.

In the case of Nigeria, despite setting service standards, there are no references to technologically based standards meaning that there are no further details on how the different latrines should be built. In the case of South Africa, the VIP can take a variety of forms but it must meet 'minimum requirements' in terms of cost, sturdiness, health benefits and environmental impact (National Sanitation Task Team, 1996, p.3). There are no subsequent references to what the minimum requirements are but one of the roles assigned to the national government is to set 'basic minimum standards and levels of service' (ibid, p.27). Whether or not these basic minimum standards would also include the 'minimum requirements' for a VIP is not known. However, there are further references to the monitoring of 'construction standards' (ibid, p.23) and in order to monitor construction standards, there must be some sort of standard in the first place. Therefore, although the term 'standard' is not used, there are implications that a 'standard' will be applied during the construction of household latrines.

4.2.3.2 Technological standards

In the National Sanitation Strategy from Namibia the fact that there are 'no approved set of technical options with standards', is considered a key strategic issue for water sector co-

ordination. It received a score of 3.4 out of 4 for importance (Ministry of Agriculture, Water and Forestry, 2009, p.19). Developing a set of 'technical sanitation guidelines' is considered part of the foundations of their sanitation strategy map (presented as a 'house of sanitation') (ibid, p.28) and the construction of residential latrines is expected to be 'according to national standards and guidelines' (ibid, p.29). The contents of these guidelines will be discussed in section 4.2.3.4. There is also the intention to develop minimum standards for operation and maintenance for all sanitation options/systems. The indicator for this action will be the 'number of residential sanitation facilities well operated and maintained' (ibid, p.51). This is the only case of standards for operation and maintenance as well as construction in the sample.

In the National Sanitation and Hygiene Strategy from Ethiopia, there is an intention to define a standard for both urban and rural domestic latrines, but there is no further information on the type of standard (Ministry of Health, 2005, p.37). There is also an intention to develop guidelines and manuals for the construction of different latrine options (ibid, p.55). In the Strategic Action Plan from 2011, it states that CLTS has been adopted and as such there will be 'no prescribed toilet models' (Ministry of Health, 2011, p.21). Promoting latrine construction and use without imposing a specific model is one of the core principles of the CLTS approach, as discussed in section 2.4.1.11. Section 2.4.3.1 discusses how the use of a 'prescribed model' is linked to a subsidy based approach and as such is considered a constraint on households adopting the use of an improved latrine. However, there is also a section in the Strategic Action Plan on 'adopting a national standard' (ibid, p.25). Although this implies that the national standard would not support the use of specific models it is not made clear whether or not this national standard would only become applicable once a community has become open defecation free. Without this clarification there could be significant confusion for facilitators promoting the CLTS approach in communities and the local authorities who are tasked with monitoring progress. The issue of monitoring is discussed in section 4.2.5.1.

In the Sanitation Policies from Ghana there is a specific reference to the application of a standard to household latrines in the 1999 version (Ministry of Local Government and Rural Development, 1999, p.23) with the selection of technologies governed by the Ministry through the publication of 'technical guidelines' (ibid, p.29). However, it is also stated that all premises (including residential ones) will be subject to building code inspections with separate provisions made for the inspection of newly constructed buildings (ibid, p.49). If these documents present different standards there will be confusion over which 'standard' is the right one for households to follow, the building code or the one set by the Ministry.

In the 2010 version of the policy, there is a more general focus on standards for environmental sanitation as a sector which should include household latrines but the extent to which it will be unclear. CLTS is also adopted as an approach in Ghana, however, it is still expected that the Ministry will issue 'technical guidelines' and residential properties will still be subject to the building code (Ministry of Local Government and Rural Development, 2010, p.36). The problem with using a building code as a tool for regulation is the difficulty in enforcing it both in terms of financial commitment and the availability of staff to do the inspections. The extent to which a building code can be applied to residential

properties in rural areas or informal settlements is therefore doubtful but the use of building codes for regulation is discussed further in section 4.2.5.1.

In the Environmental Sanitation and Hygiene Policy and Strategy documents from Kenya there are only general references to the need to develop standards for improving environmental sanitation and health overall. Their application to household latrines is unclear. However, there is an intention for the government to develop a 'list of approved technologies' with the aim of creating 'a degree of standardisation but in a way that will not obstruct the possibility of technological breakthroughs' (Ministry of Health, 2007, p.20). As discussed in section 2.4.3.1 of the literature review, the use of a standard model is perceived to place constraints on the construction of different types of latrine and is no longer a popular approach.

In Malawi, despite the mandatory requirement to have 'some kind' of latrine at every household there are no specific references to standards for household latrines. However, there is an intention to develop standards and guidelines for sanitation and hygiene so these may or may not be applicable to household latrines (Ministry of Irrigation and Water Development, 2008, p.26).

In the Water Supply and Sanitation Policy from Sierra Leone, the subsidy arrangements are presented for the construction of VIPs in village communities. This is the only document in this sample which details a subsidy approach. References to standards relate to 'standard material schedules' which will be developed by each region according to local costs. Standards in this context therefore relate to standard models which can be provided under the subsidy programme. 'Standard sketches and drawings' for different types of latrines have been in use since 1981 and these are to be reviewed and if found suitable, be adopted for general use (UNECA, 2007, p.83).

In 2008, Sierra Leone adopted the CATS approach which does not use subsidies to support latrine construction and in the recent CATS evaluation report it is stated that the Government of Sierra Leone has accepted a 'broader approach' to achieving ODF status rather than focusing on the construction of improved latrines as defined by the JMP (Hydroconseil *et al*, 2013, p.20). This is an example of the compromise that can be made to achieve a universal level of service at a basic level rather than some people remaining without services which was discussed in section 2.4.1.3. However, one of the major problems with latrine construction in Sierra Leone is that of durability, with latrines built under the CLTS approach being prone to collapse, which consequently makes the sustainability of latrine use less likely (*ibid*, p.22).

4.2.3.3 Supporting household decision making

Several of the documents present the expectation that good or improved sanitation and hygiene will become a social norm. One of the ways presented for achieving this is through education and the provision of information. All of the documents focus on a demand led approach placing the households at the centre of the decision making process. Whilst there is the desire to have households make the decisions on the type of facility they want to build and for them to be the primary investors, in all cases it is perceived as the

government's role to provide the households with the relevant information to support the demand responsive approach. Throughout section 4.2.3 there are several references to the development of guidelines and some references to standards. These form the primary sources of information intended for use by communities and households. From the eleven sample documents, thirteen different names for the proposed documents have been found. They are;

- National guidelines
- Guidelines
- Approved standards
- Standards
- National norms/accepted norms
- Latrine options manual
- Standard material schedule
- Bills of Quantities (BoQs)
- Standard sketches and drawings
- Equipment and material specifications
- Technical manuals
- Standard practice manuals
- Technical sanitation guidelines

National or accepted norms have been included because, as discussed in section 2.3.1, the term 'norm' is often used synonymously for the term standard. In all cases it is anticipated that national governments will play the lead role in developing the documents listed and that the information will be disseminated to the public with the intention of promoting more informed decision making and supporting demand led latrine construction at the household level. The proposed content of technical guidelines is discussed in section 4.2.3.4.

4.2.3.4 Proposed content of technical guidelines

There are only three documents from the sample that outline the expected contents of technical guidelines, two of which are from Ghana and present the same information. In the National Sanitation Strategy from Namibia 'technical sanitation guidelines' are expected to contain the following; options with bills of quantities, specifications, minimum standards, application areas and costs for construction, operation and maintenance' (Ministry of Agriculture, Water and Forestry, 2009, p.28). Later in the document these technical guidelines are referred to a 'user friendly guidelines/manuals' developed specifically for local authorities, communities and beneficiaries (ibid, p.29).

In both versions of the Environmental Sanitation Policy from Ghana 'technical guidelines' are expected to 'specify which technologies may be used including design parameters and recommended operating procedures' (Ministry of Local Government and Rural Development, 2010, p.36). In both of these cases the guidelines are expected to provide similar types of information and both will include information on latrine designs. Section 2.4.1.10 in the literature review discusses how a lack of information on latrine designs can hamper household decision making when choosing to invest in a latrine.

This idea of providing information on designs is linked to section 4.2.4.1 which discusses the concept of approved and allowable technologies in more detail. Guidelines and manuals are two of the sources identified in section 2.4.3.1 of the literature review as possible sources for standards. These types of documents will be analysed in greater detail in section 4.3.

4.2.4 Technology choices

4.2.4.1 *Approved and allowable technologies*

In all cases, open defecation and where applicable the use of bucket, pan or trench latrines is strongly discouraged. Only five of the documents in the sample list any technologies, this includes both policies from Ghana which state the same information. In addition to these, the National Water and Sanitation Policy from Nigeria states the minimum technology expected in each area of residence (as discussed in section 4.2.3.1) but also includes a list of 'feasible' options which go from unimproved latrines up to conventional sewerage.

In the Water Supply and Sanitation Policy from Sierra Leone technologies are specified according to residence in rural and small town communities. In rural communities households are 'encouraged' to select from a rectangular (lined or unlined) single pit VIP, a Mozambique single pit VIP (lined or unlined), a double pit VIP or a san plat. In small towns the technologies are 1-3 seater KVIP (communal), pour flush, WC with septic tank. Due to cultural expectations households will usually have two latrines, one for each gender (UNECA, 2007, p.82). This case is a good example of the point discussed in section 2.4.1.7 that technology choices and subsequent service levels are expected to be different between rural, peri-urban and urban areas and also the importance of cultural considerations discussed in section 2.4.1.7.

In Ghana there is a distinction made between all possible methods of excreta disposal and on-site systems. For households requiring on-site systems 'acceptable technologies' are a VIP or WC with a septic tank, soakaway or sub-surface drainage fields. District Assemblies are expected to determine the acceptability of using VIPs in urban areas and there must be provisions for the removal of sludge periodically. Double pit VIPs can only be used in areas where the number of users is low to ensure sufficient time for sludge digestion (Ministry of Local Government and Rural Development, 2010, p.37).

The terms acceptable, appropriate, approved and allowable are used to describe latrine technology options in seven of the documents from the sample. These terms can be interpreted in two different ways; that any latrine option not considered 'acceptable' by the government will not be 'approved' and should therefore not be built or that the promotion of a specific range of 'acceptable' technologies is an attempt to reduce the incidences of poor latrine construction and aim for some level of standardisation.

4.2.4.2 *Technical specifications*

None of the documents present any kind of technical information related to the design or construction of a latrine (e.g. pit depth, superstructure dimensions). Only the two documents from Ethiopia contain detail on what 'minimum requirements' actually represent. The key features are listed as; a secure, stable pit, round, conical and not too

deep; solid, sealed (tight lid) platform with termite resistant logs and smooth plastered finish to ease cleaning; secure, stable (preferably moveable) superstructure which ensures privacy and a sense of security, strong enough to resist rain, wind and animals and ventilation with locally available materials (Ministry of Health, 2005, p.53). This is the most detailed list of 'requirements' found in any of the documents from this sample.

In the strategy from 2005, it states that access to a latrine is low in the domestic priorities of families. Information from knowledge, belief and practice surveys revealed that latrines have a poor reputation due to their apparent lack of stability, privacy and safety (ibid, p.13). It is therefore clear that the key requirements suggested have been developed in response to the apparent weaknesses in the current design and construction of a latrine. The strategy provides some information on the types of materials that might be used but does not go any further in terms of specifying how the latrine should be built or what dimensions it is expected to have.

In the Strategic Action Plan from Ethiopia in 2011, the following key design features are listed under the heading 'adopt a national standard'. It states that 'there is consensus that all on-site toilets will have the following key design features; a stable pit and sustainable platform which can be cleaned and where possible moved when the pit is full, a covered drop hole, a hand washing system and a superstructure strong enough to resist extreme weather conditions and animal incursions' (Ministry of Health, 2011, p.25). The differences between the two lists are subtle. The moveable superstructure has been replaced by one capable of withstanding 'extreme weather conditions' and the log based platform has been replaced with a 'sustainable platform' which can be moved where possible which would imply the use of a cement or plastic slab. Both of these items represent a move towards better constructed, potentially longer lasting latrines and demonstrate how ideas about what the 'minimum requirements' can change over time.

The main difference between the documents is in their tone. In the strategy from 2005 there is no discussion about the development of a standard for household latrines but in 2011, the features presented are done so under the heading of a 'national standard' that 'all' latrines should meet. This type of 'standard' cannot be said to be presenting a 'standard model' that has to be adopted because each of the requirements could be met using different materials or building methods. However, it does represent a level of standardisation for latrine construction which incorporates certain key features. Achieving a level of standardisation whilst still retaining room for technological improvements was cited as a desirable situation in the National Environmental Sanitation and Hygiene Policy from Kenya as discussed in section 4.2.3.2.

Despite the fact that most of the documents do not include references to specific technologies, all the documents in the sample state key considerations which should be taken into account when selecting a latrine. Table 13 lists all the considerations for selecting a latrine as they appear in the eleven documents in this sample. The number of occurrences relates to the number of documents from the sample that list the consideration, rather than the total number of occurrences of each consideration in all the documents from the sample. Therefore, although not all of the documents present a list of

defined technology options, they all present a list of criteria which the technologies should meet. In terms of standards, these criteria could be considered as a code of practice in each country. A code of practice presents best practice and the results of practical experience primarily for the purpose of providing clear and easy access to information (as discussed in section 2.3.1). A majority of the documents considered affordability and environmental sustainability to be key considerations in selecting a latrine.

Table 13 Considerations for selecting a latrine

Consideration	Number of occurrences (maximum of 11)
Affordable Environmentally sustainable	8
Acceptable (socially and culturally)	6
Safety/reliability (i.e. not liable to collapse) Allows for recycling/re-use of wastes Avoid contamination of water	5
Privacy Accessible (e.g. for disabled users) Minimise health risks Water saving	3
Safe storage of faeces Location issues (e.g. rocky ground) Cost effective Affordable O+M Users engage in design	2
Safe disposal of faeces Water supply service levels Potential to upgrade Use of local resources Settlement patterns Easy to construct and maintain	1

4.2.4.3 Adopting new latrine designs

Section 2.4.3.4 in the literature review discussed the role of standards in innovation and how standards can be perceived negatively as a constraint on innovation. This particular concern was raised in the National Environmental and Sanitation Hygiene Policy from Kenya, in which the aim is to achieve ‘a degree of standardisation’ without preventing innovation (Ministry of Health, 2007, p.20). The problem of introducing new latrine designs before they have been assessed for applicability in country was highlighted in Kenya. VIPs were originally promoted but the unaffordable design meant that they failed to scale up nationally (Ministry of Health, 2007, p.13).

Most of the documents in the sample refer to the need to conduct more research into latrine technologies and different designs. In some cases there are specific challenges to overcome such as difficult building conditions, whereas others focus on the affordability aspects with a focus on research for ‘low-cost’ sanitation options. Responsibility for conducting this research belongs to either the national government or local universities with the national government giving the final decision on introducing the new option or not.

It is difficult to determine from the documents how local innovations will be perceived and if they will be supported or not. The documents from Sierra Leone, Ethiopia and South Africa strongly support the use of locally available materials but they do not discuss the use of locally modified designs.

The National Sanitation Strategy from Namibia and the National Environmental and Sanitation Hygiene Policy from Kenya are the only documents in the sample that discuss the intention of piloting or field testing new latrine technologies in communities before being approved for use (Ministry of Agriculture, Water and Forestry, 2009, p.35; Ministry of Health, 2007, p.16). Unfortunately, there is no further elaboration on how the testing will be done or what criteria the technologies would be required to meet in order to be accepted. There are no references in either document of the need for the new latrine to meet a particular standard. However, as discussed in section 4.2.3.2, in the document from Namibia there are specific references made to the development of a standard for household latrines, it can therefore be anticipated that any new designs or technologies would be expected to be equal to or better than the standard proposed.

4.2.5 Monitoring, enforcing and regulating standards

4.2.5.1 Intention to monitor, regulate and enforce standards

Section 4.2.2.2 discussed that in the cases of Malawi and Nigeria it is clearly stated that households are expected to have a latrine, but that in some cases, although the need for latrine ownership is not explicitly stated, it is implied through the stated intentions for monitoring, regulating and enforcing standards. Standards are voluntary in nature so their implementation can be monitored if required but they do not have to be automatically regulated and enforced.

In the documents from Malawi, Namibia, Nigeria, Sierra Leone and Ethiopia there is an intention to regulate and enforce standards for sanitation and hygiene generally but there are no specific references to the enforcement of standards for household latrines. However, the automatic link between standards and the assumed need to regulate them is highlighted by these examples. In South Africa there is an intention to monitor construction standards of sanitation systems and technologies but there are no references to regulating or enforcing them (National Sanitation Task Team, 1996, p.23).

In the cases of Kenya and Ghana, references to regulation and enforcement are much stronger. In the two documents from Kenya, the National Environmental Sanitation and Hygiene Policy discusses the monitoring and regulation of environmental sanitation standards generally so this may or may not include household latrines but in the Strategy, there is a specific reference to using 'enforcement measures' to create demand for latrines in order to meet national targets (Ministry of Public Health and Sanitation, no date, p.11). This is the only document in the sample to cite meeting national targets as one of the motivations for enforcement. However, it is not clear exactly what is being enforced. The targets set by the strategy are to eradicate open defecation by 2015 and to aim for 'Total Sanitation'. It is specifically stated that 'counting construction of new latrines as [an] indicator of improved coverage is not considered. Rather eradication of 1) open defecation 2)

foul water and 3) litter from an entire community/village/sub location etc will serve as [an] indicator of improved sanitation coverage' (ibid, p.5). The intention is to use enforcement as the stick and promotion as the carrot in order to create demand for latrines. Therefore, if zero open defecation is the target and not the construction of latrines, it would imply that there will be no enforcement related to the type of latrine built, only that there is one.

Enforcement method: Building codes

In the policy documents from Ghana, the 1999 version has a much stronger emphasis on enforcement than the 2010 version. In the 1999 version the intention was to enforce the construction of household toilets in every residential property through by-laws set by the District Authorities. Infractions were expected to be addressed by community tribunals in the first instance, escalating higher as needed (Ministry of Local Government and Rural Development, 1999, p.26). Later in the document it is stated that District Assemblies shall regulate domestic toilets by legislation and application of the building code (ibid, p.41).

In the 2010 version, the intention to enforce the construction of household toilets has been removed in favour of a more general reference to environmental sanitation but the application of legislation and the building code remains (Ministry of Local Government and Rural Development, 2010, p.36). All premises, including residential ones are expected to undergo periodic sanitary inspections to make sure that the relevant laws are being followed and the building code is being observed (ibid, p.40). These are the only documents in the sample to refer to a building code as a means of regulating domestic toilets but this level of regulation seems particularly heavy given that ownership of a latrine is not cited as being mandatory in the 2010 version. However, the CHORE manual on implementing sanitation as a human right also expects building standards to be used where applicable and states that 'individuals have a responsibility to construct toilets which adhere to building and development standards where possible' (CHORE *et al*, 2008, p.30).

Ghana and Kenya are examples of a situation where although there is no explicit requirement to have a latrine stated, it is likely to become mandatory through the use of enforcement measures. As stated in section 4.2.3.2, the extent to which a building code can be applied to rural households is debateable. It may be possible that laws would be applied to rural households and those already constructed and that the building code would be applied to urban households or new builds, however, this is not discussed.

Enforcement method: Bylaws

In the documents from Nigeria and Sierra Leone there are references to the use of by-laws as a means of regulation and in the manual on sanitation as a human right, by-laws are considered as a way to 'promote the construction of toilets' (CHORE *et al*, 2008, p.22). The following example of a by-law from Blantyre City Assembly in Malawi highlights the constraints that can be put in place by the use of by-laws that are not fit for purpose. In Blantyre there are bylaws relating to the use and siting of latrines.

- Article 4 states that ‘all urinals, latrines and water closets prescribed in terms of these by-laws shall be properly, adequately and effectively lit and ventilated and pit latrine shall be effectively screened against the entry of flies’.
- Article 5 states that ‘no water-closet or pit latrine may be provided, construction, fixed or otherwise arranged or used inside or under any roof affixed to a building used or intended for use as a dwelling or for the storage inside preparation, manufacture or sale of foodstuff for human consumption’.
- Article 7 states ‘no person shall construct a pit latrine within – (a) 450 metres of any building, (b) 1.5 metres of any plot boundary; or (c) within 30m of any stream, pool, damn, well, borehole, spring or other underground water supply’.

The penalties for failing to comply with the by-laws include a fine of 2000 Malawi Kwacha (which equates to approximately £3 at 2003 rates) and up to six months in prison (Blantyre City Assembly, 2003). Article 4 is effectively stating that all latrines must be at least a VIP in urban areas and requiring a pit latrine to be built 450m from any building in an urban area effectively bans the use of pit latrines in urban areas because house plots are not large enough to accommodate such a large distance. It would also mean that people have to travel almost 1km to use a latrine.

4.2.5.2 Responsibility for setting and enforcing standards

In all cases the highest level of national government has the responsibility for setting standards nationally. Ethiopia is the only country from the sample where provisions are made to allow local authorities to adapt the standards to suit their specific needs. It is interesting to note that in none of the documents in this sample is there any mention of a national standard making body having the responsibility for developing standards, even in the cases where there are references to ‘national standards’ it is still anticipated that the ministry with responsibility for sanitation will take the lead. Although the process of developing a formal standard is not universal, for countries in which there are internationally recognised standard making bodies (i.e. those that are signatories to the International Standardisation Organisation) if a standard is not recognised by a national standard making body it cannot be considered as a formal standard.

Responsibility for enforcing the standards is given to decentralised structures including local government, public sector technicians, environmental health officers, community WASTAN groups and communities themselves. In the National Hygiene and Sanitation Strategy from Ethiopia it states that the ‘community sets the rules and standards on non-compliance which would be subject to local sanction’ (Ministry of Health, 2005, p.9). The same is true in the National Water and Sanitation Policy from Nigeria which states that the ‘community shall, with the aid of sanitation promoters, establish sanitation norms that must be accepted by all members. The community shall sanction members that do not observe the accepted sanitation norms’ (Federal Ministry of Water Resources, 2004, p.21).

The use of fines, penalties or other traditional sanctions is proposed in half of the sample but in most cases it is stated that current regulatory frameworks need to be updated because existing laws are no longer fit for purpose. For example, the National Guidelines from Uganda state that fines for failure to build a household latrine are based on the Public Health Act of 1964 and are 'no longer effective deterrents' (MoH, 2000, p.4).

In the cases of Malawi and Nigeria where ownership of a latrine is mandatory, enforcing regulations which refer to standards for sanitation generally can be assumed to encompass household latrine ownership. However, only in Nigeria is the type of technology specified as being 'at least' a VIP. In the case of Malawi ownership is the requirement, it does not specify the type of latrine. In the other cases where having a latrine is encouraged but not mandatory, it would be difficult to sanction households for non-compliance as there is no requirement to have a latrine.

For the documents in this sample there is only one specific reference to the regulation of household latrines in the National Sanitation Policy from Ghana in 1999 but that document is superseded by the later 2010 version. None of the other documents refer to the regulation or enforcement of standards for household latrines in particular and it is not possible to determine the extent to which household latrines would be included under the umbrella of sanitation, hygiene or environmental standards in each country. Given that all of the countries in the sample are working towards the MDGs, which have specific provisions for increasing the coverage of improved latrines it can be surmised that the monitoring and or regulation of household latrines would be carried out to some extent in order to assess progress towards the MDG goals.

However, even in countries where compliance is supposed to be enforced, in practice the systems in place and the limited availability of resources limits the potential for widespread enforcement activities. The case of pan latrines in Ghana illustrates the problem of enforcing compliance; 'the continued presence of pan latrines in houses (3% nationally) which was banned about a decade ago illustrates the ineffective application of enforcement and sanctioning systems which hitherto were the main vehicles for ensuring compliance' (Ministry of Local Government and Rural Development, 2010, p.17). Given the difficulties of managing enforcement activities it is surprising that the 2010 policy from Ghana reiterates the intention to engage in continued monitoring and enforcement of legislation for domestic latrines.

4.2.6 Education and training on standards

In the sample documents, the most commonly proposed approach for educating people about latrines is to make the dissemination of guidelines or manuals part of a wider awareness raising programme for sanitation and hygiene activities. Section 4.2.3.4 gives the list of names given to these guidelines, manuals and standards. However, in order to develop and disseminate this information there are financial implications. The National Sanitation and Hygiene Strategic Action Plan from Ethiopia and the National Sanitation Strategy from Namibia are the only documents to acknowledge the need to allocate a budget for disseminating the guidelines, however, in both cases it is a very small amount. In

Ethiopia the budget was set at 480USD per region for printing and transport costs. That equates to a total budget of 4,320USD for printing all the manuals, guidelines and handbooks and distributing them to the regional level (Ministry of Health, 2011, p.33). In Namibia the total dissemination budget over five years is 50,000 Namibian Dollars which in April 2009 was equivalent to approximately 5,600USD (Ministry of Agriculture, Water and Forestry, 2009, p.34). In addition, whilst the activity is budgeted for in the strategic plan it does not mean that the budget will be available, as demonstrated in section 6.4.3.1 which discusses the availability of a sanitation budget in Rwanda.

The main focus for education and training is on local authorities and communities. In all of the documents from the sample, training activities are focused on upgrading the knowledge and skills of local authorities, builders, technicians or artisans and community workers. Training for those doing construction (builders, technicians and artisans) focuses on technology choice and appropriate construction methods. This links back to the discussion in section 4.2.4.1 about the promotion of 'allowable' and 'approved' technologies. In the case of the National Sanitation and Hygiene Strategic Action Plan from Ethiopia it is stated that artisans will be certified and accredited as suitable for providing services and that they are required to provide a guarantee or warranty for their products (Ministry of Health, 2011, p.44).

As stated in section 4.2.4.2, Ethiopia is the only country to outline 'minimum requirements' for a household latrine. Whether or not an understanding of these minimum requirements will form the basis of the accreditation is unknown, but this is the only document in the sample to refer to any sort of formal accreditation for those constructing latrines. However, the minimum requirements can be met in a variety of ways. Whether or not the certification of builders and the issue of warranties will lead to the introduction of a 'standard model' depends entirely on how the builders are trained and assessed. The same could be true in the other countries that want to focus on training latrine builders and providing technical information on latrine construction. Although the Strategic Action Plan from Ethiopia contains no intention to introduce a 'standard model' the process of accreditation could lead to the standardisation of designs by default.

Training for community workers and local authorities focuses on monitoring, education and processes of ensuring compliance, which reflects the assumption that household latrines will be subject to some level of monitoring in most cases, even if it is community led. In the cases of Nigeria and Namibia the local government is tasked specifically with providing technical assistance to households for up-grading on-site sanitation facilities. The technology focused training and provision of technical assistance reflects the understanding expressed in section 4.2.4.1 that the government is expected to provide allowable and appropriate technical information to communities.

It is also somewhat surprising that there are no references to the training of environmental health, civil or environmental engineering and public health students in any of the documents. After completing their studies and entering the professional market, these professionals have the potential to play key roles in the achievement of national objectives for improving sanitation and hygiene countrywide.

4.3 Standards in guidelines, manuals and training guides

4.3.1 The confusion surrounding standards and guidelines

Guidelines, manuals and technical norms are discussed in section 2.4.3.1 as some of the sources where standards can be found. Section 4.2.3.3 listed thirteen different names for guidelines, manuals and standards that were found in the sample of policy and strategy documents. In four of the documents ‘standards and guidelines’ are referred to in the same phrase but in six of the documents standards and guidelines or manuals are referred to as separate things. In the National Sanitation Strategy from Namibia guidelines are expected to include standards (Ministry of Agriculture, Water and Forestry, 2009, p.28) and in the National Environmental and Sanitation Hygiene Strategy from Kenya it is expected that there will be ‘guidelines on required minimum standards’ (Ministry of Public Health and Sanitation, no date, p.4). Reviewing a sample of the guidelines and manuals available helps to further understand if standards are found in these types of documents and how they are perceived. Table 14 presents the framework used to analyse the guidelines and manuals. The quick reference tables are presented in annex 2. There are more differences between the different guidelines and manuals than there are between the policies and strategies analysed in section 4.2, therefore, the framework presented in Table 14 had to go through several iterations before it could be applied to the full range of documents. Table 15 outlines the countries for which a guideline, manual or training guide was available.

Table 14 Framework analysis of guidelines and manuals

Theme	Sub-theme	Reason for inclusion
Overview	Year and title	Context
	Lead organisation/institution	In a multi-stakeholder sector it is important to see who has developed what
	Role of document	Context
	Standard discussed?	Are standards discussed explicitly? (e.g. is the role of the document to set a standard)
Contents	Key considerations in selecting latrines	
	Description of technology or technologies	Are specific technologies described
	Pictures of technologies	Is the information presented in pictorial form and what information to the pictures convey
	Dimensions given	Are dimensions given and if so which ones
	Drawings given	Are drawings given and is so how much information do they have
	Advantages and disadvantages	Is there a discussion about advantages and disadvantages of the technologies
	Instructions for using latrine	Are there instructions for using the latrine
	Instructions for maintaining latrine	Are there instructions for maintaining the latrine (e.g. is O&M considered)
	Costs	Are any costs presented
	Types of materials	Are the materials to be used specified or suggested
	Upgrading possible	Is it possible to upgrade the design or is upgrading promoted

Table 15 Countries with a guideline, manual or training document for household latrines

Country	Document	Date	Lead institution/organisation
Ethiopia	Construction Usage and Maintenance of Sanitary Latrine Extension Package	2004	Ministry of Health
Ghana	Sector Guidelines: Small Communities Design Guidelines	2010	Community Water and Sanitation Agency (CWSA)
Ghana	Sanitation: A construct it yourself manual on VIP latrine	1991	Wateraid
Kenya	Sanitation field manual for Kenya	1987	Ministry of Health
Kenya	How to construct a brick VIP latrine	1991	Greenacre N
Liberia	The guidelines for water and sanitation service in Liberia	2010	Ministry of Public Works
Lesotho	A VIP Latrine Builders Manual	No date	No author
Malawi	Sanitation Trainers Guide	2011	Ministry of Irrigation and Water Development
Nigeria	VIP latrine construction. Do it yourself manual	1990	UNICEF and Ministry of Health
South Africa	Sanitation Technology Options	2002	Department of Water Affairs and Forestry
Sudan	Small Project Training Manual: Volume 3 Sanitation	1987	No author
South Sudan	Technical Guidelines for the Construction and Management of Household Latrines: A Manual for Field Staff and Practitioners	2009	Ministry of Irrigation and Water Resources – Government of National Unity
Tanzania	Training of Trainers Manual on: Sanitation Marketing, Community-led Total Sanitation, Handwashing with Soap	2009	WSP Tanzania
Uganda	Ecological sanitation: Design and Construction	2003	Ministry of Lands, Water and Environment: Directorate of Water Development
Uganda	National Sanitation Guidelines	2000	Ministry of Health
Zambia	Why A Pit Latrine: A manual for latrine builders and extension workers	No date	Independent author
Zimbabwe	Double Compartment Blair Latrine Builders Instruction Manual (2 nd edn)	1988	Ministry of Health
Zimbabwe	The Blair VIP a Construction Manual	2011	Morgan,P

In countries where subsidy programmes have been used to build latrines, construction standards are set with the intention of ensuring good quality builds and the correct application of the subsidy and are therefore more visible in the programme documents. For example, in the Guideline Implementation Manual for Department of Water Affairs and Forestry Funded Household Sanitation Projects a VIP latrine is considered the minimum acceptable design for a basic level of service and there is a detailed checklist to be completed which covers all aspects of the construction (Mvula Trust, 1997, p.15 annex). However, as discussed in section 2.4.1.10, supply driven subsidy programmes are not as

common as they used to be now that the focus has shifted to demand creation approaches. Whilst this type of subsidy based document is useful in understanding how current latrine designs may have been influenced by past experiences and how the subsidy supported latrines may be perceived as 'standard models', this type of document has not been included in the sample used in this section if a more recent document from the same organisation was available. For example, in the document on Sanitation Technology Options from South Africa (Department of Water Affairs and Forestry, 2002) the subsidy programme described by the Mvula Trust (1997) is no longer referred to and there are no references made to standards or checklists for any latrine designs which would imply that the 'standard model' promoted under the subsidy programme is no longer relevant.

4.3.2 Overview of the documents

4.3.2.1 Intended users of the documents

There are a wide range of documents in this sample ranging from the 1980s to the current decade. The inclusion of older documents in the sample is interesting because they can reflect the history of latrine construction in a country and will have contributed to shaping the current knowledge about latrine construction. As discussed in section 2.4.3.3, changing construction techniques can take time, especially if there is a long history of doing something a certain way, for example, changing the shape of a pit from rectangular to circular or reducing the depth of the pit.

The documents used in this sample are all written for specific countries, those from international organisations which provide information on latrine construction in general have not been included. All of the documents presented in Table 14 are designed to be used as training guides for locally based staff (e.g. health workers, planners), as training guides for masons or builders or as sources of information for households themselves. A majority of the documents are intended for builders or trainers (e.g. community workers), only three of them are designed specifically for use by communities or households; the Blair VIP construction manual from Zimbabwe, the VIP construction manual from Nigeria and the sanitation technology options document from South Africa.

4.3.2.2 References to standards

Standards for latrines are only discussed in two of the documents from the sample. The Blair VIP Construction Manual from Zimbabwe is the only document to make reference to a specific technological standard, a 'standardised brick Blair VIP', but the standard is set in the national policy rather than the construction manual (Morgan, 2011, p.3). In the case of South Sudan the 'minimum standard' is ownership of one latrine per family (Ministry of Irrigation and Water Resources, 2009, p.15) but there are no technical standards presented.

In some of the other documents there are more tenuous links to standards but none of the documents state explicitly that the latrine models presented must be built. The adoption of specific latrine models is implied in the Small Communities Design Guidelines from Ghana which states that designs will be provided by the CWSA and that construction of latrines

shall be 'assigned to certified artisans and small-scale contractors' (Community Water and Sanitation Agency, 2010, p.10). By providing the designs and by certifying specific builders to construct the latrines the CWSA will establish a level of standardisation throughout their project areas. As discussed in section 4.2.2.2, the Environmental Sanitation Policy from Ghana (Ministry of Local Government and Rural Development, 2010) makes reference to standards and guidelines for sanitation generally but does not specify the use of particular technologies or the achievement of a particular service level for household latrines. As the sector guidelines are intended to guide CWSA projects rather than providing information to communities or households the use these designs may not be applicable to construction activities outside the remit of the programme. However, there is potential for the designs to become unofficially recognised as 'standards' which could influence perceptions about how all latrines are supposed to be constructed including those unrelated to the programme. This example demonstrates how projects and programmes can influence standards, as described in section 2.4.1.10 and how there is the potential to set informal standards that are not necessarily supported by national policy and strategy documents.

In the Double Compartment Blair Latrine Builders Instruction Manual from Zimbabwe, at the bottom of each page is the statement 'build according to instructions' (Ministry of Health, 1988). This manual dates from the time when VIPs were standardised in Zimbabwe but has since been superseded by a later version from 2011 which includes a new design for the BVIP which can be upgraded over time.

In the VIP construction manual from Nigeria the superstructure is supposed to be 'architecturally compatible' with the main house (Ministry of Health and UNICEF, 1990, p.17). The same idea is expressed seventeen years later in the National Water and Sanitation Policy from Nigeria, which expects latrines in rural areas to have an 'appropriate super-structure matching other buildings in the area' (Federal Ministry of Water Resources, 2004, p.7). In the VIP construction manual from Kenya it states that the use of local materials is encouraged but that they should 'conform with materials used for the local house, if not better' (Greenacre, 1991, p.30). In these two examples, although there are no standard models presented, an expectation about the latrines appearance has been set.

Technical drawings and BoQs

Eight of the documents provide detailed drawings with enough dimensions to enable them to be used for construction. A further two documents provide basic drawings with some dimensions. Dimensioned drawings (also known as working or technical drawings) can be considered as both part of the hardware of latrines and part of the software. On the hardware side they are linked to the physical construction of a latrine, and on the software side they can provide detailed information to people who want to build a latrine, and to those who want to modify an existing design or change the materials used. They are also useful for planning and calculating the up to date costs of construction based on locally available materials because they can be used to develop BoQs.

Four of the documents from the sample provide Bills of Quantities (BoQs) for different models of latrines. In these cases it can be argued that by providing a BoQ with specific material requirements the document is in effect promoting a 'standard model' of latrine,

especially if the BoQ is accompanied with detailed construction instructions and working drawings. However, it can also be argued that the BoQ provides valuable information for a person wanting to construct a latrine because by knowing exactly what materials are required, it is possible to calculate an accurate price. In this case, a BoQ could act more as guidance for decision making rather than as an instruction to be followed. In the case of Malawi, the BoQ is provided in a sanitation trainers manual which supports the development of sanitation as a business and is included specifically to help sanitation entrepreneurs in developing a business plan and establishing accurate costs for their materials and labour. For the three remaining documents it is not possible to determine what role the BoQ is supposed to play.

The potential problem with providing design related information is that it can set certain expectations in people's minds about the way that latrines should be constructed, the materials which should be used and the types of latrine available. In this way, design guides and manuals can become unofficial standards if people believe that the options presented are the only ones available, especially if they are promoted under the banner of 'allowable' or 'approved' options as discussed in section 4.2.4.1. The extent to which this happens would have to be assessed on an individual country basis.

4.3.3 Style and content of the documents

The documents vary in content from being nearly completely picture based with very little text to being predominately texted based with very few pictures. The documents aimed specifically at communities or households are the ones which are predominately picture based and usually only contain instructions for one type of latrine (e.g. a VIP) with possible variations (e.g. single or double pit), but they are also the older ones in the sample. In the case of Ghana, the construct it yourself manual on VIP latrines was picture based and was created specifically because existing manuals were considered too technical for people to use (Wateraid, 1991, p.2).

As stated in section 4.3.2, a majority of the documents in the sample are intended for builders or trainers and as such contain information on several different options for latrines. There is no consistent style to the guidelines and manuals analysed in this section but some commonalities can be highlighted. Where the manuals and guidelines are intended for use by builders or artisans, they tend to contain more pictures, more detailed step-by-step construction information and in most cases, drawings with at least some dimensions on them. The style of drawings ranges from hand-drawn sketches to computer generated working drawings. When the manuals and guidelines are intended for use by trainers (e.g. public health workers or community health workers) they tend to contain more information related to sanitation and hygiene generally with less focus on latrines in particular. Drawings are still provided but they focus more on what the latrine can look like and how it works rather than the construction aspects. The number of dimensions provided is limited which would make it difficult to use them as construction guides. A majority of the documents from the sample include at least basic information on operating and maintaining the latrines described. The cost of construction is only estimated in two of the

documents, the Blair VIP construction manual from Zimbabwe and the WIP construction manual from Nigeria.

4.3.4 Flexibility and upgrading

The issues of flexibility and upgrading are interesting to consider. In the National Guidelines from Uganda it states specifically that there should be a focus on gradual improvements rather than the imposition of 'one inflexible national standard' (Ministry of Health, 2000, p.27). In the Training of Trainers Manual from Tanzania it is acknowledged that promoting a single standard design for latrines has failed to work in the past (WSP Tanzania, 2009, p.20). In these two cases a standard refers to a standard model which is seen as a constraint and a problem. However, the issue of how flexible the guidelines should be is not addressed in either case.

It was discussed in section 2.4.3.3 of the literature review that governments can find it difficult to relinquish control over standards and it can be difficult to show support for 'below standard' construction when there are national and international targets to achieve. Section 4.2.4.1 discusses the role of governments in developing and disseminating information on latrine designs to households but acknowledges that it is difficult to determine from the documents how local innovations will be perceived and if they will be supported or not. For governments aiming for a higher degree of standardisation, support for local innovations which deviate from the 'standardised model' are less likely to be supported.

Morgan (2011, p.3) states that the Government of Zimbabwe has accepted a more simple version of the Blair VIP which is upgradable, instead of the standardised brick Blair VIP which was formerly required. The removal of large but unsustainable material subsidies has been the catalyst for adopting what can be viewed as a lower standard in order to encourage a higher level of self-financing and a greater uptake in latrine use in the long term. However, there is a long standing relationship between the government and the developers of the upgradeable Blair VIP which may make the compromise easier to negotiate. Morgan (2011, p.3) also states that the new design is on trial and being monitored by the government. Therefore, the government is still retaining a certain level of control over the design, development and eventual adoption at the national scale.

4.4 Key findings from the analysis of SSA documents

It is acknowledged that the sample used in this study is small and the results cannot be considered to represent a generalisation of documents from Sub-Saharan Africa as a whole. However, the following conclusions can be drawn. The questions are taken from the conceptual framework and the text in brackets shows which of the five concepts are interacting within the framework.

Where are standards found? [Regulation and Development]

Throughout all of the documents found from Sub-Saharan Africa there are very few specific references to standards for household latrines. Only two policies and strategies set service standards based on the adoption of specific technologies. In South Africa a VIP is considered to represent a 'basic' level of service whilst in Nigeria, service levels are set according to place of residence. In the sample of guidelines and manuals none of the documents present a standard technology or a standardised service level. Only documents from Ethiopia (MoH, 2006) and Nigeria (UNICEF and MoH, 1990) present criteria which latrines should meet, but these are subjective and open to interpretation, e.g. privacy. In Malawi the requirement is that households have some kind of latrine but there are no references to specific types which should be used. In most cases, the construction, ownership or use of a household latrine is encouraged or strongly encouraged but mandatory ownership it is not made explicitly clear. A majority of the documents expect the use of a household latrine to become a social norm. Therefore, for a majority of these sampled documents it cannot be said that they are presenting either service or technical standards for latrines.

How are standards viewed? [Role and Regulation]

All references to the use of standard or prescribed models in the sample of documents are negative and none of the documents discuss an intention to develop a standard latrine model. However, in a majority of the documents there is a general acknowledgement that some form of standardisation of latrines would be useful. Section 4.2.3.4 listed thirteen different names for guidelines, manuals and standards that were found in the sample of policy and strategy documents which governments intend to develop or re-publish. Based on this understanding is the idea that national governments should select and disseminate a list of 'approved' latrine models which are intended to provide households with relevant information to support the demand responsive approach.

In all of the documents from the policy and strategy sample, training activities are focused on upgrading the knowledge and skills of local authorities, builders, technicians or artisans and community workers. Training for those doing construction (builders, technicians and artisans) focuses on technology choice and appropriate construction methods which reinforces the understanding that one of the governments roles is to provide a list of 'allowable' and 'approved' technologies.

There are a variety of terms used to discuss standards and the phrase 'standards and guidelines' was found in several of the policy and strategy documents along with the terms 'minimum requirements', 'minimum standards', 'allowable' and 'approved' technologies, construction standards, 'technical guidelines' and 'national standards'. Whether or not guidelines, manuals, BoQs or any other type of document listed in section 4.2.3.3 are considered standards has to be assessed on an individual country basis.

What do standards look like? *[Development and Use]*

There is no common understanding of what a standard is and what one might look like from the documents in this sample. Although it is understood that the prescription of a standard model is not desirable, there is little discussion on what should be included in a standard and what one should look like.

Despite the fact that most of the documents do not include references to specific technologies, all the documents in the sample state key considerations which should be taken into account when selecting a latrine. In terms of standards, these criteria could be considered as a code of practice in each country. A majority of the documents considered affordability and environmental sustainability to be key considerations in selecting a latrine.

Although there is no consistent style to the guidelines and manuals analysed in this chapter some commonalities can be highlighted. Eight of the documents provide detailed drawings with enough dimensions to enable them to be used for construction. A further two documents provide basic drawings with some dimensions. Where the manuals and guidelines are intended for use by builders or artisans, they tend to contain more pictures, more detailed step- by step construction information and in most cases, drawings with at least some dimensions on them. When the manuals and guidelines are intended for use by trainers (e.g. public health workers or community health workers) they tend to contain more information related to sanitation and hygiene generally with less focus on latrines in particular. Drawings are still provided but they focus more on what the latrine can look like and how it works rather than the construction aspects. The number of dimensions provided is limited which would make it difficult to use them as construction guides.

Is regulation required? *[Regulation and Consensus]*

For the documents in this sample there is only one specific reference to the regulation of household latrines in the National Sanitation Policy from Ghana in 1999 but that document is superseded by the later 2010 version. None of the other documents refer to the regulation or enforcement of standards for household latrines in particular but where the regulation of more general standards for sanitation, hygiene or environmental standards is discussed it is expected that these will be regulated. However, the extent to which household latrines are covered under the umbrella of sanitation, hygiene or environmental standards needs to be identified on an individual country basis. The issue of regulating standards for household latrines is complicated by the dynamic between the private and public nature of household latrines. On the one hand there is an understanding that households should make their own decision on the type of latrine to build and use but on the other there is an expectation that they will make the 'right' decision based on the acceptance of an 'approved' model from the government which meets international standards of being improved.

How can standards be regulated? *[Regulation and Use]*

Responsibility for enforcing the standards related to sanitation, hygiene and the environment is in all cases given to decentralised structures including local government,

public sector technicians, environmental health officers, community WASTAN groups and communities themselves. Training for community workers and local authorities focuses on monitoring, education and processes of ensuring compliance, which reflects the assumption that household latrines will be subject to some level of monitoring in most cases, even though there are very few cases of standards being available to monitor against. The use of fines, penalties or other traditional sanctions is proposed in half of the policy and strategy sample documents but in most cases it is stated that current regulatory frameworks need to be updated because existing laws are no longer fit for purpose. Even in countries where compliance is supposed to be enforced, in practice the systems in place and the limited availability of resources limits the potential for widespread enforcement activities.

4.5 Standards in policies and strategies from Rwanda

The documents in this section are divided into the same categories as those from Sub-Saharan Africa; policies and strategies and guidelines and manuals and were analysed using the same frameworks. The quick review tables are presented in annex 2. Table 16 lists the policy and strategy documents found for Rwanda.

Table 16 Policies and strategies from Rwanda

Lead institution	Document	Date
MININFRA	Water and Sanitation Sector Strategic Plan 2013/14 - 2017/18	2013
MININFRA	National Policy and Strategy For Water Supply and Sanitation Services (NPSWSSS)	2010
MININFRA	National Strategic Plan on Sanitation	2008
MINIRENA	Sectoral Policy on Water and Sanitation	2004
MoH	Environmental Health Policy	2009

4.5.1 Document overview

4.5.1.1 Title and lead institution

The two main institutions with a responsibility for sanitation in Rwanda are the Ministry of Infrastructure (MININFRA) and the Ministry of Health (MoH). The responsibility for water supply and sanitation was transferred to MININFRA from the Ministry of Lands, Environment, Forests, Water and Natural Resources (MINIRENA) in 2008. The Sectoral Policy on Water and Sanitation from MINIRENA in 2004 is predominately focused on water supply rather than sanitation. The National Policy and Strategy for Water Supply and Sanitation Services (NPSWSSS) (MININFRA, 2010) was written to try and redress the balance between water supply and sanitation.

4.5.1.2 Household latrines mandatory or encouraged

The ownership or construction of a latrine is not expressed as a mandatory requirement in any of the policy or strategy documents. In the NPSWSSS sanitation is understood to encompass liquid waste and excreta, solid waste and storm water management. In Rwanda, access to basic sanitation is defined as ‘access to a private sanitation facility of one of the following types: flush or pour-flush to piped sewer system, septic tank or pit latrine, ventilated improved pit latrine (VIP), pit latrine with slab, composting toilet, or other ecosan toilet’ (MININFRA, 2010,p.35). A pit latrine with a slab is therefore the lowest level of technology presented. An improved or hygienic latrine is defined as ‘a sanitation facility, the use of which effectively breaks the cycle of disease transmission’ (ibid, p.62). This statement expresses the level of service which is expected but does not specify the use of particular technologies in order to achieve it. The definition of full sanitation coverage is extended to include accessibility to all, use and proper maintenance.

4.5.2 Understanding how standards are discussed

In the Sectoral Policy on Water and Sanitation it only states very broadly that ‘the country is not yet equipped with drinking water quality, distribution and sanitation national standards’ (MINIRENA, 2004, p.16). This is given as a constraint on making progress but there are no further references to standards in the document. The extent to which these standards would apply to household latrines is unknown. The Environmental Health Policy (MoH, 2009) discusses the importance of sanitation at the household level but does not make any references to standards for sanitation services or latrines. The Water and Sanitation Sector Strategic Plan 2013/14 -2017/18 (MININFRA, 2013) focuses on the State’s role in sanitation which is to promote education and behaviour change at the household level. The government is only responsible for public and institutional latrine construction. It also contains no references to standards for household latrines.

The National Strategic Plan on Sanitation from 2008 states the need to define norms and standards at different levels (e.g. urban, semi-urban and rural) and the need to define minimum standards for latrines (MININFRA, 2008a, p.14). In the NPSWSSS defining ‘minimum standards for sanitary facilities’ is given as a strategic action to implement (MININFRA, 2010, p.76). The NPSWSSS states that the Rwanda Bureau of Standards (RBS) will be involved in the standardisation of sanitation technologies (ibid, p.22) and it is expected that manuals will be developed to help disseminate the information. However, there is no further indication on what information the manuals will contain or who they will be intended for.

The Government of Rwanda uses a Common Performance Assessment Framework (CPAF) to select annual indicators that can be used by donors to assess the government’s performance against specific policy actions. It is primarily used when donors are providing budget support. In the CPAF for the water supply and sanitation department of MININFRA, standards are referred to as follows;

Under the EDPRS strategic objective of increasing the percentage of the population using hygienic sanitation facilities the policy action is given as 'develop and promote sanitation facilities and hygiene'. The expected outputs for policy actions are as follows;

- 2010/2011: Put in place the norms and standards of sanitation in Rwanda
- 2011/2012: Reinforce capacity of decentralised organs in management of sanitation facilities.
- 2012/2013: Dissemination of norms and standards of sanitation

Responsibility for these activities is given to MININFRA, MoH and the district authorities. (MININFRA, 2008b, p.8). Further references are made to the development of 'National Sanitation Guidelines' in the detailed logframe for WATSAN activities in 2009. The guidelines are expected to be in place by 2010 with a 'sanitation standards report' available and published (MININFRA, 2009a, p.5).

In 2013 a new strategic plan was introduced to cover the next phase of the EDPRS (MININFRA, 2013). In this strategic plan there are no references to the need to develop minimum standards for latrines, guidelines or manuals, therefore, it is understood that the production of the Guideline of Latrine Technologies Usable in Rwanda (MININFRA, 2011) has satisfied this need. This document will be analysed in section 4.6.

4.5.3 Technology choices

The NPSWSSS is the only document to provide a list of improved technologies. Levels of open defecation are already very low nationally, but it is strongly discouraged in cases where it is still practiced. None of the documents provide any type of technical specifications and only the NPSWSSS outlines some key considerations for selecting a latrine. These are affordability; user preference; status; health benefits; safety and environmental protection. Affordability and environmental sustainability were the two most frequently cited considerations for selecting a latrine in the policies and strategies from other countries in Sub-Saharan Africa in section 4.2.4.2. Acceptability to the users and safety were the next two highest scoring considerations. Therefore, there is a consistency in the key considerations listed in policy and strategy documents.

It is acknowledged in three of the documents that the current latrine options are expensive (MININFRA, 2010, p.10; MININFRA, 2008, p.6; MINIRENA, 2004, p.17). Consequently, the main focus of research and development activities is to reduce the cost of on-site latrine technologies. The development of sanitation showrooms is promoted in conjunction with practical field testing of technologies in order to promote them more widely in communities (MININFRA, 2010, p.66).

4.5.4 Monitoring, enforcing and regulating standards

The only reference to enforcing standards is found in the Sectoral Strategic Plan from 2008 in which it is stated that compliance with the norms and standards for urban, semi-urban and rural areas is expected (MININFRA, 2008a, p.10). In order to achieve this it is anticipated that a 'technical team' will be appointed to inspect buildings, including domestic, public and private ones (ibid, p.16). However, the lead institutions for this action

are MININFRA and Kigali City Council, therefore, the applicability of inspection and compliance outside of Kigali City is questionable. None of the other documents contain references to the enforcement of standards specifically and in the Environmental Health Policy active enforcement is discouraged in favour of voluntary compliance (MoH, 2009, p.13).

Although Public Health Laws are outdated (MoH, 2009, p.17) and in a current phase of renewal, provisions for the regulation of human waste are made in the 'Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda' (Rwanda OG. No.4, 2005, p.25).

- Under Article 3 it states that 'every person has the duty to protect, conserve and promote environment'.
- Under Article 81 'defecating or urinating in inappropriate place is prohibited'
- Under Article 107 a person can be punished with a fine of ten thousand (10,000) Rwandan francs or 'be compelled to clean the place where persons have polluted public or private property with human and domestic waste, except if such a place has been designated by the competent authorities' (Rwanda OG. No.4, 2005, p.42).

Therefore, although ownership of a household latrine is not given as a mandatory requirement in any of the policies and strategies, open defecation is punishable by a monetary fine. Consequently, this means that everyone is expected to use a latrine of some sort for urinating and defecating but there are no indications of the type of latrine to be used.

4.5.5 Education and training on standards

There is no specific training on standards proposed in any of the documents. Training and educational activities are expected to focus on upgrading the skills of community health workers, practical skills of the informal sector (e.g. masons) and management capabilities of district level staff to enable them to manage the full range of sanitation projects within their remit, not just household latrines.

4.6 Standards in guidelines, manuals and training guides from Rwanda

In addition to MININFRA and the MoH there are two other institutions with a responsibility for sanitation. The Rwanda Environment Management Authority (REMA) has a broad remit which includes protection of the environment and vulnerable ecosystems from the effects of pollution, including pollution from latrines. The remit of the Rwanda Housing Authority (RHA) includes the implementation of national housing and urbanisation policies which includes household latrines to a small extent. Table 17 presents the list of documents found for analysis in this section.

Table 17 List of guidelines, manuals and training guides from Rwanda

Lead institution	Document	Date
MININFRA	Basic Housing Construction Instructions for Protection Against Natural and Manmade Disasters in Rural Areas	2012
MININFRA	Project de construction de latrine familiale VIP non vidangable	2011
MININFRA	Guideline of Latrine Technologies Usable in Rwanda	2011
MoH	Manual for Training of Environmental Health Officers	2011
MoH	Manual for Training of Facilitators and Community Health Workers	2011
MoH	Roadmap to CBEHPP	2010
REMA	Practical Tools for Sectoral Environmental Planning #1	2010
REMA	Practical Technical Information on Low-cost Technologies such as Composting Latrines and Rainwater Harvesting Infrastructure #9	2010
RHA	Building Control Regulations	2012

4.6.1 Document overview

The documents found for analysis in this section are from a number of different organisations in Rwanda with a remit to deal with sanitation. The roles of these documents from the different institutions are briefly summarised as follows;

Organisation: Ministry of Infrastructure

The primary role of the guidelines on latrine technologies is to protect health by supporting the adoption of appropriate ‘hardware’ [a ‘sanitary latrine’] and setting ‘minimum standards’ (MININFRA, 2011, p.18). There is a lack of knowledge on how to construct and maintain pit latrines within households which results in poor quality construction, design faults, unsafe facilities and poor maintenance habits (REMA, 2010b, p.6). Therefore, in addition to setting a minimum standard, the second stated role of the guidelines is to provide ‘guidance and information about technologies, norms and standards, costs and maintenance’ to help people make their own decisions about the technology they want (MININFRA, 2011, p.2).

The Basic Housing Construction Instructions for Protection Against Natural and Manmade Disasters in Rural Areas have been developed to raise the standard of basic construction skills in rural areas in order to reduce damage and death caused by the effect of extreme weather conditions on poorly constructed buildings (MININFRA, 2012, p.3).

The working drawings included in the sample are from the Programme National d’Alimentation en Eau potable et Assainissement en milieu Rural (PNEAR) a programme supported by the African Development Bank. The project is primarily focused on water supply and institutional or public latrine construction, however, there is a household sanitation element which involves training community health workers, training masons and running awareness raising campaigns. In the first phase of PNEAR, 2,120 household latrines were built. In the second phase that number was increased by a further 16,000. The latrines are constructed for vulnerable households and those least able to provide their own hygienic facilities.

Organisation: Ministry of Health

The Community Based Environmental Health Promotion Programme (CBEHPP) is designed to empower communities and actively promote their participation in solving community specific sanitation and hygiene problems. The primary mode of implementation is to strengthen the capacity of 45,000 community health workers (CHW) who then facilitate the formation of community health clubs (CHCs) in each village (MoH, 2010). The approach works through a system of education and peer-pressure with each CHC given the responsibility of monitoring activities within their village. There are three components to the CBEHPP training kit, the 'Manual for Training of Environmental Health Officers' (EHOs), the 'Manual for Training of Facilitators and Community Health Workers' and the 'Toolkit for Participatory Sessions in CHCs'.

Organisation: Rwanda Environment Management Authority

REMA has developed a series of toolkits which are designed to strengthen environmental management capacities of local authorities (REMA, 2010a). There are two documents in the series that apply to sanitation, one is primarily a tool for planners which focuses on the management of household liquid and solid waste to reduce the potential for environmental contamination. The second provides an overview of the different latrine technologies available, with a particular focus on composting latrines which REMA considers to be any latrine from which a useful product can eventually be acquired (e.g. arborloo, skyloo, VIP and ecosan).

Organisation: Rwanda Housing Authority

The Rwanda Building Regulations have been developed to support construction professionals and urban planning professionals with the overall aim of providing a baseline from which to operate (RHA, 2012a, p.2).

4.6.2 Existing legislation

The existing legislation on toilets and latrines applies primarily to Kigali City. Kigali City is usually considered as a separate entity and as such is subject to by-laws on cleanliness in the city (Rwanda, OG No 52 Instruction No. 01/11 of 23/10/2011). The instruction covers cleanliness in residential houses and designates a fine for not having a toilet, which is 10,000 Rwandan Francs (approximately £10). It also states that all houses with flush toilets must have a septic tank.

Kigali City Council passed a bylaw requiring the installation of flush toilets in all newly constructed houses (Babijja, 2012). The Rwanda Building Regulations state that building owners must convert to a waterborne system of excreta disposal when it becomes possible to connect with a water supply system providing a minimum of 75 litres per person per day (Rwanda Housing Authority, 2012a, p.42). Flush toilets are used by 8% of households in Kigali City (City of Kigali, 2013, p.40).

4.6.3 References to standards

According to the building control regulations, all rural residents of Kigali City are required to have ‘at least’ a VIP latrine (RHA, 2012a, p. 68; Kigali City Council, 2007, p.1). Rural in this context means peri-urban. In the guidelines on latrine technologies the ‘absolute minimum standard’ for a pit latrine is that it is sealed, cleaned and maintained. Sealed refers to the presence of a hole cover for the slab and that any ventilation pipe is screened (MININFRA, 2011, p.18). These minimum standards relate to the use and maintenance of a latrine rather than to any technical requirements although the use of a vent pipe would suggest that the construction of a VIP is expected.

The technologies included in the guidelines are pit latrines, VIPs, ecosan, cistern flush and mobile toilets for use in public places like markets or bus stations. Toilets connected to biogas systems are also discussed as an option for institutional toilets. Technologies are presented according to applicability in the different geographical regions but no distinctions are made between urban and rural areas. Despite stating the minimum standard for a latrine the guidelines state that ‘the reader should choose a model of technology that fulfils the criteria of ‘Sanitary Latrine’ (MININFRA, 2011, p.2). Therefore, whilst the guidelines present a minimum standard, users of the guidelines are encouraged to adopt a better type of latrine. A latrine is considered a ‘sanitary latrine’ if it has a good infrastructure, is hygienic and is ecologically acceptable. Table 18 presents the characteristics required for a latrine to be considered ‘sanitary’.

Table 18 Characteristics of a ‘sanitary latrine’

Infrastructure	Hygienic	Ecologically acceptable
Substructure to contain excreta and prevent leakage Washable slab Washable cover (for the drop hole) Superstructure which gives privacy and dignity Roof to stop rain entering the latrine	Odour free No flies Clean Air flow so not humid Have a hand washing facility Be covered (the drop hole)	Not pollute or contaminate soil Not pollute or contaminate surface or ground water No files and to stop the entrance of animals Not require high technology Not produce odour and give ugly sight

(Adapted from MININFRA, 2011, p.18)

In the NPSWSSS the lowest level of technology referred to is a pit latrine with a slab. Whilst the construction of a sanitary latrine is not mandatory in either the NPSWSSS or the guidelines on latrine technologies, the characteristics of a sanitary latrine are more comprehensive than the pit latrine with a slab referred to in the NPSWSSS. There is also a significant jump from the requirements of the ‘minimum standard’ which are based on use of a latrine to those for a ‘sanitary latrine’ which include both use and structural elements.

In the basic housing instruction document it is recognised that there are four different categories of housing which can be constructed according to financial capacity. However, there is only one type of latrine presented, which is considered to be applicable across the

four different categories. Throughout an 82 page document on constructing houses in rural areas there is only one figure of a pour flush latrine with some basic dimensions which would be insufficient for use during construction. Pour flush latrines are not common in Rwanda, coverage in rural areas is 0.1% (NISR *et al*, 2010, p.20). It is also not a technology promoted by community health workers (CHWs) in communities and is not included in the guidelines on latrine technologies so the reason for its inclusion in this instruction document is unclear.

In the practical technical information on composting latrines from REMA, composting latrines are preferred because they allow 'compliance with the Rwanda Sanitation Code' (REMA, 2010b, p.13). However, no references can be found to the 'Rwandan Sanitation Code' from other sources nationally and none of the experts in the Delphi study or the participants in the semi-structured interviews discussed it. Additional enquiries with REMA as to the existence and content of the Rwandan Sanitation Code were also unsuccessful. It is therefore impossible to determine the extent to which the code may or may not apply to household latrines and whether it still is, or has ever been, in effect.

Under the CBEHPP, household representatives attend training sessions on twenty sanitation and hygiene topics and are given 'homework' after each session. One of the pieces of homework is to improve the family latrine and an overall CBEHPP priority is to 'ensure safe excreta disposal with zero open defecation and hygienic use of toilets' (MoH, 2010, p.6). Waterkeyn (2011a, p.15) states that one of the main objectives of the CHC programme is to 'encourage all Rwandans to build their own latrines and hand washing facilities', however, this objective does not specify that the latrine should reach a particular standard or be of a particular type. The manual for training EHOs does not contain any references to specific latrine technologies or to standards for household latrines. In the manual for facilitators and CHW there is a household inventory to be completed. There are four questions relating to latrines. They cover type, cleanliness, use and anal cleansing methods. The responses are scored from 0-4 with a VIP gaining the highest score (Waterkeyn, 2011b, p.11). There are no standards presented, no technical specifications given and no indications that specific technologies are required, but upgrading as far as a VIP would receive the highest score on the latrine inventory.

4.6.4 References to regulation

The building control regulations clearly state that it is an offence to build a latrine which does not comply with the regulations and that a VIP can be forcefully closed or emptied if it becomes a nuisance or hazard (RHA, 2012, p.76). Building Inspection Guidelines have been created by RHA (2012b) to support the process of inspecting new construction projects, however, enforcement of these regulations is still a major challenge due to human and financial capacity shortages and they deal exclusively with the installation of flush toilets. In section 4.6.1 that discussed the role of the building control regulations, there is a specific reference to their use by urban planning professionals which would indicate that there is no intention to use them in rural areas.

The regulatory aspects of the basic housing construction instructions are unclear. The introduction to the document states that ‘this document will serve as a guide in addressing the needs and rationale for safer house development in rural areas; recommending a series of suggested steps that highlight key points that should be considered when planning a safer house construction and/or retrofitting initiative’ (MININFRA, 2012, p.6). This statement would imply that the guidelines can be voluntarily followed. However, it later states that ‘houses constructed without consideration of disaster resilience and maintenance instructions will be under local government disapproval as habitable or ready for occupancy’ (MININFRA, 2012, p.8) which implies that those who do not comply with the guidelines will be penalised by not receiving a certificate of habitation, which is a legal requirement in Rwanda. However, there are no references to any inspection process which are expected to take place. There are also no references to regulation, monitoring or compliance in the guidelines on latrine technologies from MININFRA or in any of the documents from the MoH.

4.7 Areas of confusion from the Rwandan documents

There are three key areas which can be highlighted from the Rwandan documents where there is the potential for confusion to occur.

4.7.1 Differences in technical information presented

Table 19 represents a consolidation of all the different ways that a household VIP latrine is presented in documents from Rwanda. As discussed in section 3.5.1, a majority of the population have a latrine, although most are considered unhygienic and unimproved. Therefore, the challenge in Rwanda is for households to move towards the use of an improved latrine. The VIP is considered to be an improved latrine and has therefore been used as the basis of comparison in Table 19. All of the documents in Table 19 have been produced nationally.

It should be highlighted that there are no documents from the health sector represented in Table 19. The health sector documents addressing household sanitation do not contain any technical information, which demonstrates the division of responsibilities between MININFRA and the MoH. MININFRA’s responsibilities include the ‘hard’ infrastructure side of sanitation whereas the MoH takes the lead on the ‘soft’ behaviour change side.

The Building Control Regulations (RHA, 2012a) give the most comprehensive list of requirements for a VIP latrine and they have the most well documented process for regulating construction and enforcing compliance, but their application is currently limited to urban areas, predominately Kigali City.

The working drawings are in use by the PNEAR project so the attributes presented represent the design of a ‘project’ VIP. The other documents are designed to be used by practitioners, planners and the households themselves. The ‘project latrines’ built through PNEAR cost approximately 183,500 RWF for the single pit and 429,500 RWF for the twin pit (approximately £183 and £429 respectively). In comparison, the VIP proposed in the

guidelines on latrine technologies costs 41,000 RWF (approximately £40) when built with locally available materials.

In addition to these documents, there are documents used by NGOs and other organisations in Rwanda which contain different information again. One example is a BoQ, developed by an NGO which sets the cost of a VIP latrine at 107,800 RWF (approximately £107) (Water for People, 2012, p.18). This price makes it cheaper than the PNEAR project latrine but still significantly more expensive than the model presented in the guidelines, primarily because of the materials used.

Table 19 demonstrates how there can be multiple variations of the same design being used in the same country. Although each of the documents could be used to construct a VIP, each one would be different from the others and in all cases at least one piece of information is missing and would need to be found from another source. For example, even though the building regulations are the most comprehensive they do not include any requirements for pit depth other than stating that the minimum time of use should be two years. The appropriate pit depth can be calculated according to the number of users but the calculation and necessary information is not presented. The building regulations also do not include working drawings or indicate where they should be found so it is assumed that these would need to be sourced elsewhere or would be available to the person carrying out the construction. This duplication and division of information between different government departments creates confusion in the sector and makes it more difficult for people to find the information they need.

Table 19 Specifications for a VIP latrine in documents from Rwanda

Attribute	Document				
	Building Control Regulations	Working drawings and BoQ from PNEAR* project latrines – normal latrine	Working drawings and BoQ from PNEAR project latrines – Special latrine (for difficult areas)	Guideline of Latrine Technologies Usable in Rwanda	Practical Technical Information on Low-cost Technologies such as Composting Latrines and Rainwater Harvesting Infrastructure
Author	RHA, 2012	MININFRA &PNEAR, 2011	MININFRA & PNEAR, 2011	MININFRA, 2011	REMA, 2010
Location from plot boundary	1.5 - 3m must be accessible to emptying vehicles at any time.				
Accessibility	Located on plot, accessible 24hrs/day				
Distance from house	<30m				
Superstructure material	Approved building material	Adobe (mud brick)	Adobe (mud brick)	Local or permanent	Local or permanent
Superstructure properties	Offer privacy, comfort & safety, strong & durable			Offer dignity and privacy	
Slab	Masonry superstructure: reinforced concrete Other: treated timber	Reinforced concrete	Reinforced concrete (twin pit design)	Reinforced concrete, ceramic, wood, plastic	Reinforced concrete
Superstructure dimensions (internal)	At least 2.1m high, 800mm wide, 1.2m long	2.18m high 1.2m wide 1.7m long	2m high 1.2m wide 1m long	2.2m high 1.1m wide 0.9m long	2.5m high 2m long
Pit lining	Lined or unlined	Unlined	Masonry lining	Lined	Unlined
Pit depth		6m	1.5m	3m	2m
Min pit use time	2 years				2 years
Ventilation pipe Ø	100mm	110mm	110mm		
Ventilation pipe materials	Internally coated/ lined galvanized metal, cast iron, masonry, concrete, (uPVC), fibre glass or other non-corroding material	PVC	PVC	Bamboo	PVC
Fly screen properties	Apertures not bigger than 1.5mm ²				
Seat (if used)	Adequately strong to support any user, smooth surface, cover to obstruct light				Wooden seat with cover to obstruct light
Emptying/closing	When contents are <0.5m from cover slab				When contents are <0.5m from cover slab

4.7.2 Overlapping mandates of institutions

The number of documents from different organisations in Rwanda with a remit to deal with sanitation highlights how multiple sources of information and a lack of clarity on the regulatory status of the documents can lead to confusion for all stakeholders. By providing information from one source there is more standardisation in that information and the chances of confusion are reduced. Section 4.2.3.3 discussed the government's role in providing information to households in order to help support decision making processes. However, documents such as manuals and guidelines do not have to be written by government bodies, they can also be written by donors, NGOs, community based organisations (CBOs) or the private sector. Therefore, in a multi-stakeholder sector, co-ordinating the information that reaches people becomes more challenging and less controlled. The lack of awareness about the 'Rwandan Sanitation Code' and not knowing whether or not it exists, demonstrates the challenge of disseminating information successfully. If the code does exist and is supposed to be in use none of the participants in this study were aware of it.

4.7.3 Lack of clarity on regulatory obligations

Both the building control regulations and the construction instructions for rural houses could be considered as standards, however, they would not be considered as national standards because they have not passed through the required processes of RBS which is discussed in chapter 6, section 6.3.3. In the construction instructions, the pour-flush latrine presented for construction in all rural households is of a higher technical specification than the one required in peri-urban areas under the building regulations. The guidelines also allow for a lower level of technology than the construction instructions with the setting of a minimum standard. The RHA and MININFRA are closely aligned departments in theory, but in practice the information they provide is very different.

The Guidelines on Latrine Technologies Useable in Rwanda (MININFRA, 2011) cover household, institutional and public latrines in rural, peri-urban and urban areas. However, it must be assumed that they will only be used in rural areas because building regulations and specific bylaws set the requirements for peri-urban and urban housing as discussed in section 4.6.2. However, these links to existing documents and legislation are not stated in the guidelines so users of the guidelines may be unaware of their existence

The construction of a sanitary latrine is not mandatory in either the NPSWSSS or the guidelines. However, the building control regulations (RHA, 2012a) clearly state that it is an offence to build a latrine in urban and peri-urban areas which does not comply with the regulations and in the construction instructions for rural housing (MININFRA, 2012) it is implied that households who do not construct a pour flush latrine will not receive certificates of habitation. Although the regulatory aspects of the construction instructions are unclear, the guidelines on latrine technologies make no references at all to the regulation or enforcement of the guidelines. Therefore, it could be assumed that the construction instructions have more regulatory power and more weight behind them because the implications of not following the instructions are presented, in which case they

could supersede the guidelines. They were also created more recently than the guidelines on latrine technologies and were created by the same government ministry. They do however come from different departments. Therefore, it is also possible that the housing department was unaware of the guidelines on latrine technologies created by the water supply and sanitation department, which would account for choosing a pour flush latrine as the only model to be built at all levels of rural housing.

4.8 Key findings from the document analysis

The purpose of the conceptual framework is to understand how a standard for a household latrine functions within the sanitation system of a country where a standard already exists and how a standard could function within the sanitation system where a standard does not currently exist.

In order for a standard to be recognised as a national standard in Rwanda it must pass through the process designated by the Rwanda Bureau of Standards (RBS) and be approved by them. Based on this understanding there are no national standards for household latrines currently available in Rwanda. However, as the previous sections have demonstrated, there are three key documents which could be considered as setting informal or private standards as discussed in section 4.6.1. These documents are the building control regulations, the construction instructions and the guidelines on latrine technologies. Table 20 shows the contributions to the conceptual framework as a quick reference. The faded questions cannot be answered at this stage but will be addressed in subsequent chapters. Following Table 20 the contributions made by this chapter are expanded upon.

Table 20 Contributions to the conceptual framework from the document analysis

Concept	Consensus	Role	Use	Regulation	Development
Consensus		Do stakeholders consider role of standards differently?	Where should standards be used? Depends on location e.g. urban/rural	Levels of regulation?	What if views on standards are very different?
Role	What do stakeholders consider when developing a standard?		What role do existing standards play?	How are standards viewed?	What role do stakeholders want standards to play?
Use	Intended users? BR: construction and planning workers CI: anyone building a house in a rural area GL: households and institutions	What need do standards meet? BR: provide a baseline CI: Reduce problems of poor construction and improve disaster resilience GL: provide information and support decision making		Are standards constraints? Potentially: BR: at least a VIP CI: pour flush is only model given	Are informal standards known and recognised?
Regulation	Is regulation required?	Voluntary or mandatory? BR: mandatory in urban areas CI: unclear	How can the standard be regulated? BR: enforcement officers CI: local government		Where are standards found? Building regulations; Construction instructions; Guidelines
Development	Who is involved in the process? CI: developed by consultation GL: developed by consultation	Type of standard? BR: specification CI: code of practice GL: code of practice	What do standards look like? BR: detailed technical specification CI: very limited drawing GL: list of characteristics and drawings	Process of monitoring or checking? BR: separate guidelines with detailed process	

Abbreviations used: BR- Building Control Regulations
 CI- Construction Instructions
 GL- Guidelines

Where should standards be used? [Consensus and Use]

Given that the building control regulations are limited to application in urban areas it is understood that the construction instructions for rural households will be used instead of the building regulations in rural areas. This would indicate that different standards will be applied in different areas. The National Strategic Plan on Sanitation from 2008 also anticipated that different 'norms and standards' would be developed for urban, semi-urban and rural areas (MININFRA, 2008a, p.14).

Intended users? [Use and Consensus]

A majority of the documents from Rwanda are intended to be used by multiple users. The guidelines are fulfilling a dual role of setting out minimum standards to be achieved whilst also outlining the more aspirational options for future adoption. The guidelines and construction instructions are supposed to be used by households but both are lengthy documents containing large amounts of information which could lead to more confusion.

What need do standards meet? [Use and Role]

The building regulations are intended to provide a baseline for those involved in construction and planning to work from. The construction instructions are intended to reduce the problems associated with poorly constructed housing in rural areas and consequently improve disaster resilience. The guidelines on latrine technologies are intended to provide information on the different types of latrine available and assist in decision making. Therefore, the primary needs being met by these documents are those of safety and information provision. During the analysis of the policies and strategies from Sub-Saharan Africa the issue of providing information to households in order to support a demand led approach came across strongly.

Are standards constraints? [Use and Regulation]

The building control regulations are the only document in the sample that has specific regulatory implications and specifies that peri-urban households must have at least a VIP latrine. The regulations also contain the specifications for siting and constructing the latrine. MININFRA and REMA have acknowledged that current technological options are prohibitively expensive for some households, as discussed in section 4.5.3, and the siting requirements could cause problems for households with small plots. Therefore, for peri-urban households there could be some constraints. The construction instructions have the potential to place serious constraints on the construction of latrines in rural areas if all households are required to build a pour-flush latrine.

Is the standard voluntary or mandatory? [Regulation and Role]

In the Sectoral Strategic Plan from 2008 compliance with norms and standards is expected and the building control regulations are clear in the provisions for regulation. However, the regulatory aspects of the construction instructions are very unclear and the guidelines make no reference to the necessity for regulation. In the Environmental Health Policy, enforcement of specific actions is discouraged in favour of voluntary compliance.

How can the standard be regulated? [Regulation and Use]

The Sectoral Strategic Plan anticipates that a technical team will be responsible for inspecting latrines in buildings. The building regulations are enforced by a team of inspectors using compliance guidelines. This level of enforcement is expensive and time consuming and more relevant to urban areas. Regulating a standard in rural areas needs a different approach.

Who is involved in the development process? [Development and Consensus]

In both the guidelines and construction instructions it is stated that they were developed through consultation but the list of stakeholders is not provided so the extent of the consultation is not known.

What is the type of standard? [Development and Role]

The building regulations provide a technical specification for a VIP latrine. The guidelines and construction instructions can be considered as codes of practice.

What does the standard look like? [Development and Use]

The building regulations contain a technical specification for a VIP within a much larger document. The construction instructions contain one figure with limited dimensions towards the end of a larger document and the guidelines provide a list of characteristics for a sanitary latrine and drawings (both aesthetic and technical) for each type of latrine but it includes both household and institutions which increases the length of the document. During a review of the guidelines and manuals from Sub-Saharan Africa it was highlighted that the documents aimed specifically at communities or households are predominately picture based but they also tend to be the older ones in the sample. More recent documents tend to be longer and contain more information related to sanitation issues nationally, contain fewer pictures and less technical information.

4.9 Summary of key findings from the document analysis

The aim of this chapter was to address the first research sub-question; how are standards viewed, discussed and presented in existing documents. Section 3.7.1 of the method chapter discussed how the use of documents can place interventions in the broader policy context.

The analysis of documents from Sub-Saharan Africa has demonstrated that although standards can be found in policies, strategies, guidelines and manuals as discussed in section 2.4.3.1 of the literature review, in the sample of documents analysed in this chapter there are very few references to standards for household latrines. A majority of the references to standards relate to sanitation and hygiene more generally with the expectation that latrine use and ownership will become a social norm through education and behaviour change. However, there is also a general acknowledgement that some form

of standardisation of latrines would be useful as long as standard models are not put in place.

The idea of standardisation is closely aligned with ideas of approved, acceptable and allowable models which meet international standards of being improved whilst providing householders with some choice over the type of latrine they choose to use. Rwanda does not have a national standard for household latrines but there are a number of documents from different organisations that present information that could be viewed as a standard. The document analysis process has shown that the overall lack of clarity and co-ordination between the different documents from different departments and organisations presents a serious challenge for co-ordinating the information in the sector and for gaining consensus on how a standard could be developed and used.

There is no common understanding of what a standard is and what one might look like from the documents analysed. This is one of the key challenges in trying to provide guidance on what a 'well-written' standard can be like. The standard does not necessarily have to be a formal standard, especially as having a standard model is perceived negatively. The flexibility of a non-formal standard may be preferable and needs to be considered in greater detail. Whilst the documents have provided important contextual information for this study, the use of the Delphi Method and semi-structured interviews in the subsequent chapters are designed to explore the problem in more detail.

4.10 Chapter summary

The purpose of this document review chapter was to analyse how standards are presented in different national documents from countries in Sub-Saharan Africa in general and Rwanda in particular. This chapter begins with an overview of how policies and strategies can relate to different aspects of the sanitation system. The document analysis is divided into two categories, policies and strategies, guidelines and manuals. The frameworks used for the document analysis process are included throughout the chapter with quick reference tables included in annex 2.

References to standards in the sample documents are intertwined with promoting access to improved latrines, monitoring and in some cases regulation and enforcement. In the documents analysed in this chapter there are references to service and technological standards as well as standards for operation and maintenance.

A review of standards in policies, strategies, guidelines and manuals for Sub-Saharan Africa has not been carried out before so the review in this chapter and the corresponding quick reference tables in appendix 2 provide a useful contribution to other researchers and interested parties who are also considering the role of standards in household level sanitation in Sub-Saharan Africa.

The chapter concludes by presenting contributions to the conceptual framework from the document analysis process. In chapters 5 and 6, the perceptions about standards for household latrines and levels of consensus between stakeholders on different aspects which could influence their development in Rwanda are explored.

5. Presentation of findings from the Delphi Method

5.1 Chapter outline

The aim of research objective two was to explore levels of consensus between stakeholders on the influences which can affect the process of developing a standard. The specific sub-question and research objective addressed in this chapter are;

Research sub-question 2: *Is there a consensus between stakeholders in Rwanda about the need for a standard, the role it can play and how it can be used?*

Research objective 2: *To establish what levels of consensus exist between stakeholders in Rwanda and identify areas where gaining consensus could pose a particular challenge.*

The Delphi method, its history and the processes used in this research have been fully described in chapter three (section 3.9.2). The aim of the Delphi exercise used in this research was to gather the views of as many different types of stakeholder as possible, without making efforts to force a consensus amongst the expert panel. The importance of developing consensus during the development of a standard was discussed in chapter two (section 2.3.4).

The results from the Delphi Method are presented in rounds, with an explanation of how the results from each of the questions were analysed. In order to protect anonymity, each expert has been given a number, these numbers remain consistent throughout the rounds. The responses have been randomly ordered so the numbers used are solely for the purposes of reporting the contributions made and have no relation to any positions or views held by the experts. Section 5.7 demonstrates the contributions made to the conceptual framework as a result of the Delphi study.

5.2 Round One

5.2.1 Question 1: How do you define a standard?

This first question on defining a standard was asked in order to provide contextual information on how individual experts define standards because, as discussed in section 2.3.1, the term 'standard' can be defined in different ways. This question was only asked in round one.

The volume of text generated in response to this question was small so the responses were coded using pen and paper. An inductive coding approach was used which resulted in the development of four main themes, with corresponding sub-themes. A framework of these themes and sub-themes was developed and used to do the final coding of each response. Table 21 presents the framework as a list of themes, sub-themes and their corresponding codes.

Miles and Huberman (1994, p.253) state that presenting qualitative data in numerical format has three primary benefits, 'to see rapidly what you have in a large batch of data, to verify a hunch or hypothesis and to keep yourself analytically honest, protecting against bias'.

Visualising the data numerically can help to highlight patterns and provides more weight to the intuition used when interpreting qualitative research. The contributions made by each expert are presented in Table 22. Three experts did not answer the question (experts 5, 24 and 26).

Table 21 Codes for analysis of round 1 question 1

Theme	Sub-theme (code given)	Description of the code
Type of Standard	Name	Specific reference to a type of standards e.g. guide, code of practice, specification, method or vocabulary
Development of Standards	Existing practice	Standards should be based on existing practices
	Contents	Describes elements to be included in a standard e.g. drawings, list of materials, bill of quantities
	Best practice	Standards should reflect best practice or be aspirational
	Approved	A standard should be approved by a recognised body or
	Agreement	A standard should be agreed upon by stakeholders
Role of Standards	Knowledge	Standards provide knowledge, information or instruction to
	Quality	Standards act as an indicator or measure of quality
	Safety	Standards ensure protection and safety of users
	Performance	Standards outline expected performance levels
	Minimum requirements	Standards set minimum requirements to be met
	Accepted way	Standards present an accepted way or common reference model to aid conformity and repetition
Implementation of Standards	Published	A standard should be published
	Voluntary	A standard should be used voluntarily
	Regulation	A standard should or can be regulated

Table 22 Contributions to the data from experts for Round 1 Question 1

Themes	Expert number																											No. of occurrences	
	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	27					
Codes																											2		
Type of standard																												2	
Name									#																#		2		
Development of standards																												17	
Existing																									#		1		
Contents		#										#	#						#	#						#		6	
Best practice																										#		1	
Approved		#											#															2	
Agreement		#	#									#	#			#	#									#		7	
Role of standards																												26	
Knowledge								#									#		#									3	
Quality			#		#		#			#	#			#															6
Safety																										#			1
Performance		#		#		#																							3
Minimum											#				#										#				3
Accepted way	#								#		#	#	#			#	#				#	#				#	#		10
Implementation of standards																												6	
Published		#											#													#			3
Voluntary																										#			1
Regulation												#														#			2

Symbol # represents a contribution

Missing data points: experts 5, 24 and 26 did not answer the question

5.2.1.1 Defining standards

Section 2.3.1 discussed that despite the different wording used by international standard making bodies to define a standard, the key elements of a standard are that it should be established by *consensus*, be *documented* and contain information that can be used *consistently*. In terms of national or international standards, *approval* by a *recognized body* is also critical. These key elements of international definitions of a standard were all included in the definitions given by the experts to some extent.

- *Development by consensus* is under the theme ‘development of standards’ and sub-theme ‘agreement’
- *Documented* is under the theme ‘implementation of standards’ and sub-theme ‘published’
- *Used consistently* is under the theme ‘role of standards’ and sub theme ‘accepted way’
- *Approved by a recognised body* is under the theme ‘development of standards’ and sub theme ‘approved’

The themes with the highest number of contributions were the ‘role of standards’ and the ‘development of standards’, receiving 26 and 17 contributions respectively. The sub-themes which received the highest number of contributions were that standards promote an ‘accepted way or common reference’ and that standards should be ‘agreed upon by stakeholders’. Both of these ideas are also considered to be key elements of a standard. The idea that a standard should be approved by a ‘recognised body’ and should be ‘published’ received lower levels of recognition from the panel but they were both still included to a small extent.

The understanding that a standard should be an ‘approved model’ reflects two different ideas. An approved model could refer to ‘standard model’ and it has been discussed in chapters 2 and 4 that ‘standard model’ latrines have caused problems in the past because of their inflexibility and in both the literature review and during the analysis of documents from Sub-Saharan Africa it was highlighted that standard model latrines are perceived negatively. The second interpretation relates to the discussion in section 4.2.4.1 about the use of the terms ‘approved’ and ‘allowable’ in relation to a list of possible latrine options to be used in a given context or country which may or may not be a ‘standard model’.

5.2.1.2 Role of standards

The sub-themes within this theme all reflect the idea, discussed in section 2.3.2 that standards are designed to make people’s lives easier. Expert 27 captures this idea by stating that standards can ‘*make life simpler*’. The sub-themes of quality, safety, performance and the provision of minimum standards represent the key ways in which standards can allow people to ‘*fully enjoy a service or product with all the required conditions*’ (Expert 4). These four sub-themes can be joined under the concept of protecting the users and ensuring safety, which as discussed in section 2.3.2, is one of the roles a standard can play, especially

for consumer goods. In terms of latrines, the concept of protection applies not only to the safety of the latrine itself; primarily its construction and the materials used; but also to improved safety through the removal of faecal matter from people's environment. The statement from Expert 25 summarises this dual meaning;

'[a] standard is defined as guidelines basing on the existing standards and people's practice of all types like materials, buildings etc. in order to achieve the required benefits to the owners and protect them from eventual problems they may face' (Expert 25).

5.2.1.3 Development of standards

Under the development of standards theme there was recognition that different stakeholders should be consulted during the standards development process with five experts referring specifically to a consensus based approach. The importance of adopting a consensus based approach was highlighted in section 2.3.4. The second largest sub-theme under development was that of contents. The type of contents given indicates the types of information that the experts expect a standard to include, and begins to show developers what the standard may look like. The types of content given were;

- *'..sets out specifications and procedures..'*(Experts 2 and 14)
- *'a standard is a set of criteria...'* (Expert 13)
- *'a plan from an architect'* (Expert 19)
- *'a drawing and list of materials to show what to do'* (Expert 20)
- *'..a technical specification or other precise criteria'* (Expert 27)

This type of content would make the standard technically based rather than service based and would result in a document that looks most like the guidelines on latrine technologies (MININFRA, 2011). Table 1 in section 2.3.3 outlines the main types of British Standards in use by BSI and indicates the type of information that would be found within each of them. The main types of standards are; specification, method, guide, vocabulary and codes of practice. Each one has a different format, includes different information and will be used in a different way.

Using the BSI standards as a guide, the type of content given by the six experts would primarily fit under specification, but *'procedures'* could also fit within method, guide or code of practice. A plan or drawing could fit within a specification, method, guide or code of practice, depending on how prescriptive or flexible developers want the standard to be.

Expert 25 states that standards should be adopted after research based on existing standards and people's practices, whereas Expert 27 states that standards should be based on best practice and be aspirational. These are different ideas and would result in different content. Based on the understanding of Expert 25, a standard should represent the lowest acceptable level according to current practices but based on the understanding of Expert 27 the standard should represent the best level achievable. This highlights an area where

consensus is particularly important because these different interpretations of what a standard should do will change the need that the standard meets and its subsequent role.

5.2.1.4 Implementation of standards and type of standards

The remaining two themes of implementing standards and the type of standard received relatively low numbers of contributions in comparison to the first two themes. Of the six experts whose responses included contributions under these two themes, two experts have a background in standard development and one expert gave the BSI definition of a standard (Expert 27). These three experts were the only ones to give definitions which acknowledge that a standard should be published. For the two experts who named a specific type of standard, both described standards as 'guides' or 'guidelines' and both of these experts have been involved in the development of the guidelines of latrine technologies useable in Rwanda (MININFRA, 2011), which may have influenced the definition of standards for latrines they gave. As discussed in section 3.9.2.4, respondent bias based on professional background and experience cannot be overlooked but by including such a wide range of stakeholders in the expert panel every attempt to limit the influence of respondent bias has been taken. Examples of situations where respondent bias is suspected are highlighted during the analysis and discussion of the findings from the data.

5.2.1.5 Summary from question one

The aim of this question was to provide contextual information on how individual experts currently view standards. When viewed as a whole set of definitions, there are none that stand out as being significantly different from the rest and on the whole, they reflect the key elements found in international definitions of standards. However, as with many definitions, there can be a need to define elements within the definition. For example, there could be a significant difference between a standard that sets 'minimum requirements' and one that aims for 'best practice'. However, if best practice is taken to mean the practice that everyone can adopt, it could reflect minimum requirements so establishing what is required from a standard is one of the key elements to be considered during development. Section 5.5.1 considers how the definitions given by the experts in question one have been reflected through their answers to the other questions in rounds one to three.

5.2.2 Question 2: What should a standard for household latrines include?

Question two was asked in order to find out what a standard could look like and what information experts would expect to be included. As discussed in section 3.9.2, it is important for the researcher to remain flexible whilst using the Delphi method as it can be difficult to anticipate how questions will be answered by respondents. The responses to this question were broader than originally anticipated by the researcher. As well as providing details on the type of information that should be included in a standard, some respondents provided characteristics that latrines should have and in some cases, provided technical specifications which latrines should meet. In order to analyse the data, content analysis

using word counts was carried out. Tables 23 and 24 include frequency counts of the occurrence of specific words or phrases. Table 25 presents all specifications given for a particular latrine component. The original wording and mode of expression used by the experts has been maintained.

Table 23 Types of information to be included in a standard

Type of information to include	Number of occurrences
Siting and location within the house/compound	7
Plans or drawings of the latrines	4
Waste disposal/management options Types of technology available (including advantages and disadvantages) Instructions for use (including good O&M)	3
Structural features of technologies (e.g. pit depth, slab dimensions, superstructure dimensions) Cost estimation Geographic zone the standard could be applied in Acquisition process (of materials/components)	2
Situational analysis of latrines in the region where the standard has to be applied Definitions of generally used latrine terms	1
Total	17

Table 24 Characteristics a latrine should have

Characteristics of a latrine	Number of occurrences
Be hygienic and clean	10
Be safe (not going to collapse) Have a roof	8
Have a super structure Have a cement slab Have no unpleasant odour Be convenient/accessible to all Provide privacy	6
Have hand washing facilities Have a door Not contaminate ground water Have a covered (squat) hole	5
Have no flies Be ventilated	4
Have cemented or painted walls	3
Include a bathroom Have a pit Be affordable Have an impermeable (cement) floor Be well operated and maintained Pit should have a minimum depth	2
Ensure safe disposal of excreta Be culturally acceptable Pit should be lined	1
Total	102

Table 25 Technical specifications latrines should meet

Component	Technical specifications given
Distance from users	Not more than 30m
Pit dimensions	At least 15m deep
	At least 10m deep
	At least 1.2mx1.5m x3m deep
	Max depth of 6m- min depth of 3m with a diameter not exceeding 1.5m
	Not less than 6m deep
	Have at least 6m deep
Superstructure dimensions	At least 1.5m (width) x2m (height)

The responses in Tables 23 and 24 are primarily focused on technical elements of a latrine rather than service based ones and therefore indicates that the experts would expect a standard for latrines to be technically based rather than service based. This expectation was also identified from the definitions presented in section 5.2.1.3.

The responses which detail characteristics that latrines should meet are more applicable to round one question four ‘what factors should be considered when setting standards for household latrines’. However, the list of responses demonstrates some of the existing knowledge people have about latrine design, construction, use and maintenance. For example, based on the contributions in Table 25 it can be summarised that a latrine is supposed to have a superstructure, a door and a roof, it is also expected to be clean, safe and convenient. At the bottom end of the list is the understanding that the pit should be lined. This is interesting to note because in the guidelines on latrine technologies a pit is expected to be lined, which would represent a change from current practices.

The technical specifications given in Table 25 also highlight areas of existing knowledge and the problem of harmonising and potentially changing currently held beliefs about latrine construction. The depths of 10m and 15m were given by representatives from the same community. The remaining depths were given by government, NGO and donor staff, which demonstrates that even at the co-ordination level of projects and programmes there are different opinions regarding the construction of latrines. The problem of co-ordinating information in a multi-stakeholder environment was discussed in section 4.7 of the document analysis chapter, in which it was highlighted that conflicting information from different stakeholders can cause confusion for people because there is no clear understanding of what is the ‘right’ information.

Due to the variety of responses received, the question needed to be re-formatted before it could be taken forward into round two. The aim of the question was to identify the types of information that should be included in a standard, therefore, the responses given in Table 23 were made the focus of the question for round two. The responses in Table 23 were categorised into four main themes; design and construction, siting and location, technical specification and instructions for use. Responses from Table 24 were incorporated under

the four themes so that experts who had provided latrine characteristics as their contributions to this question would see them reflected in the question for round two.

Building consensus on technical specifications would be applicable at a much later stage in the standard development process when the country is actually in the process of writing a standard. Therefore, none of the dimensions given in response to this question were presented back to the panel in round two.

As well as the four key themes, two additional issues were included in the question which were; definitions of generally used terms and a situational analysis of the latrines in the region where a standard would be applied to identify current practices and challenges. These points were raised by two individual experts but could not be categorised under one of other key themes. The researcher did not want to arbitrarily decide not to include these additional points because they did not fit into one of the other categories so by including them in round two, the experts were able to decide on their relevance, not the researcher.

5.2.3 Question 3: What are the motivations for having standards for household latrines?

Question three was asked in order to find out how the experts view the potential role of a standard for household latrines and why one should be developed. All of the responses to question three were put together in a single document and duplicates were removed, leaving a list of 32 different responses. No attempts were made to organise or sort the responses so that the list generated for use in round two would be randomly organised.

Table 26 presents the responses to question three and the number of occurrences of each. The researcher did not modify the language or expressions used. For instances where multiple experts expressed the same idea, the wording which best captured the idea was used. Responses have been ordered based on their number of occurrences for presentation purposes only. In this round the top motivation for having a standard was to promote good sanitation practices in the community. This reflects the idea discussed in section 1.1 that household sanitation is considered a public good because of the benefits to community health.

Table 26 Responses from round 1 question 3

Response	Number of Occurrences
To promote good sanitation practices in the community	10
To prevent contamination of water sources	6
To ensure safety during use (durable latrines to prevent accidents due to collapse etc)	4
Assists in management of land use for the population (e.g. implementation of settlement plans, master planning)	4
Everyone has baseline standard depending on his capacity in relation to his latrine	3
To stop open defecation	3
For ease of construction (technicians have a reference and do not have to make their own)	3
To promote good quality of life (to impact positively on sustainable economic growth and reduce poverty)	3
Provides acceptable evaluation criteria that can be applied without bias by inspectors or health workers	3
Ensures latrines are user friendly (e.g. easy to clean, comfortable, convenient)	3
To promote affordability of the different technological options (including options for hand washing)	3
Allows users to gain the most benefits from each technology according to their capacity (financial capacity to build)	3
To make it easier to train people on the requirements needed (provides a tool to help with national education programmes)	3
Allows for monitoring of national targets and data collection (e.g. percentage of people who have achieved a good standard)	2
To promote smart styles of latrines	2
Provides privacy for users	2
Provides a common understanding to all stakeholders (so they can be understood and used by many people)	2
For harmonisation of approaches	2
To standardise maintenance work, spare and replacement parts	2
Encourages continuous improvement for achieving a higher level of development/ improvement over time	2
Provides dignity to users	2
Can apply penalties to individuals who do not adhere to the standards	1
Provides alternative options for waste treatment or recycling of wastes (especially in urban areas)	1
Support behaviour change (to adopt the use of a hygienic latrine)	1
To guarantee ease of use and access by all	1
Provides harmonisation according to physical conditions (e.g. soils, water table)	1
Teach children how to be healthy and avoid diseases	1
Can include researched information and data which is beneficial to the user	1
Time-saving benefits (e.g. less days spent suffering from illness)	1
Minimise air pollution from offensive gases	1
To make training of builders and technicians easier	1
To ensure compliance with good hygienic practices (and stop unhygienic ones)	1

5.2.4 Question 4: What factors should be considered when setting standards for household latrines?

Question four was asked in order to find out what the key considerations should be when developing a standard. It was intended to highlight issues including, social, financial and cultural aspects. A total of 44 different responses were collected. Table 27 shows the responses given with the number of occurrences of each. Choice and availability of construction materials in the area was considered the most important factor to consider when setting a standard in this round. The availability of materials is highlighted as being a potential constraint on the choice of latrine a household wants to install in section 2.4.1.10 of the literature review. Consequently, this finding would suggest that local adaptability for the standard based on material availability as well as geological or climatic considerations in an important consideration.

Table 27 Responses from round 1 question 4

Response	Number of Occurrences
Choice and availability of construction materials in the area	9
Income levels of the community and ability to make the investment in the latrine	7
Distance from the household, nearest cooking area and water source	7
Traditional village norms and cultural taboos (for cultural acceptability and use)	6
Affordability of Technology	6
It should not contaminate ground water	6
Safety and protection of users (prevent collapse and exposure of user to bad weather)	5
Aesthetics of the latrine	4
It should be free from bad odours, inaccessible to insects, flies and animals	4
Accessibility (slope/steps, general design)	4
Sustainability (longer use or ease of moving to a new location)	4
Space needed to build and allow for emptying	3
Management and maintenance (skills needed should not be very specialized)	3
Have a suitable sub-structure to safely store excreta and prevent leakage (lined)	3
Use of materials which will not cause environmental damage	3
Durability of materials	3
Options for recycling or enhancing the value of wastes	3
Local physical conditions (soil, weather, topography)	2
Geography (location e.g northern region, southern region)	2
Direction of latrine door (should not open into a public place)	2
Consideration of traditional factors (Ubudehe, Umuganda, Umusanzu)	2
Gender	2
Ease of applying the standards	2
How the users (beneficiaries) can be included in the design of the standards	2
Disability or impaired use (e.g. elderly people, pregnant women, children)	1
Availability of spare parts	1
Local and semi-skilled persons should be able to construct it	1
It should be low-cost compared to a conventional sewerage system	1
Prevention of erosion around the latrine	1
The Rwanda building control regulations	1
Availability of skilled persons (builders/technicians) in the area to build the latrine	1
It should allow for regular use without interruption	1
Standard minimum depth vs average usage	1
Size (depending on number of individuals)	1
Technical details (e.g. slab composition, size of drop hole, type of platform, lining etc)	1
Availability of water	1
Category of the plot i.e. high standing, medium standing, and low standing	1
Should be applicable to all Rwandans based on living conditions (e.g. Rural areas, urban areas, agglomerations, commercial centres)	1
The acquisition process (i.e. steps to build a typical latrine)	1
Language of the standards (e.g. Kinyarwanda, use of complicated or technical terms)	1
Distance of the hand washing facility from the latrine	1
Willingness of people to adopt a specific type of latrine technology	1
Presentation of the standards (e.g. manual, posters, how to inform the population)	1
Should allow health inspectors to give instructions based on the information given	1

5.2.5 Question 5: How should a standard for household latrines be implemented?

Question five was asked in order to see how the experts think a standard should be implemented and to see if there are any mechanisms or approaches already in existence that are highlighted as potential channels for implementation.

It was initially intended that question five would be taken forward to the second and third rounds. In preparation for the second round, all the responses were put into a single document. After an initial reading of the responses as a whole document it was clear that the scope of the answers given was wider than the researcher had anticipated. The key themes emerging represented different aspects of implementation, including approaches to take, roles and responsibilities of stakeholders and options for regulating standards. Given that the responses were all related to implementation, it was decided that asking the experts to reduce the number of responses in order for ranking to take place in round three would not provide an accurate reflection of the different aspects of implementation which had been highlighted. Therefore, the responses were analysed using inductive coding from which a framework of the themes and sub-themes was developed and used to do the coding of each response. Table 28 presents the framework as a list of themes, sub-themes and their corresponding codes. The responses were coded using pen and paper as they were for question one (section 5.2.1). Table 29 shows the contributions from each expert.

Table 28 Themes, sub-themes and codes for round 1 question 5

Theme	Sub-theme (code given)	Description of the code
Dissemination		
Approaches	Publish	States a standard should be released as a published document
	Raise awareness	Awareness raising or sensitisation campaigns on the new standard, explaining usefulness or importance, key issues etc.
	Training materials	Development or use of supplementary materials to assist in educating people about standards
Recipients of information	Everyone	Awareness campaigns and dissemination strategies should target everyone in all regions
Training required	Builders & technicians	Training for builders and technicians
	Local leaders	Training for local leaders (at district and village level)
Roles and responsibilities		
Government role	Set standard	Government should set the standard
	Value standard	Government should give the standard the required levels of
	Give assistance	Government should help people to build according to the standards
	Policy & Strategy	Government should write a policy and strategy for implementing the standard
Responsibility for implementation	Householders	Person, body or organisation given as being responsible for implementing the standard
	Community	
	Builders	
Responsibility for monitoring/ inspecting	Local authority	Person, body or organisation given as being responsible for monitoring and inspecting latrines. Both terms (monitoring and inspection) are used interchangeably.
	Healthcare Workers	
	Hygiene clubs	
	MININFRA/ MINISANTE	
	Relevant authority	Monitoring and inspection expected but only a general reference to a 'relevant authority' given.
Regulation		
Approaches	Technical regulation	Develop a technical regulation to accompany the standard
	Law	Reinforce the standard by law
	Imihigo	Make the standard part of the local imihigo contracts
Penalties	Penalty	Apply a penalty for non-compliance
	No penalty	Do not apply any penalties

Table 29 Contributions to the data from experts for round 1 question 5

Theme	Expert number																											Number of occurrences	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		
Dissemination																												31	
Approaches																												20	
Publish										#			#													#		3	
Raise awareness			#	#			#		#	#		#	#		#	#					#					#		#	12
Training materials									#	#					#											#		#	5
Recipients of information																												6	
Everyone									#			#	#						#							#		#	6
Training required																												5	
Builders & Technicians						#				#								#								#			4
Local leaders																										#			1
Roles and responsibilities																												35	
Government role																												12	
Set the standard			#																	#	#	#							4
Value standard							#					#																	2
Give assistance	#																						#						2
Policy & strategy									#																				1
Institutional framework									#						#													#	3
Responsibility for implementation																												6	
Householders	#								#																				2
Community								#									#					#							3
Builder	#																												1
Responsibility for monitoring/inspection																												17	
Local authority		#						#		#	#			#															5
Healthcare workers								#			#														#				3
Hygiene clubs											#													#					2
MININFRA/ MoH															#														1
Relevant authority				#		#	#		#				#	#															6
Regulation																												10	
Approaches																												5	
Technical regulation		#																											1
Law											#			#															2
Imihigo		#													#														2
Penalties																												4	
Penalty		#		#																		#							3
No penalty	#																												1

[Symbol # represents a contribution]

5.2.5.1 Roles and responsibilities

The theme of roles and responsibilities received the highest number of contributions from the experts. The three categories within the theme are government role, who has responsibility for implementing the standard and who has the responsibility for monitoring its use or inspecting facilities to ensure compliance.

The sub-theme identifying who should have the responsibilities of monitoring and inspecting the standard received far more contributions than the sub-theme identifying who should be responsible for implementing the standard. The relatively low numbers of references to implementation could be due to the fact that it is assumed that householders will be the primary implementers of any standard for their latrine.

Monitoring and inspecting

Monitoring activities are expected to ensure that the latrines being constructed or those in use are able to maintain the safety and health of the wider population. The fact that members of the panel expect there to be monitoring and inspection of household latrine standards reflects the challenge discussed in section 1.1 in which community wide sanitation is considered a public good but providing a latrine at the household level is a household responsibility.

The groups of people identified as being responsible for monitoring the standard are those who are closest to the communities and households. These are the local authorities, which is a broad term used to cover several levels of leadership from the village level up to district office level, health care workers, who can be attached to clinics, hospitals or environmental health departments at district level or be community health workers who are based in the village in which they work, and community hygiene clubs who are composed of village representatives and have a number of functions within their community for promoting the adoption of good WASH practices. The same reliance on decentralised structures was identified during the document analysis of documents from Sub-Saharan Africa discussed in section 4.2.5.2.

In order for a standard to be monitored a processes needs to be established during the development of the standard that can support the monitoring activities required. The level and type of monitoring would also need to be established during this time. For example, the monitoring could be limited to the process of disseminating the standard and identifying how well users are receiving the messages about standards. However, the monitoring could also include individual latrine inspections to see if the standard is being complied with. Both are very different types of monitoring with different implications in terms of resources and legal frameworks required. Section 2.3.6 discusses how standards are voluntary, however, compliance can be enforced through the use of a technical regulation or through adoption into law. Regulating the standard is discussed further in section 5.2.5.3.

Implementation roles

Several different roles are attributed to the government. One is to show support for the standard so it is more respected, for example, by developing a specific policy and strategy for implementation. The other roles involve directly supplying the standard to be followed and then helping households to build latrines which meet the standard. Expert 22 described the government's role by stating *'the government should make a standard and help people achieve it, having a standard is good'*. This response reflects the former supply-led approach in which there would be a standard model with a subsidy from the government or donors to help families build a latrine and was given by a builder.

In a similar tone, Expert 20 stated that *'if the government gives it [the standard] then it is good for the household because they have their own technicians for testing them so they know it's good'*. This response was given by a community health worker. During the document analysis in section 4.6.1 it was shown that community health workers are currently given very little technical training on latrine construction and supporting latrine adoption is just one amongst many of their tasks. If the government 'gives the standard' which has already been tested and approved by government technicians the community health worker can share that 'approved' information and the risk that they provide inappropriate or incorrect advice is reduced. Section 4.2.4.1 of the document analysis discussed this idea of approved and allowable technologies in detail and highlighted that in many of the sample documents from Sub-Saharan Africa, one of the expected roles of the national government is to develop and disseminate information on acceptable latrine technologies. The results from the Delphi process show that some of the experts in Rwanda share the same expectation.

5.2.5.2 Dissemination

Process

The sub-themes under dissemination highlight the approaches which can be adopted to disseminate the information, who it should be disseminated to and who would benefit from training or capacity building. The approach which received the most contributions from the experts was to raise awareness. In this context, raising awareness would be done through the use of an educational campaign, which is the normal approach for communicating information to the general public. Three experts stated that the standard should be published and five experts included the development of training materials in their responses. Both of these approaches are often combined with awareness raising campaigns. The findings from the document analysis chapter presented in section 4.2.6 reinforce that this is the typical approach for disseminating information for countries throughout Sub-Saharan Africa.

Recipients of the information

For the experts who identified the recipients of the information in their responses, all six expect national and local dissemination to *'all actors'* (Expert 12), providing something that *'all people can follow'* (Expert 19). The style of the document is

therefore very important if it expected that anyone should be able to read it. In terms of training, builders and technicians received more specific references than any other group. Training builders, technicians and masons is another common element of many current WASH projects and programmes in Rwanda which promote or actively construct latrines in project areas. Therefore, the responses from the four experts which included the need for training builders and technicians reflect the existing situation of project and programme organisation in Rwanda.

5.2.5.3 Regulation

The two themes within regulation refer to approaches which can be adopted and to the use of penalties. The approach to regulation is dependent on the level of regulation required. Monitoring, in the context of dissemination, is not necessarily a product of regulation but inspection would be. Inspection implies checking for compliance against a given set of criteria or rules. For the four experts whose responses included references to regulation, the approaches suggested were that a technical regulation be created; that the standard be enforced through law; and that compliance with the standard becomes part of the imihigo contracts.

Imihigo contracts are performance contracts for encouraging people to 'strive towards perfection in everything they do' (Ministry of Sports and Culture, 2008, p.7). Imihigo contracts are used at all levels of Rwandan society, for example, individual households sign imihigo contracts with Umudugudu leaders, Umudugudu leaders with Cell leaders and so on, all the way up to provincial contracts with central government. The imihigo contracts, highlighted by two experts provide Rwanda with a built-in mechanism for implementing and monitoring the standards at the community level, they can therefore be used to support both dissemination and implementation.

A technical regulation is similar to a law in that both are legally binding. Section 2.3.6 discusses the role of technical regulations in protecting public health and safety and the environment. Improper management of faecal waste can have negative impacts on both public health and safety and the environment (as discussed in section 2.4.2.3), therefore, there could be grounds for developing a technical regulation. Developing a technical regulation was suggested by an expert with extensive experience in developing national standards stating that '*enforcement is necessary as latrine standards have public hygiene and safety implications*' (Expert 2). If a technical regulation or a law was developed which stipulated that compliance with the standard was mandatory, it would be expected that there would be some kind of penalty for non-compliance.

In terms of applying penalties there is a division of opinion between the experts. Expert 1 was the only expert to state '*you should not punish people*' (Expert 1). This statement was based on the problem that not everyone can meet a 'high standard'. For the experts who did suggest the imposition of a penalty or sanction, one expert who highlighted the need for penalties during both the expert panel and semi-structured interviews presents a clear argument in favour of penalties;

“...because it is important to the health of whole village. People can be fined for wrong construction of houses so it would be ok to fine people for wrong construction of latrine” (Expert 21).

Expert 21 is a community health worker who interacts frequently with households to discuss community health issues. The proviso to this statement was that people need to be given enough time to make the necessary changes because behaviour change is recognised as being a slow process.

5.2.5.4 Development of a standard

In addition to thoughts on implementation, some of the responses included references to the development of a standard. Five experts gave responses which included the stakeholders who should be consulted as part of the standard development process. Expert 6 gave the most complete list of stakeholders;

‘The following should be asked and brought together for a common product;

- *Beneficiaries since they know what they want*
- *Government authorities to enforce standards*
- *Engineers since they are the implementers*
- *Financial providers supporting the people’s initiative’ (Expert 6).*

The other four experts highlighted the role that people (i.e. the users) should play in the process, expressed by the statement *‘the population must play a vital role in setting standards’ (Expert 7).*

The importance of creating a standard which reflects different levels of financial capacity was also highlighted by six experts. Taking account of the income levels of the community was one of the highest scoring responses from question four; what factors should be considered when setting standards for household latrines. The repetition of this consideration would suggest that it is considered by the panel members to be a key factor in the development of a standard.

5.2.5.5 Summary from question five

Question five was asked in order to see how the experts think a standard should be implemented and to see if there are any mechanisms or approaches already in existence that are highlighted as potential channels for implementation. The responses indicate that some level of monitoring of latrines is expected with those closest to the households and communities bearing the responsibility for monitoring activities. The process of dissemination identified reflects current practices used to raise awareness about other WASH issues. Approaches to be considered for regulation include the creation of a technical regulation, that the standard be enforced through law and that compliance with the standard becomes part of the imihigo contracts. However, the approach to regulation is dependent on the level of regulation required. The importance of creating a standard which reflects different levels of financial capacity and includes the opinions of a range of stakeholders was also highlighted.

5.3 Round two

Questions one and five from round one were not taken forward into round two (as discussed in section 5.2.1 and 5.2.5). Consequently, for round two the question numbers were changed to reflect the reduced number of questions being asked (three instead of five) and to prevent confusion in case participants thought there were 'missing questions'. The wording of the questions was not changed. Table 30 outlines these changes.

Table 30 Changes to question numbering between Delphi rounds 1 and 2

Question number in round 1	Question number in round 2
1 How do you define a standard?	<i>Not carried forward</i>
2 What should a standard for household latrines include?	Becomes question 1
3 What are the motivations for having standards for household latrines?	Becomes question 2
4 What factors should be considered when setting standards for household latrines?	Becomes question 3
5 How should a standard for household latrines be implemented?	<i>Not carried forward</i>

5.3.1 Question 1: What should a standard for household latrines include?

Table 31 shows how the information was presented to experts during round two. Experts were asked to select any of the responses that they agreed with from the choice of six. The aim of the question was to provide a consolidated view of the types of information that experts expected to be in a standard. It also provided the opportunity to see if the two additional points raised by individual experts would be considered to be of importance once they were presented as options to the rest of the expert panel. Table 32 shows the contributions made by the experts in response to round 2 question 1. Experts 3,4,26 and 27 dropped out after round one.

Table 31 Presentation of question 1 for round 2 of the Delphi process

<p>Design and construction Including: Details of technology options available Cost and affordability Safety and durability (of materials) Comparative advantage/disadvantage Plans and drawings of latrines</p>	
<p>Siting and Location Including: Site selection within the house Geographic zones the standard can be applied in (e.g. south region)</p>	
<p>Technical Specifications Including: Depth of pit Slab/floor materials and dimensions Superstructure (roof, walls and door) and dimensions</p>	
<p>Instructions for use (including Operation and Maintenance) Including: Ventilation, no flies and not accessible to animals Accessibility Hygienic (to use) Privacy Cultural acceptance Mode of use/ emptying/ cleaning/ maintenance/waste disposal</p>	
<p>Definitions of generally used latrines related terms e.g. a glossary of terms and technical language used</p>	
<p>Situational analysis of the latrines in the region where the standard has to be applied e.g. current practices and possible challenges</p>	

Table 32 Responses to round 2 question 1

Theme	Expert number																								Total responses	% of respondents
	1	2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
Design and construction	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	22	100	
Siting and Location		#	#	#	#		#		#	#	#	#	#	#			#		#		#			14	63	
Technical Specifications	#	#	#	#	#	#	#	#	#	#	#	#	#	#		#	#	#	#		#	#		20	91	
Instructions for use	#	#	#	#	#	#	#	#		#	#	#	#	#	#		#	#	#	#	#			19	79	
Definitions	#	#					#		#			#							#					6	27	
Situational analysis					#	#	#	#							#	#	#	#						8	36	

[Symbol # represents a contribution]

Missing data point: expert 25 did not answer this question

The results in Table 32 show that all the experts expect a standard for latrines to include information on design and construction. The second most popular category being technical specifications, with instructions for use and siting and location both being selected by more than 60% of the panel. This corresponds with findings from round one questions one and two which identify the same tendency towards a technically based standard rather than a service based one. It also reflects the current contents of the guidelines on latrine technologies (MININFRA, 2011) which were analysed in section 4.6.1. The two additional categories, definitions of sector vocabulary and a situational analysis both gained increased recognition during round two, but neither were selected by a majority of the panel. It can be noted that a situational analysis is included in the guidelines on latrine technologies from MININFRA, which could explain the increase in the number of experts which selected it as being important in round 2. This increase in the number of occurrences between rounds demonstrates one of the key functions of the Delphi process, which is to allow experts to change their responses between rounds when presented with new or different information.

5.3.2 Question 2: What are the motivations for having standards for household latrines?

The aim of the second round was to pare down the list of responses for this question to a more manageable size. There are no prescribed methods for reducing the sizes of lists generated by the Delphi method, however, Schmidt (1997, p.769) recommends that respondents are asked to select at least ten percent of the issues as being most important, or more if the lists contain less than 100 items. The number of responses generated for questions three and four in round one were 32 and 44 respectively. Selecting only ten percent of these responses would leave a very small number of responses for ranking in the third round. Therefore, the experts were asked to choose their top ten responses for each of the questions presented. The top responses were those selected by a simple majority of the panel. Table 33 shows the responses given for question two, with the most frequently selected responses highlighted. Due to relatively small amount of data to be processed data entry into the table was done twice to remove the potential for researcher error. Expert 16 selected too many responses so could not be included in the analysis.

Table 33 Responses for question 2 round 2

Response	Expert number																									Total responses
	1	2	5	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25				
For ease of construction	#	#	#				#	#	#			#	#	#	#		#	#		#	#		#	#	14	
To promote good quality of life				#	#		#						#	#					#	#	#				8	
To promote smart styles of latrines					#						#				#			#							4	
Assists in management of land use for the population					#	#		#				#				#		#							6	
Everyone has baseline	#	#	#	#				#	#		#				#		#	#							10	
To stop open defecation														#		#			#	#	#	#			6	
Provides harmonisation according to physical conditions		#	#	#			#		#	#	#				#										8	
Allows for monitoring of national targets and data collection									#		#		#			#		#					#		6	
Time-saving benefits		#																							1	
Minimise air pollution from offensive gases	#					#							#	#		#	#		#						7	
To ensure safety during use	#		#			#	#	#	#		#	#	#		#	#	#				#				13	
Provides privacy for users	#		#	#														#		#					5	
Provides acceptable evaluation criteria for inspectors or health			#	#	#	#		#	#				#		#	#	#								10	
Provides a common understanding to all stakeholders				#	#				#		#	#	#						#	#	#				9	
For harmonisation of approaches											#														1	
Ensures latrines are user friendly	#		#		#		#	#	#	#	#				#	#	#				#				11	
To ensure compliance with good hygienic practices		#				#	#	#	#	#	#	#	#			#	#			#		#	#		12	
To promote good sanitation practices in the community		#		#		#								#	#	#				#		#			8	
Can apply penalties to individuals who do not adhere to the standards																	#								2	
Provides alternative options for waste treatment/ recycling wastes					#	#	#					#				#	#	#	#	#	#		#		10	
Teach children how to be healthy and avoid diseases				#	#													#	#	#		#			6	
To promote affordability of different technological options	#	#	#									#	#	#								#			7	
Encourages continuous improvement		#		#				#			#	#		#											6	
Provides dignity to users	#				#													#			#	#	#		5	
Support behaviour change (to adopt the use of a hygienic latrine)	#				#						#	#					#		#		#				7	
To guarantee ease of use and access by all											#	#								#		#	#		4	
To prevent contamination of water sources		#	#		#	#	#	#	#										#	#	#				10	
Gain most benefits from each technology according to capacity				#	#		#	#	#		#		#						#						7	
Researched information and data which is beneficial to the user																		#							1	
To make it easier to train people on the requirements needed		#										#			#	#						#	#		5	
To make training of builders and technicians easier			#								#			#	#								#	#	5	
To standardise maintenance work, spare and replacement parts	#						#			#	#			#			#								6	

The responses in Table 33 show that the highest scoring item was selected 14 times, which represents selection by just over 60% of the panel. The lowest scoring items (of which there were three) were only selected once each. By including items with scores ranging from 14 to 9 there were nine items in the majority (highlighted in Table 33). Deciding the cut-off point for the top responses can be difficult when the results are dispersed as they are in this case. If items scoring eight were included there would be an additional three responses to rank in round three. Each additional item taken forward into round three increases the time it would take for the expert panel to complete the exercise because ranking requires responders to assess all the alternatives before making their choices. Potential drop-out rates also needed to be considered. At this stage there was a good level of response from the expert panel and as round three would be the final round in this study it was decided that it was better to keep the final number of items shorter rather than longer. Therefore, the top nine responses were presented back to the panel in round three.

5.3.3 Question 3: What factors should be considered when setting standards for household latrines?

Table 34 shows the responses given for question three with the highest scoring items highlighted. The highest scoring item was selected 12 times which represents selection by just over 50% of the panel. The lowest scoring items (of which there were two) were not selected at all. Experts 5, 8 and 16 selected too many responses so their contributions could not be included in the analysis. By including items with scores ranging from 12 to 7 there were 11 items in the majority. Once again, a cut-off point had to be decided. Question three had an initial list of 44 items compared to 32 for question two. Therefore, it was deemed acceptable to take a slightly higher number of responses through to round three. The top 11 responses were presented back to the panel in round three.

Table 34 Responses for question 3 round 2

Responses	Expert number																				Total responses
	1	2	6	7	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25	
Affordability of Technology	#		#			#		#	#	#	#	#			#				#	#	11
Consideration of traditional factors											#						#				2
Community income and ability to invest			#		#			#				#					#				5
Prevention of erosion around the latrine	#				#		#								#						4
Geography			#					#													2
Traditional village norms and cultural taboos								#			#	#		#			#	#	#		7
Choice and availability of materials	#		#		#	#		#	#	#				#	#				#	#	11
Distance from the household	#	#			#	#						#			#	#	#	#	#	#	11
Direction of latrine door												#						#		#	3
Space needed	#			#						#					#	#		#			6
Gender		#				#															2
Disability or impaired use	#	#			#	#	#	#		#		#	#		#		#			#	12
Availability of spare parts								#			#										2
Local and semi-skilled persons able to construct				#								#									2
Low-cost compared to a conventional sewerage		#		#																	2
Free from bad odours, flies and animals		#	#				#					#	#	#				#		#	8
Not contaminate ground water		#		#		#	#			#			#			#	#	#	#		10
Safety and protection of users			#		#		#		#	#			#			#		#		#	9
Rwanda building control regulations							#												#		2
Availability of skilled persons to build								#		#	#					#	#			#	6
Allow for regular use without interruption				#				#								#		#	#	#	6
Sub-structure to safely store excreta														#			#				2
No environmental damage							#		#				#								3
Standard minimum depth vs average usage		#										#		#							3
Size (depending on number of individuals)				#												#					2
Management and maintenance					#				#		#						#				4
Accessibility		#				#			#					#							4
Durability of materials		#	#					#					#		#	#		#			7

5.4 Round three

In round three the experts were asked to rank the items presented for each question in order of priority from highest (value of 1) to lowest. The Kendall Coefficient of Concordance (W) can then be used as a statistical test of consensus (Okili and Pawlowski, 2004, p.26; Schmidt, 1997, p.765). This is a non-parametric test that is able to determine the association between three or more sets of rankings. In this case, each respondent represents a single set of data to be tested. W expresses the degree of agreement amongst the respondents with values ranging between 0 and +1 (Siegel and Castellan, 1988, p.262).

There are two different types of statistical technique, parametric and non-parametric. Parametric tests make assumptions about the distribution of the population, assuming that it is symmetrical with a normal distribution and all assumptions must be met in order for the test to be used. Non-parametric tests do not make the same assumptions about the distribution and are therefore used when the data needs to be measured on a ranked scale, as it has been in this study. When dealing with statistics, parametric tests should be given preference over non-parametric ones where there is a choice available. However, for ranked data, there is no parametric equivalent (Pallant, 2010, p.213; Field, 2009, p.790).

Using the ranking system, it is possible to identify the issues that are considered to be of more importance. If there is perfect consensus, $W=1$, every item would be given the same rank by every panel member. Therefore, the most important issue would have a mean rank of 1, the second issue a mean rank of 2 and so on.

In order to calculate W the following calculation is used (Siegel and Castellan, 1988, p.264):

$$W = \frac{12\sum R_i - 3kN(N+1)}{k^2N(N^2-1)}$$

Where k = the number of experts
 N = the number of items being ranked
 R_i = Sum of the ranks for each item

It is also possible to test the significance of W using the chi-square test (X^2) when N is greater than 7. This can show if the agreement amongst respondents is related or independent.

In order to calculate X^2 the following calculation is used (Siegel and Castellan, 1988, p.269):

$$X^2 = k(N-1)W$$

Where k = the number of experts
 N = the number of items being ranked
 W = Kendalls Coefficient of Concordance (derived from equation above)

Using a table showing critical values of the chi-square distribution it is possible to see if the value of X^2 equals or exceeds the value shown in the table for a particular level of significance and a particular value of df .

$$df = N-1$$

Where N = the number of items being ranked.

If the rankings are independent or unrelated because the ranking process had been completed at random, the value of X^2 would be lower than the critical value shown for a given level of significance.

It should be remembered that Delphi results should not be considered as indisputable fact (Hasson and Keeney, 2011, p.1701). There are no right or wrong answers in the process. Instead, the results show how a group of experts views a given problem at a particular time.

5.4.1 Question 1: What are the motivations for having standards for household latrines?

Motivations for having a standard relate directly to the role that a standard will play, achieving consensus on this aspect of the standard is therefore important during the development of a standard. Table 35 presents the ranking of responses by expert in response to the question of what motivations are there for having standards. Experts 2 and 25 dropped out during round three. Each factor is referred to by a shortened name for ease of presentation.

Table 35 Ranking of responses for question 1 round 3

Motivation	Ranked position of each motivation by individual experts																			
	1	5	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24
Construction	1	2	3	3	4	5	5	4	1	7	5	5	1	5	7	1	8	4	7	7
Baseline	2	1	1	2	2	1	6	1	2	3	9	4	6	3	6	2	1	2	5	1
Safety	6	9	6	4	5	6	1	2	5	2	3	8	5	4	1	4	5	5	4	2
Evaluation	3	6	5	1	6	9	8	3	3	6	8	2	7	2	4	6	2	8	6	9
Common understanding	8	5	2	8	8	8	7	8	4	5	1	1	4	1	5	5	7	6	1	3
User friendly	4	7	4	9	7	3	4	6	6	4	4	7	2	6	2	3	3	3	8	8
Good hygiene	7	3	7	7	1	2	2	5	7	1	2	3	3	7	3	7	6	1	3	6
Recycling	5	4	9	6	9	7	9	9	8	9	7	9	9	8	8	8	4	7	2	5
Prevent contamination	9	8	8	5	3	4	3	7	9	8	6	6	8	9	9	9	9	9	9	4

Missing data point: Expert 16 ranked all responses as 1

Table 36 presents the mean rank score for each of the 9 motivations presented to the panel from ‘most important’ (i.e. mean rank of 1) to ‘lowest importance’ (i.e. mean rank of 9).

Table 36 Mean ranks of responses for question 1 round 3

Motivation	Mean rank
Baseline	3.00
Support good hygienic practices	4.15
Ease of construction	4.25
Safety	4.35
Provides a common understanding	4.85
User friendly	5.00
Provides acceptable evaluation criteria	5.20
Alternative options for waste treatment/recycling	7.10
Prevent contamination of water sources	7.10

Kendall’s Coefficient of Concordance, W , was calculated to be 0.243. Schmidt (1997, p767) provides the following interpretations of W as shown in Table 37;

Table 37 Interpretation of W and confidence in ranks

W	Interpretation	Confidence in ranks
0.1	Very weak agreement	None
0.3	Weak agreement	Low
0.5	Moderate agreement	Fair
0.7	Strong agreement	High
0.9	Unusually strong agreement	Very high

Based on the interpretations in Table 37, a W value of 0.243 indicates very weak to weak agreement amongst the panel with low to no confidence in the ranks. This indicates that there is not a strong agreement between the experts regarding the motivations for having standards for household latrines. However, the chi-square (X^2) value is 38.907 (when $df=8$) which means that the probability that the rankings are unrelated (or independent) has a significance level of .000. Consequently, it can be concluded with confidence that the agreement amongst respondents is higher than it would be by chance had the rankings been random or independent.

A low value of W can mean that the experts are not applying the same selection criteria to the list and therefore generate different rankings. The way that experts rank each motivation can be influenced by any number of factors including educational background, professional experience or personal beliefs. Experts in a non-homogenous group are therefore less likely to base their decisions on the same selection criteria as those in a more homogenous group. However, conflicting responses do not mean that the study lacks reliability, rather that it provides more options for further discussion by decision makers (Loo, 2002, p.767).

The mean rank for each motivation (shown in Table 36) provides a quick overview of how the expert panel ranks the importance of each motivation in developing a standard for a latrine. However, by reducing the data to a single number some of the detail is lost. For example, the motivations 'recycling' and 'contamination' have the same mean value of 7.10 but by displaying the distribution of rankings for each motivation it is possible to visualise specific areas of stronger and weaker agreement amongst the experts. The motivations for which there are smaller ranges represent stronger levels of agreement between the experts than those with larger ranges. This additional step in the analysis process becomes important during subsequent discussions on developing a standard and can have particular relevance in policy and strategy discussions which will be discussed further in chapter 7.

Figure 2 shows the distribution of responses for the highest ranked motivation for having standards for household latrines; that everyone has a baseline standard depending on his capacity. The mean rank was 3.

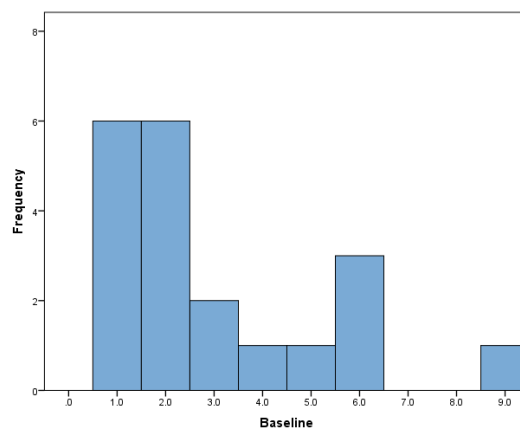


Figure 2 Distribution of responses for 'everyone has a baseline standard'

During round two, having a baseline and not contaminating ground water had the same number of occurrences (as shown in Table 33, section 5.3.2). However, in round three they have been ranked at opposite ends of the list, with having a baseline coming top and not contaminating ground water coming bottom. Figure 2 shows that one expert ranked having a baseline as the least important motivation for having a standard which is contrary to the majority of the other experts. This example highlights the problem of trying to reach consensus in a multi-stakeholder sector that was discussed in section 2.4.1.9.

Figure 3 shows the distribution of responses for 'ensure compliance with good hygienic practices'. The mean rank was 4.15.

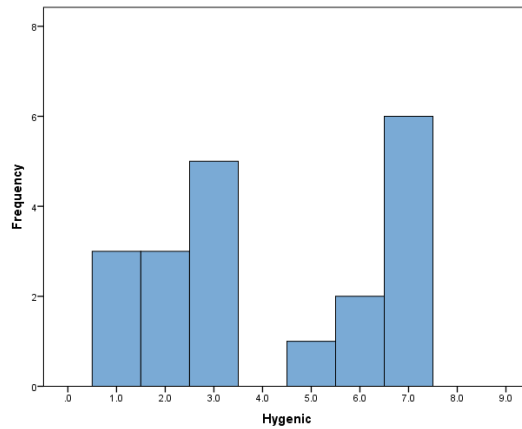


Figure 3 Distribution of responses for 'ensure compliance with good hygienic practices'

Figure 3 shows a distinct split in the range of rankings with 11 experts giving a rank of 3 or above and 9 experts giving a rank of 5 to 7. Section 2.4.1.7 in the literature review discussed the role that messages about good hygienic practices are used as a basis of hygiene education and behaviour change practices. Based on this understanding, although this motivation was ranked second overall it is surprising that almost half of the panel ranked it on the lower half of the scale.

Figure 4 shows the distribution of responses for 'ease of construction'. The mean rank was 4.25.

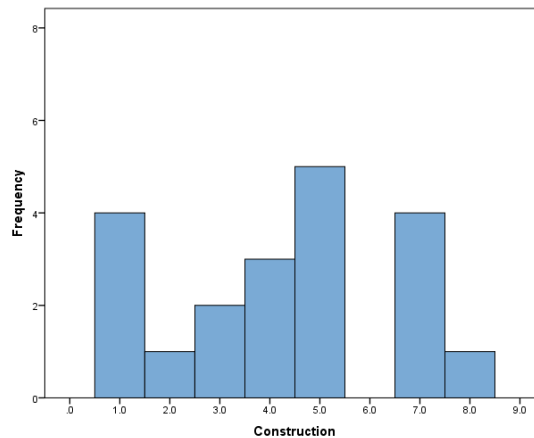


Figure 4 Distribution of responses for 'ease of construction'

Figure 5 shows the distribution of responses for ‘ensuring safety during use’. The mean rank was 4.35.

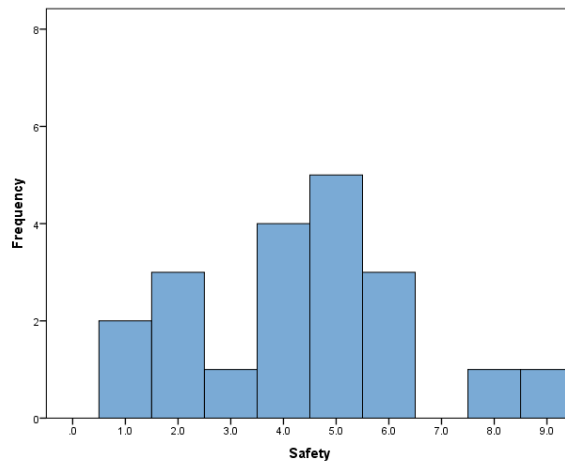


Figure 5 Distribution of responses for ‘ensuring safety during use’

The difference in mean rank between ease of construction and safety is only 0.10 but safety ranks very slightly lower than ease of construction because the range of ranks is larger as shown in Figure 5 which has rankings from 1 to 9 as opposed to Figure 4 which has rankings from 1 to 8. Section 2.3.2 in the literature review discussed how safety is a common motivation for developing a standard, and in terms of latrines it was listed as a key consideration in selecting a latrine in several of the policy and strategy documents from Sub-Saharan Africa. It is therefore surprising that two of the experts ranked it as the least important motivation for having a standard.

Figure 6 shows the distribution of responses for ‘providing a common understanding to all stakeholders’. The mean rank was 4.85.

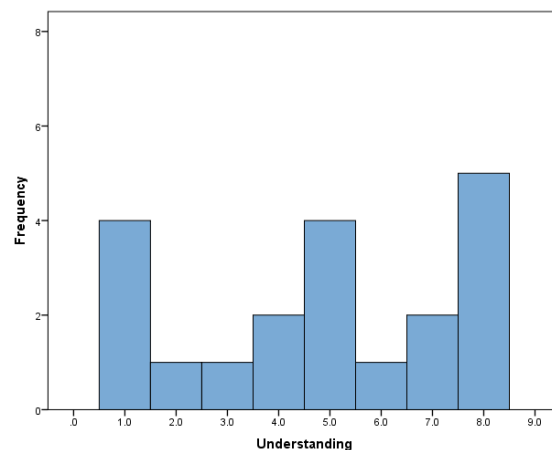


Figure 6 Distribution of responses for ‘providing a common understanding’

The ranking of this motivation highlights a case where there is weak agreement between the panel on the importance of this issue and consequently it occupies a position in the middle of the ranks. More experts ranked the motivation at the bottom end of the scale

than ranked it at the top end (12 and 8 respectively) with just under half of the experts ranking it at opposite ends of the scale to each other (at positions 1 and 8).

Figure 7 shows the distribution of responses for 'ensures latrines are user friendly'. The mean rank was 5.00.

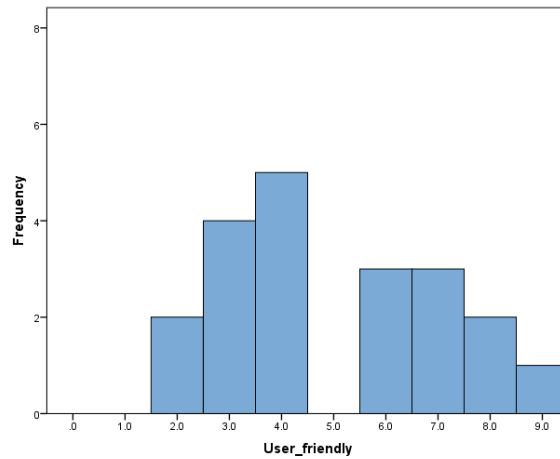


Figure 7 Distribution of responses for 'user friendly'

Figure 7 is similar to Figure 3 in that it shows a distinct split in the opinions of the experts with 11 experts giving a rank of 2 to 4 and 9 experts giving a rank of 6 to 9. This division of opinion highlights an issue that would need to be discussed in more detail during the development of a standard to ensure that a consensus is reached.

Figure 8 shows the distribution of responses for 'provides acceptable evaluation criteria'. The mean rank was 5.20.

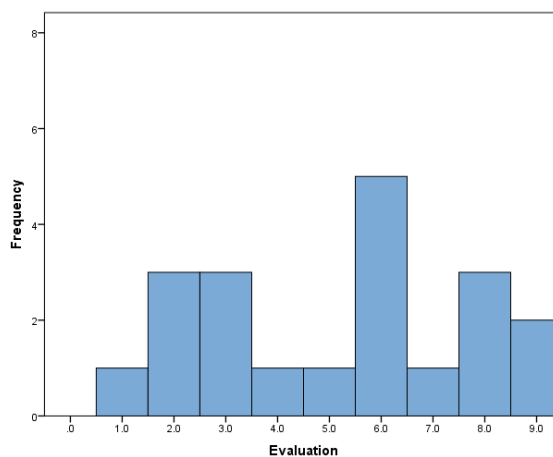


Figure 8 Distribution of responses for 'provides acceptable evaluation criteria'

Figure 8 shows a similar situation to Figure 6 where there are low levels of agreement between the experts which causes a wide range of distribution. This is the only motivation to be ranked in every position and would be particularly important during subsequent discussions on the development of a standard because the idea of evaluation criteria is

closely linked to the idea of regulation. As discussed throughout this study, a standard is supposed to be used voluntarily but during the document analysis it was highlighted that there is an assumption in many of the documents from both Sub-Saharan Africa and Rwanda that household latrines should be subject to some form of monitoring and in some cases, regulation. The low levels of agreement on this issue highlight it as an area that could be particularly difficult to reach a consensus on.

Figure 9 shows the distribution of responses for ‘provides alternative options for waste treatment and recycling’. The mean rank was 7.10.

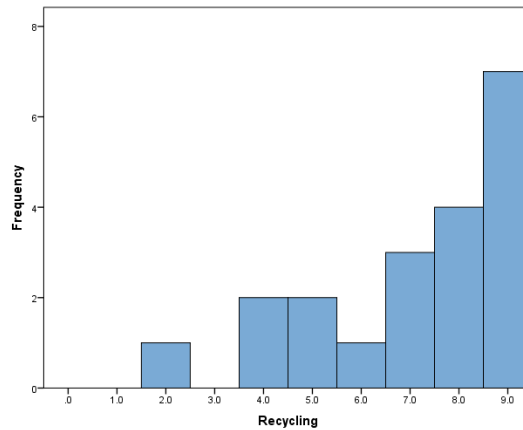


Figure 9 Distribution of responses for ‘alternative options of recycling/treating waste

Figure 10 shows the distribution of responses for ‘preventing the contamination of water sources’. The mean rank was also 7.10.

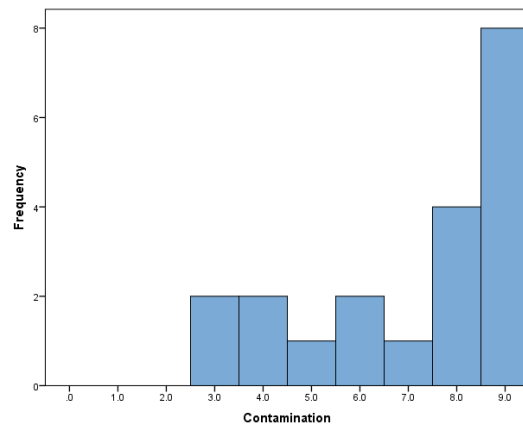


Figure 10 Distribution of responses for ‘preventing contamination of water sources’

Figures 9 and 10 show that despite having the same mean rank, there can be different ranges of distribution in the ranks with a slightly stronger agreement shown in Figure 10. Preventing the contamination of water sources was recognised as an important consideration in five of the policy and strategy documents and ten of the guidelines and manuals from Sub-Saharan Africa . Therefore, it is surprising that preventing the contamination of water sources is ranked as the least important motivation for having a standard for a latrine.

5.4.2 Question 2: What factors should be considered when setting standards for household latrines?

Identifying which factors are considered more important than others is a useful step in the standard development process because it helps to identify the needs that a standard should address and it contributes to defining the role that a standard will play. Table 38 presents the ranking of factors by experts in response to the question of what factors should be considered when setting standards for household latrines. Each factor is referred to by a shortened name for ease of presentation.

Table 38 Ranking of factors for question 2 round 3

Factor	Ranked position of each factor by individual experts																			
	1	5	6	7	8	9	10	11	12	13	15	17	18	19	20	21	22	23	24	
Affordability	1	1	2	3	1	6	5	6	2	2	1	1	1	2	1	1	1	6	1	
Norms	11	3	11	11	3	11	3	10	11	10	5	2	7	10	11	10	11	8	7	
Materials availability	2	5	1	4	2	10	10	9	3	5	2	3	8	7	3	2	2	2	6	
Distance	3	8	10	6	9	2	2	7	5	11	8	5	6	4	4	4	4	1	2	
Disability	9	4	4	8	4	5	7	8	8	4	9	4	5	9	8	6	7	3	3	
No odour	7	7	3	10	5	3	8	5	9	7	3	6	4	8	5	8	6	7	4	
Not contaminate water	8	9	9	5	6	1	4	3	10	9	10	8	9	3	6	9	3	5	5	
Safety	4	10	6	9	7	8	1	2	7	3	7	7	10	6	2	3	8	4	9	
Durability	5	6	5	2	8	7	9	4	4	6	6	9	3	5	7	5	9	9	8	
Recycling	6	11	8	7	11	9	11	11	6	8	11	11	11	1	9	7	5	10	10	
Ease of application	10	2	7	1	10	4	6	1	1	1	4	10	2	11	10	11	10	11	11	

Missing data point: Expert 16 ranked all responses as 1 and expert 14 did not complete ranking

Table 39 presents the mean rank score for each of the 11 factors presented to the panel from 'most important' (i.e. mean rank of 1) to 'lowest importance' (i.e. mean rank of 11).

Table 39 Mean ranks of responses for question 2 round 3

Factor	Mean rank
Affordability of Technology	2.32
Choice and availability of construction materials	4.53
Distance from the household, nearest cooking area and water source	5.32
Safety and protection of users	5.95
Disability or impaired use	6.05
Free from bad odours, inaccessible to insects, flies and animals	6.05
Durability of materials	6.16
Not contaminate ground water	6.40
Ease of applying the standards	6.40
Traditional norms	8.16
Options for recycling or enhancing the value of wastes	8.58

Kendalls Coefficient of Concordance, W , was calculated to be 0.245. Based on the interpretations in Table 37, a W value of 0.245 indicates very weak to weak agreement amongst the panel with low to no confidence in the ranks. This indicates that there is not a strong agreement between the experts regarding the factors to be considered when setting a standard for household latrines. However, the chi-square (χ^2) value is 48.287 (when $df=10$) which means that the probability that the rankings are unrelated (or independent) has a significance level of .000. Consequently, it can be concluded with confidence that the agreement amongst respondents is higher than it would be by chance had the rankings been random or independent.

Figure 11 shows the distribution of responses for 'affordability of technology'. The mean rank was 2.32.

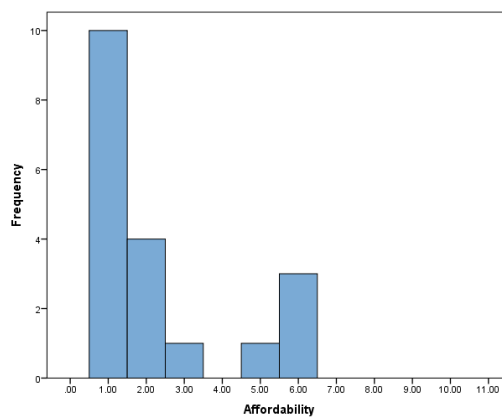


Figure 11 Distribution of responses for 'affordability of technology'

Figure 11 shows that the factor of affordability was ranked in first place by ten experts. This is the only item in round three to be given the same ranking by over 50% of the panel and as such, during the development of a standard, it would be a clear priority.

Figure 12 shows the distribution of responses for 'choice and availability of construction materials'. The mean rank was 4.53

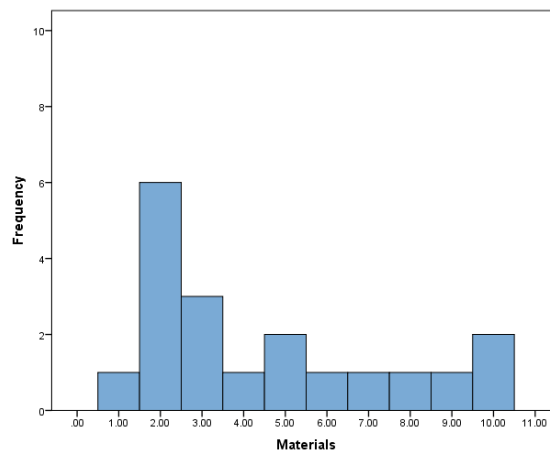


Figure 12 Distribution of responses for 'availability of materials'

Although the choice and availability of construction materials is ranked in second place, there are low levels of agreement amongst the panel, demonstrated by the wide distribution of ranks shown in Figure 12. The same is true of the distribution for the factor ranked third which was the 'distance from the household, cooking area and water source' as shown in Figure 13 with a mean rank of 5.32.

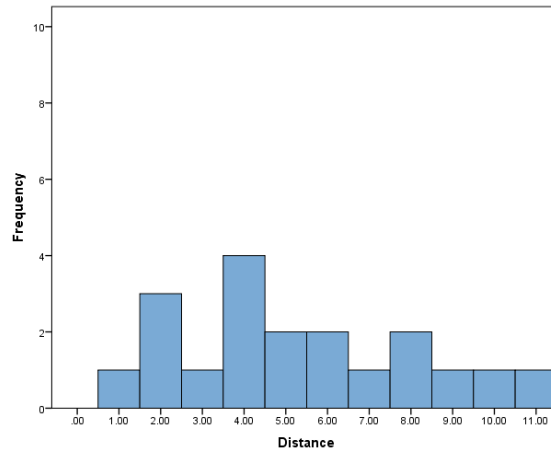


Figure 13 Distribution of responses for 'distance from household, cooking area and water source'

Figure 14 shows the distribution of responses for 'safety and protection of users'. The mean rank was 5.95.

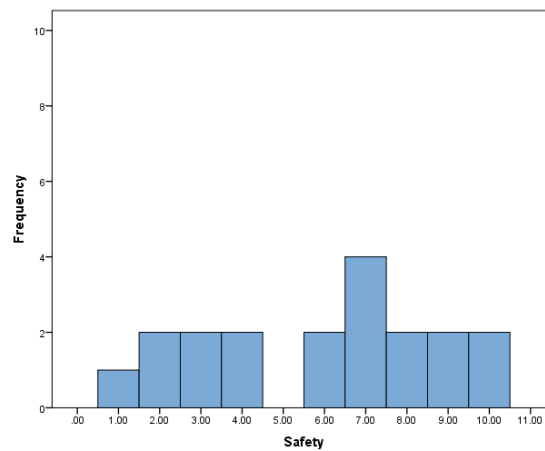


Figure 14 Distribution of responses for 'safety and protection of users'

The distribution of ranks for 'safety and protection of users' in Figure 14 shows a clear split in opinion but more experts ranked it in the lower half of the list which is surprising. The researcher would have expected it to be ranked higher in the list, given that one of the main reasons used to promote latrine construction is improved health (e.g. protection) and one of the main problems with poorly constructed latrines is that they pose hazards to users. The fact that safety is ranked lower than considerations such as affordability and the availability of materials suggests that being able to construct the latrine in the first place (i.e. by having an affordable option and available materials) is the first barrier to consider and once those needs are met, other considerations such as

safety and accessibility can be considered.

Figure 15 shows the distribution of responses for 'Disability or impaired use'. The mean rank was 6.05.

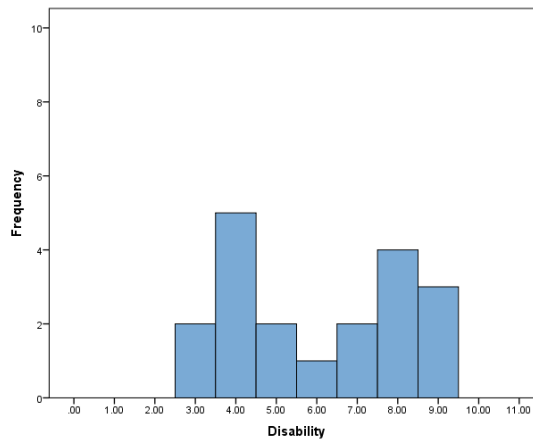


Figure 15 Distribution of responses for 'disability or impaired use'

Between rounds 1 and 2 the importance of disability and impaired use as a factor to consider when setting standards for household latrines increased dramatically from a 4% representation in round 1 to a 52% representation in round 2 as shown in Table 40. In round 2 it was also the factor with the highest number of occurrences, being selected by over 50% of the panel.

Figure 16 shows the distribution of responses for 'free from bad odours, inaccessible to insects, flies and animals'. The mean rank was 6.05.

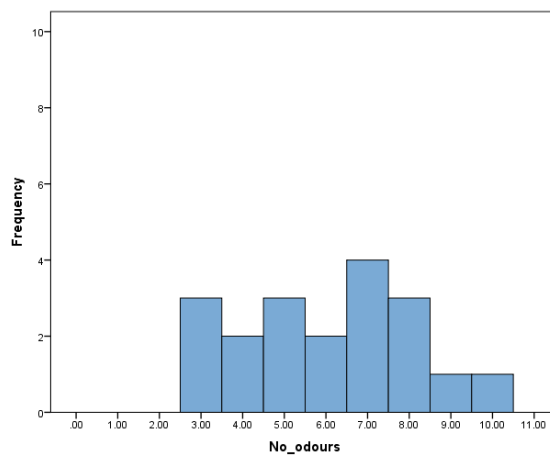


Figure 16 Distribution of responses for 'free from odours, flies and animals'

The mean rank for Figure 16 is the same as that for disability and impaired use in Figure 15 use but there is a wider distribution in the ranks given.

Figure 17 shows the distribution of responses for 'durability of materials'. The mean rank was 6.16.

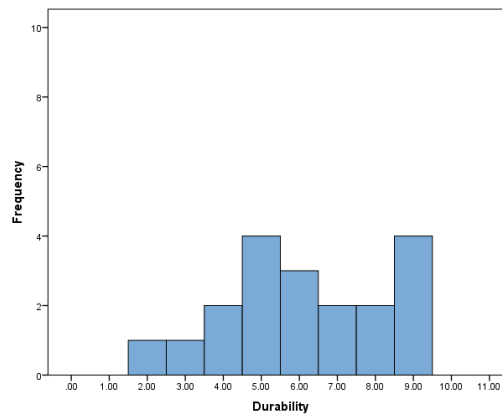


Figure 17 Distribution of responses for 'durability of materials'

Between rounds 1 and 2 the percentage representation for durability of materials more than doubled to 30% from 13% in round 1 (as shown in Table 40) but at 30% it was still one of the lowest represented factors going in to round 3. The other factors with a representation of 30% were ease of applying the standards and traditional norms which have both been ranked lower overall (in positions 7 and 8 respectively).

Figure 18 shows the distribution of responses for 'not contaminating ground water'. The mean rank was 6.40.

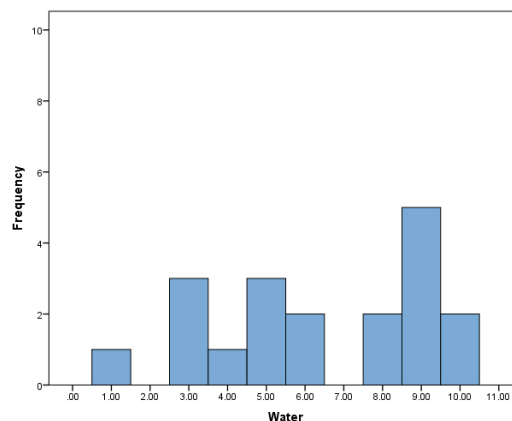


Figure 18 Distribution of responses for 'not contaminate ground water'

Figure 18 shows three very distinct splits in the ranking of this factor with one expert ranking it as the most important and 2 ranking it as the least. However, the fact that not contaminating ground water was given as a motivation for having a standard as well as a factor to consider when developing one would suggest that it is an important consideration in the minds of the expert panel.

Figure 19 shows the distribution of responses for 'ease of applying the standard'. The mean rank was also 6.40.

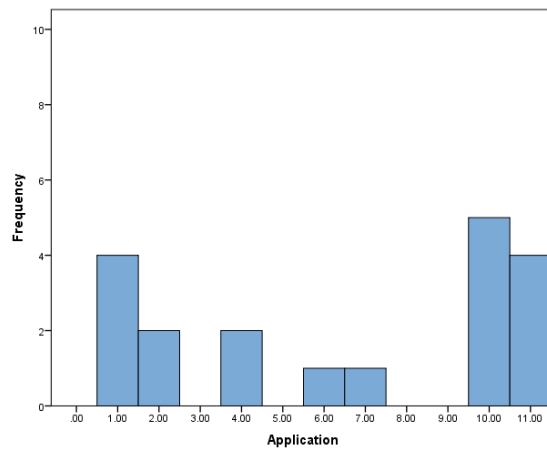


Figure 19 Distribution of responses for 'ease of applying standard'

The mean rank for Figure 19 is the same as the mean rank for 'not contaminating ground water' in Figure 18, but there is a more distinct split in the range of ranks for this factor with experts ranking it at opposite ends of the scale which indicates lower levels of agreement between the experts on the importance of this factor.

Figure 20 shows the distribution of responses for 'traditional village norms and cultural taboos'. The mean rank was 7.10.

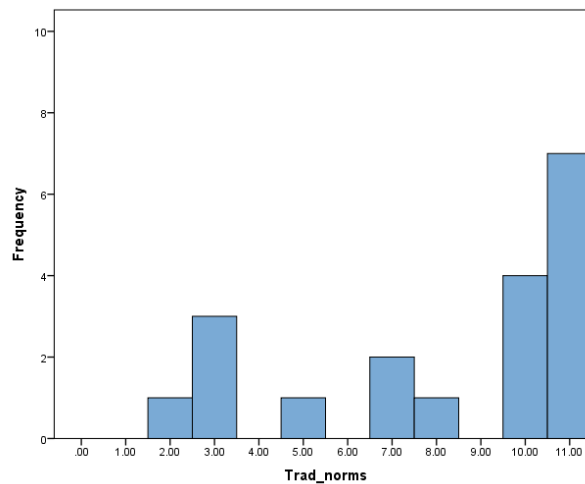


Figure 20 Distribution of responses for 'traditional norms and cultural taboos'

Figure 21 shows the distribution of responses for ‘options for recycling or enhancing the value of wastes’. The mean rank was also 7.10.

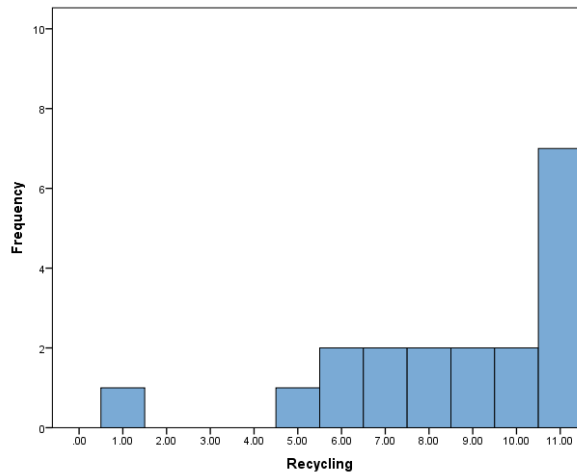


Figure 21 Distribution of responses for ‘options for recycling or enhancing value of waste’

Despite Figures 20 and 21 having the same overall mean rank, there is a stronger agreement between the experts on the ranking of providing options for the recycling of waste than there is about the importance of traditional norms. It is interesting that the option to recycle waste has been ranked lowest in the factors to consider when setting a standard because although it may be seen as a desirable attribute by some, it is not necessarily as important as the need to ensure safety and affordability. This could have implications for the future promotion of composting latrines such as ecosan and could result in a change in policy to consolidate efforts around more affordable versions of latrines rather than those with the ability to recycle wastes.

5.5 Inter round analysis of results

5.5.1 Definitions in practice

Responses to the question ‘how do you define a standard’ presented in section 5.2.1 can be seen throughout the responses given to the other four questions in the study. The responses which stand out are from the category ‘role of standards’ (see Table 22) and include knowledge, quality, safety, performance and an accepted way. The idea that a standard can ‘*make life simpler*’ (Expert 27) is reflected in the motivation for having a baseline from which everyone can make decisions about the type of latrine they want, providing a common understanding and supporting ease of construction.

The key motivations for having a standard selected in round two and ranked in round three (presented in Table 35) can be split into the themes of knowledge, safety and performance. Two of the key motivations are that the latrine will be user friendly and will support good hygiene practices and can therefore allow people to ‘*fully enjoy a service or product with all the required conditions*’ (Expert 4). Safety was given as a response to both questions in

round three. The concept of safety is closely linked and the idea that a standard should ensure that latrines perform as intended is reflected in several of the responses in round three including; materials durability, being free from odours and insects, not contaminating ground water, ease of construction and being user friendly.

5.5.2 Changing responses

The process of consolidating the responses from the entire panel and presenting them back to the panel in subsequent rounds is an important element of the Delphi process. Experts can either change their response to a given question or they can retain their original opinion and give the same response again. In cases where experts may be making substantial changes in their responses, the benefit of anonymity means that no one else on the panel can see an individual change in opinion. Table 40 shows how responses to two questions changed between rounds one and two of the study.

Table 40 Changes in responses between round 1 and 2

	Round 1 (27 experts)		Round 2 (23 experts)	
	No. of occurrences	Percentage representation	No. of occurrences	Percentage representation
Motivations for having standards for household latrines				
Baseline	3	13	10	43
Support good hygienic practices	1	4	12	52
Ease of construction	3	13	14	61
Safety	4	17	13	57
Provides a common understanding	2	9	9	39
User friendly	3	13	11	48
Provides acceptable evaluation criteria	3	13	10	43
Alternative options for waste treatment/ recycling	1	4	10	43
Prevent contamination of water sources	6	26	10	43
Promote good sanitation in communities	10	44	8	35
Factors to consider when setting standards for household latrines				
Affordability of Technology	6	26	11	48
Choice and availability of construction materials	9	39	11	48
Distance from the household	7	30	11	48
Safety and protection of users	5	22	9	39
Disability or impaired use	1	4	12	52
No bad odours, inaccessible to flies and animals	4	17	8	35
Durability of materials	3	13	7	30
Not contaminate ground water	6	26	10	43
Ease of applying the standards	2	9	7	30
Traditional norms	6	26	7	30
Options for recycling /enhancing value of wastes	3	13	9	39
Income levels	7	30	5	22

The differences in responses between rounds one and two shown in Table 40 demonstrate that it is important to let the panel reduce the initial number of responses down to a manageable number, rather than the researcher doing it after the first round. The responses 'support good hygienic practices' and 'disability or impaired use' were only given by one expert in round one, but after being presented to the rest of the panel the number of occurrences for each increased substantially even though the number of experts participating had reduced. In comparison, the numbers of occurrences of 'promote good sanitation in communities' and 'income levels' were reasonably high in round one but reduced in round two and were not carried forward into round three.

The fact that there were only low levels of consensus achieved in this study limits the validity of any inferences made about the rise and fall in importance of specific motivations and factors between rounds. However, it is interesting to see that responses changed again between rounds two and three. For example, when considering the motivations for having a standard for household latrines, supporting good hygienic practices, ease of construction, safety and user friendly all had higher numbers of responses at the end of round two than the motivation of creating a baseline. However, during the ranking process in round three, having a baseline was ranked the highest, most important motivation and not contaminating ground water was ranked (equal) lowest, despite the two motivations having the same number of occurrences in round two. If the study had been stopped after the second round, enabling ease of construction would have been considered the most important motivation and the list of motivations from most to least important would look quite different.

5.6 Critique of analysis process

The biggest challenge during the analysis process was dealing with the large range of responses which a qualitative approach to the Delphi process can generate. As discussed in sections 5.2.2 and 5.2.5, the range of responses generated in response to questions two and five in round one was not anticipated and the process of analysis had to be modified. The researcher wanted the expert panel to develop their own responses to the questions in order to explore the development of standards from their own perspectives rather than that of the researcher. This is why a qualitative approach using open questions was used. However, questions two and five can be criticised for being too open. Better question formulation which would have given the panel more direction in providing responses should result in a more consolidated set of responses which would have allowed both questions to be taken forward into the ranking phase of the process.

One of the benefits of assessing the levels of consensus using Kendalls Coefficient of Concordance is that the calculations can be done by hand or in a programme like Microsoft Excel, it is not necessary to use a licenced programme like SPSS which is not available to all researchers.

It has been discussed that a low value of W can mean that the experts are not applying the same selection criteria to the list of items to be ranked. In order to identify the selection

criteria used by each expert in more detail, a supplementary process could be added at each round of the Delphi process. This would most likely be in the form of a follow-up questionnaire which would ask experts why they made the decisions they did. Whilst this approach may provide more data for the researcher and could confirm if the same selection criteria is being used or not, it would also increase the time commitment from the experts and may lead to higher drop-out rates between rounds. However, it could be considered for future research using the Delphi method.

5.7 Key findings from the Delphi study

Table 41 shows the contributions that can be made to the conceptual framework as a result of the Delphi study as a quick reference. The faded questions have either already been answered in chapter 4 or will be answered in chapter 6.

Table 41 Contributions to the conceptual framework from the Delphi study

Concept	Consensus	Role	Use	Regulation	Development
Consensus		Do stakeholders consider role of standards differently? Standard can be based on best practice, current practices or be aspirational	Where should standards be used?	Levels of regulation?	What if views on standards are very different? Different levels of importance given to some considerations (ranking at opposite ends of scale)
Role	What do stakeholders consider when developing a standard? *See note 1		What role do existing standards play?	How are standards viewed?	What role do stakeholders want standards to play? Make life simpler Protect users – quality, safety, performance, minimum standards
Use	Intended users? All stakeholders with a focus on builders, CHW and households	What need do standards meet? *See note 2		Are standards constraints?	Are informal standards known and recognised? Some technical specifications and latrine characteristics are already well established
Regulation	Is regulation required? Yes - due to public good nature of a latrine	Voluntary or mandatory?	How can regulation be done? Imihigo contracts Law Technical regulation Potential use of penalties/sanctions		Where are standards found?
Development	Who is involved in the process? All Stakeholders should be involved, especially the people as users	Type of standard? Technical rather than service based	What do standards look like? Design and construction info. Technical specifications Siting info Instructions for use	Process of monitoring or checking Use of decentralised structures e.g. local authorities, CHW and peer pressure	

<p>*Note 1: What do stakeholders consider when developing a standard?</p> <p>Top factors:</p> <ul style="list-style-type: none"> Affordability Materials availability and durability Siting on plot Safety and protection Accessible to all Clean and hygienic Prevents water contamination Ease of applying standard Traditional norms Potential for recycling waste 	<p>*Note 2: What need do standards meet?</p> <ul style="list-style-type: none"> Providing information and a common understanding (including evaluation criteria) Supporting construction and adoption of good practices Protects users safety Prevents water contamination Supports user friendliness
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Do stakeholders consider role of standards differently? [Consensus and Role]

Two of the stakeholders made specific references to the role of the standard but these were contradictory to each other. One stated that a standard should be based on current practices and one suggested that the standard should be aspirational.

What if views on standards are very different? [Consensus and Development]

The figures showing the distribution of responses for the individually ranked motivations and factors in sections 5.4.1 and 5.4.2 highlighted some cases where experts gave ranks at opposite ends of the scale. For example, one expert ranked having a baseline as the least important motivation for having a standard which is contrary to the majority but highlights the problem of trying to reach consensus in a multi-stakeholder sector.

What do stakeholders consider when developing a standard? [Role and Consensus]

The expert panel generated an initial list of 44 factors to consider when developing a standard for a household latrine. During round two that list was pared down to the top 11 responses. One of the limitations of the ranking process discussed in section 5.6 is that the relative importance of each factor in relation to the others cannot be assessed and the value of *W* did not indicate strong levels of consensus on the ranking of the key factors. However, by presenting the factors and motivations in order of rank it is easier to see which factors could be given priority over others when developing a standard and provides stakeholders with a consolidated list of key factors to discuss in a more traditional group discussion setting such as a workshop or focus group.

In the guidelines on latrine technologies there are six key considerations for selecting a latrine. These are; affordability; space; cultural habits; availability of water; availability of skilled or semi-skilled manpower and the geographical distribution of the soil (MININFRA, 2011, p.20). All of these factors, except for the availability of man-power and the space needed were carried through to the final round of the Delphi process in question 2 (see section 5.4.2). Both space and the availability of man-power received six responses from the expert panel during round 2 but that was not enough to take them forward as considerations in round 3. Despite low levels of consensus overall, the fact that the responses from the Delphi process are consistent with existing documentation helps to verify that the responses given during the Delphi reflect current thinking in the sector.

What role do stakeholders want standards to play? [Role and Development]

The ideas that a standard should provide knowledge to users and that it should support safety and good performance can be seen in the data. In round 1 question 1 the role of a standard in making sure that latrines are of good quality was expressed by six experts and fits into the broader understanding that standards should contribute to making life easier. In terms of the type of knowledge provided, there were some references to tested and approved latrines which would reduce the levels of confusion over what is considered the 'right' kind of latrine.

Intended users? *[Use and Consensus]*

For the experts who identified the recipients of the information in their responses, all six expect national and local dissemination to 'all actors' (Expert 12), providing something that 'all people can follow' (Expert 19). Three experts stated that the standard should be published and five experts included the development of training materials in their responses. The style of the document is therefore very important if it is expected that anyone should be able to read it. In terms of training, builders and technicians received more specific references than any other group.

What need do standards meet? *[Use and Role]*

Identifying the need that the standard should meet is the first stage in the standard development process. During round 1 the experts produced a list of 32 motivations for developing a standard for household latrines which was pared down to a list of 9 motivations in round 2. The results of round 3 have shown that the most important motivation for having a standard for household latrines is to provide a baseline for households according to their financial capacity. This need is related to the provision of information and knowledge and the definition of a standard as an 'accepted way' of doing something that was expressed by over 30% of the panel during round 1.

Are informal standards known and recognised? *[Use and Development]*

The technical specifications given in response to question 2 round 1 are all different and the list of responses which detail characteristics that latrines should meet also demonstrate some of the existing knowledge people have about latrine design, construction, use and maintenance. For example, it can be summarised from the responses gained that a latrine is supposed to have a superstructure, a door and a roof, it is also expected to be clean, safe and convenient but it is not expected to have a lined pit. These responses both in terms of technical specifications and latrine characteristics highlight areas of existing knowledge and the potential problem of harmonising and changing currently held beliefs about latrine construction in the future. For example, if lining a latrine pit becomes part of a new standard for latrines then persuading households to spend additional resources on lining the pit when it has not been lined before could be difficult.

Is regulation required? *[Regulation and Consensus]* and **How can the standard be regulated?** *[Regulation and Use]*

One expert stated a very clear need to regulate household latrines because of their role in wider community health but there were very few references to regulation overall. The options presented for regulating the standard were given as, the creation of a technical regulation; enforcement of the standard through law and enforcement of the standard through the imihigo contracts. The use of penalties as a deterrent, particularly the use of fines, was suggested by three experts.

One of the motivations for having a standard was given as providing acceptable evaluation criteria for latrines that could be applied by health workers without bias. This was the only motivation from the list of 9 to be ranked in every position, which indicates that the panel

had very little agreement over its importance in the development of a standard. The potential role that regulation can play and how it can be achieved will be explored further during the interview analysis.

Who is involved in the process? *[Development and Consensus]*

Five of the experts highlighted the role that people (i.e. the users) should play in the process of developing a standard. Other stakeholders listed included government authorities, engineers and financial providers (e.g. micro-financiers).

Type of standard? *[Development and Role]*

The responses to question 1 in round 1 regarding the definition of a standard showed that the panel expects the standard to be technologically based rather than service based with some of the experts including specific technical specifications in their definition of a standard. There were several references to the idea of a standard being an 'approved model' but this could reflect the use of a 'standard model' or an allowable type of latrine based on a list of recommended options. Further exploration of this dual understanding is therefore required during the interview phase.

What do standards look like? *[Development and Use]*

The results from question 1 in round 2 show that the experts expect a standard for a latrine to be technically based rather than service based. Based on the responses, all of the experts expect a standard for latrines to include information on design and construction with the categories for technical specification, instructions for use, siting and location all being selected by a majority of the panel.

Process of monitoring or checking? *[Development and Regulation]*

Monitoring activities are expected to ensure that the latrines being constructed or those in use are able to maintain the safety and health of the wider population. The groups of people identified as being responsible for monitoring the standard are those who are closest to the communities and households.

5.8 Summary of key findings from the Delphi study

The aim of research objective two was to establish if there is consensus between the expert panel on the need for a standard, the role it can play and how it can be used. The Delphi method has been used to understand what levels of consensus exist and whether or not there are some areas where gaining consensus could be particularly challenging. It should be remembered that Delphi results should not be considered as indisputable fact and there are no right or wrong answers in the process. Instead, the results show how a group of experts views a given problem at a particular time.

The results from using the Delphi method in this study have shown that although levels of consensus amongst the expert panel are low, agreement amongst respondents is higher

than it would be by chance and that individual experts are willing to change their opinions throughout the process when presented with alternative considerations. If experts are willing to remain flexible in their opinions, negotiation is possible and the chances of achieving consensus on the most important aspects of a standard for household latrines are improved. The results from the Delphi exercise used in this study therefore provide a basis from which further, more in-depth discussions between stakeholders can take place.

Section 2.3.2 in the literature review discussed how closely the need for a standard and the role it can play are linked. There is currently little consensus on either the need for a standard or the role it can play but the idea that a standard should provide knowledge to users and that it should support safety and good performance can be seen through the responses in this chapter. Whether or not the standard should represent a 'standard model' of a latrine is not clear and will be explored further during the interview analysis. This is one of the most important areas where consensus should be established before a standard is developed.

All of the experts expect a standard for latrines to include information on design and construction with the additional categories for technical specification, instructions for use, siting and location all being selected by a majority of the panel. With a strong focus on technical information being expected, the style of the document is very important if it is anticipated that anyone should be able to read it.

There is also an assumption that household latrines should be monitored and that a standard can play a role in the monitoring. Monitoring activities are expected to ensure that the latrines being constructed or those in use are able to maintain the safety and health of the wider population, which links to the understanding shown by the results that a standard will be technically based rather than service based.

The issue of regulation, the need for it and the process through which it can be done is one of the areas which is likely to be the most difficult to achieve consensus on. The options presented for regulating the standard were given as, the creation of a technical regulation; enforcement of the standard through law and enforcement of the standard through the imihigo contracts. The use of penalties as a deterrent, particularly the use of fines, was suggested by three experts but another expert disagreed and stated that you should not punish or fine people at all. Despite the fact that a standard is by itself voluntary, the issue of regulation was independently raised by the panel and reflects one of the findings from the document analysis that regulation is considered to be 'part and parcel' of a standard. The potential role that regulation can play and how it can be achieved will be explored further during the interview analysis.

5.9 Chapter summary

This chapter has presented the findings from the Delphi method by question and round with a combination of qualitative and statistical analysis. Section 5.7 presents the contributions to the conceptual framework that can be made as a result of the data collected through the process. These contributions can be added to those from the document analysis presented in chapter 4 and semi-structured interviews which will be presented in chapter 6.

As stated previously, the aim of using the Delphi method in this study was not to force a consensus between the expert panel but to establish what levels of consensus already exist. This objective was achieved and the use of the Delphi method in water, sanitation and hygiene related research represents the use of a new method in the sector. Including stakeholders from a wide range of different interest groups has been challenging but it has shown the value of including people that would not normally be included in national level affairs. The flexibility of the Delphi method is of use in a dynamic research environment like a developing country and the fact that it could be done by local researchers is also beneficial.

The importance of developing a standard by consensus was discussed in section 2.3.4 and the results of the Delphi method have shown that consensus between the wide range of stakeholders in Rwanda cannot be assumed. Chapter 6 builds on the findings from using the Delphi method and explores stakeholder perceptions in more detail.

6. Presentation of findings from semi-structured interviews

6.1 Chapter outline

The aim of the interviews was to gain more in-depth views about stakeholder perceptions of standards and understand how a standard does or could fit into the current system. The results from the interviews are presented under themes and sub-themes identified through the coding process used to analyse the responses.

The research sub question and research objective addressed by this section are;

Research sub question 3: *How does a standard for household latrines fit into the current situation in Rwanda?*

Research objective 3: *To understand stakeholder's perceptions on standards for household latrines and how a standard fits into the current sanitation system*

Section 6.2 provides a brief overview of the coding process. Section 6.3 provides contextual insights into the current situation regarding latrines and standards in Rwanda. Sections 6.4 and 6.5 provide a discussion on the current role of the guidelines on latrine technologies and stakeholder perceptions on whether or not these are viewed as standards. Section 6.6 presents the contributions made to the conceptual framework as a result of the semi-structured interviews.

6.2 The coding process

A detailed explanation of the coding process was presented in section 3.9.3. The final node list contains 113 nodes, of which 22 are descriptive nodes which provide information on current projects, institutional arrangements, historical references and stakeholder descriptions. Some of the nodes are both descriptive and substantiating, e.g. cultural influences which describes how specific cultural understandings can influence the acceptance of new technologies and are therefore included under the substantiating nodes rather than the descriptive ones. The first 19 interviews (from a total of 38) generated 86% of the nodes developed, which demonstrates that towards the end of the interviews, the amount of new data being collected was decreasing. The use of a research diary was instrumental in noticing this pattern before the results were coded. By reviewing each interview after it was completed, it could be seen that the responses given were becoming more and more similar. This gave the researcher confidence in the responses and allowed a practical decision to be made about the benefits of continuing to identify further interview participants versus the increased financial and time costs which would be incurred by continuing.

Interviews were coded in the order in which they took place, therefore, there is less risk of longer interviews biasing the construction of the node list. The original node list is generated alphabetically in NVIVO. Between the second and third sweeps of the data, the

node list was pruned to consolidate very similar themes or sub-themes and was rearranged into seven principal categories. The full node list with the number of references against each node is presented in appendix 5.

Table 42 shows the code numbers given to each participant from a particular stakeholder group. The interviewees have a mixture of generalised national expertise and more localised experience. Those with more localised experience tend to be the builders, representatives from NGOs, the communities and community health workers. General position titles have been included but specific titles have not been used in order to protect the anonymity of participants. The codes were assigned in the order that the interviews were completed and bear no reference to the position or views of the participant. The community health worker interviews were often conducted in collaboration with other village representatives at the request of the community health worker.

Table 42 Interview participant codes

Stakeholder Group	Code	Position
Academia	Int7	Lecturer
Builder	Int11, Int13, Int16	Builders with recognised training
CHW	Int9 Int14	Southern Province Western Province
Communities	Int15 Int17 Int18 Int38	Southern Province Eastern Province Northern Province Western Province
Donors	Int3 Int12 Int23 Int26 Int32 Int33 Int35	WASH Programme Director WASH Advisor WASH Programme Officer WASH Advisor WASH Specialist WASH Programme Officer Environmental Health Specialist
Government	Int1 Int2 Int4 Int10 Int19 Int27 Int29	Project Director MININFRA Project Officer MININFRA Project Officer MININFRA EHO Head of Department Project Officer MoH Project Officer MININFRA
National Institutes	Int28	Head of Department
NGO	Int6 Int8 Int25 Int31 Int34 Int36	Programme Officer National Programme Manager International Programme Officer International Programme Officer International Director National Programme Officer International
Private sector	Int5 Int20 Int21 Int22 Int24 Int30 Int37	Consultant Managing Director Consultant Managing Director Executive Director Consultant Consultant

6.3 Understanding the current situation in Rwanda

6.3.1 Willingness to have a latrine

The general understanding in Rwanda is that if a person can afford to build a good house then they can afford to build a good toilet. Rates of open defecation are very low at 2.4% nationally (NISR *et al*, 2010, p.20) and culturally open defecation is not an acceptable practice. People moved from open defecation to the use of pit latrines with simple superstructures decades ago (Int1- government; Int6 –NGO; Int8 – NGO; Int12 – Government; Int21-private sector; Int34- NGO).

“Rwandan’s have the culture that they need to have their own property they need to have their toilets, they need to go secret, Rwandan culture is really strict they can’t do things openly” (Int25 – NGO).

However, whilst there is a willingness to have a latrine of some sort, willingness to invest in upgrading the latrine to one of a higher quality is low and presents a significant challenge for policy makers and implementers who are trying to increase the coverage of improved latrines. In some cases households have the capacity to invest but are unwilling to do so (Int4 – Government; Int8-NGO; Int12 - Government).

“A good house is a priority; people still don’t consider a good latrine to be part of a good house....people are not yet proud of their latrines” (Int22 – private sector).

A lack of willingness to prioritise latrine construction in Rwanda was also found in a recent study by Ekane *et al* (2012). The top four priorities given during the study were buying a farm, buying an animal, sending children to school and repairing the house (Ekane *et al*, 2012, p.12).

6.3.2 Health and hygiene messages

When communities and community health workers were asked why having a latrine is important the answer was always health, both communal and individual. In the CBEHPP manual for community health clubs discussed in section 4.6.1, the chapter on improving latrines focuses entirely on the health aspects (MoH, 2010, p.35). When asked how communities are persuaded to build latrines an EHO responded;

“we teach people that you have to have a latrine to prevent diseases because an unclean latrine can cause diseases, they know the list of diseases like worms. Health centres treat many cases. They also know about bad smells and flies” (Int10 – Government).

Approaches for educating communities and supporting behaviour change include awareness raising programmes in schools, through CHWs in communities, through the training of community representatives (e.g. local administrative leaders or local opinion leaders) and through the training of local builders under specific projects (Int1-government; Int2 –government; Int4- government; Int6-NGO; Int13 – builder; Int26 –donor; Int37-private

sector; Int-38 – community). According to one participant, behaviour change can take up to one year when there is a dedicated social mobiliser working in the community. In areas where the local leaders (umudugudu or cell leaders) are passionate, changes can happen more quickly (Int6 – NGO). In areas where there are specific projects and programmes there are more resources available so even if the programme is not providing direct support to households there are sensitisation campaigns, local trainings and learning materials available (Int26 – donor, Int32 - donor).

The results of the Delphi study presented in section 5.4.1 show that supporting good hygienic practices was ranked as the second most important motivation for developing standards for household latrines. Non-health related reasons for having a latrine such as privacy and dignity were not given by communities or community health workers during the interviews, but they were referred to by participants in the early rounds of the Delphi study and are listed as two of the criteria that should be met by a 'sanitary latrine' in the guidelines on latrine technologies (MININFRA, 2011, p.18). It is an interesting finding to highlight because in section 2.4.1.2 of the literature review it was discussed that research has found that health benefits are not necessarily key motivations for household decision making but in Rwanda, the importance of a latrine for improving health is still the key message delivered. This message is reinforced at the community level through household inspections covering all aspects of sanitation including compound cleanliness, water storage and treatment and the use of mosquito nets.

6.3.3 Monitoring progress towards better hygiene and sanitation

The responses gained through the interviews showed that whilst the responsibility for the quality of a household latrine rests with individual households, community health workers are expected to monitor and inspect latrines within their community. Community health workers work with local cell and sector leaders to inform the district on progress made, which is fed back to the national level, from which coverage estimates are made. The activities of CHWs can be supported by local environmental health officers (EHO) but the EHOs have a much larger population under their jurisdiction than community health workers and their trips to the field are limited by the availability of a budget for field visits (Int10 – EHO). In the case of Int38- community, they stated that no one comes to inspect their latrines whereas in Int15-community, latrines are inspected by umudugudu leaders and community health workers. Members of the community Int-15 had at the time of the interview, recently removed grass thatch roofs from houses and latrines to comply with new building regulations that prohibit the use of grass thatch on roofs in all circumstances. Unfortunately, this resulted in latrines being left without roofs because alternative materials were not readily available in the community and some were starting to collapse. The need to comply with the rule prohibiting the use of grass thatch was more important to these residents than the need to maintain a latrine with a roof. This not only reflects the level of priority given to latrines but is also a clear example of a situation where the construction of a latrine and therefore a standard for a latrine would be influenced by an activity not obviously related to the sanitation system. Section 4.7 discussed the relevance of building regulations in rural areas and whether or not they would be applicable to rural

households, but the banning of grass thatch is an example of how much influence a regulation can have, because even if the regulations are not applicable in rural areas, people believe that this aspect of them is and want to adhere to it.

When discussing penalties for not having a latrine two of the communities (Int15; Int17) said there was a penalty of 1,000 RWF for persistent offenders, however, community service would be more commonly given and in both cases the family would be supported to improve their latrine during umuganda (monthly community work). Ekane *et al* (2012, p.13) found the imposition of higher fines of 2,000 – 5,000 RWF in their study area.

6.3.4 Constraints on constructing latrines

6.3.4.1 Cost of latrines

Financial constraints were cited as being the most common reason from both communities and community health workers for not upgrading a latrine. The cost given for building a latrine ranged from 50,000RWF for a “*bad one with trees*” (Int15 – community) to between 120,000 and 150,000 RWF for a ‘modern toilet’ (i.e. a VIP using modern materials including cement).

Community savings schemes are already well established in Rwanda with people regularly saving to construct houses and buy household items (MININFRA, 2009b, p.33). It is hoped that by encouraging people to save for a latrine through the saving scheme demand for latrine construction will be generated and with it a market for sanitation (Int22- private sector; Int25 – NGO). Therefore, in time some of the financial constraints of constructing a latrine may be reduced.

6.3.4.2 Availability of materials

Closely linked to financial capacity is the availability of materials for construction. Over half of the participants, including those working at the national level stated that finding materials locally can be a significant challenge. The northern province is always highlighted as being particularly challenging because the ground is volcanic rock so stones are locally available but the mud is not suitable for making mud bricks (Int8 – NGO; Int18- CHW).

As a landlocked country, Rwanda suffers from high import costs of non-local materials including cement, iron and plastic, and there has been very limited research into the suitability of alternative, locally produced materials (MININFRA, 2009b, p.12). Community participants spoke about ‘modern materials’ meaning cement, plastics and iron sheets. These are available in trading centres for those who can afford them but transporting them to villages can be more costly than the materials themselves (Int15- community) and people have to buy more than they need because of the quantities in which the materials are sold. “*Buying 1.5 sacks of cement is not easy, you have to buy 2 at the market*” (Int22- private sector).

Two communities expressed the problem of not being allowed to use locally available materials for some parts of the latrine, especially the roof. As discussed in section 6.3.3,

thatch roofs are no longer allowed on any building which creates a problem for households that cannot afford tiles or iron sheets for a latrine roof. However, for those who can afford an iron sheet they can at least re-use it in the superstructure for a new pit once the old one is full (Int9- CHW; Int15 – community).

6.3.4.3 Physical constraints

Throughout chapter two, the importance of considering sanitation as part of a wider system is recommended. In Rwanda, there is an on-going settlement programme in which families are encouraged to move from dispersed villages into formal settlements, 'imidugudus'. Two participants expressed concern over the continued promotion of pit latrines and VIPs in an umudugudu setting because of the concentration of latrines in a specific area and the ability of the soil to accommodate so many pit latrines in close proximity (Int21- private sector; Int23- donor);

“The first problem is umudugudu because you have much house in the same place, for example you have 100 houses so that means 100 latrines in same place. So, I don't know exactly which capacity the soil have to support that, because for example if one latrine is full after 5 years it means after 5 years you have 100, then 200, and so on, so I'm asking myself if that is possible” (Int21- private sector).

However, in the guidelines on latrine technologies it is recommended that pits should be lined to prevent seepage into the surrounding soil, so the problem has been recognised and a solution is presented. Whether or not households will choose to line their pits based on the recommendation made in the guidelines is difficult to know.

One community described the process of bringing new latrines into the village which was struggling for space to build new pit latrines. Old pits would be buried but the new latrines are lined and can be emptied into another pit and made into compost. Health workers were trained by district officials to bring the new knowledge to the community. Pit lining has now become the accepted 'theoretical' norm in the village but people struggle to afford the stones (Int18 –community) so in reality many pits are still left unlined.

6.3.4.4 Informal construction norms

At the community and household level existing knowledge is limited to established practices within the communities.

“What they do is look for someone like a mason who digs a hole, because that's what he knows and there's no reference he's having, so he digs a hole 20m deep which will infect water sources” (Int31-NGO).

All interviewees from the communities could state the characteristics of a 'good latrine'. Depth was dependent on area but all participants stated that a good latrine should be cemented, be closed and have a roof. Closed in this context means having the drop hole covered. However, when asked about their current latrines all of the community interviewees admitted that whilst they know what they should be doing, few households

actually achieve it. Ekane *et al* (2012, p.11) found the same in their study and noted that whilst households can state what the requirements are for good sanitation, direct observations show that these habits are not put into practice. This problem of theory and action was also recognised by other interviewees, captured by this statement from Int35 – donor;

“..in the community they know, they know how a hygienic latrine should be even if they don’t comply to it” (Int35 –donor)

In Rwanda, latrine pits are dug by builders and only very poor households make the superstructure themselves. For those that are ultra-poor, vulnerable or unable to build their own latrine the community will build a latrine for them through community works programmes. Digging is one of the most expensive components in construction and pit depths range from 1m in some areas of the north with difficult conditions to 20m in others but deeper pits are preferred because they take longer to fill and therefore last longer than a shallow pit.

“Before the new technologies everyone use a pit latrine or open defecation in the forest. They were just built with local materials e.g. a pit, trees, banana leaves 6-8m pit. People started digging deeper after independence [1962] and in the towns. In commercial centres people would dig 15, 20, 25m. After that people in the village adopted the same” (Int29-Government).

Within the same village there can be significant differences in opinion on the correct depth for a pit latrine. In one community there were pit latrines with depths ranging from 10m – 20m but the minimum pit depth was expected to be 10m. When asked why, the response was *“if it’s not deep enough it is not safe and can be bad for the village”* (Int17- community). Safety in this context is related to keeping the faeces as far away from people as possible in a deep pit.

Participant Int22- private sector pointed out that digging to excessive depths is a waste of money, however, trying to persuade people to alter the depth of their latrine can be difficult, especially when the time taken to fill it will be decreased. One of the builders who had been trained to build ecosan latrines said *“people don’t like ecosan because they don’t know how to use it, they don’t like the depth and the expense so they ignore it”* (Int16 – Builder). In one community (Int38), the researcher was shown a new ecosan toilet by the owner. The owner had been given the toilet as a reward for achieving the status of becoming a ‘sanitation family’ by an NGO which is trying to promote ecosan technology in the area. The owner was complaining that as she had a large family the pit would fill up too quickly and she did not have anywhere to store the waste so she was not using the latrine.

Informal norm: Improving latrines

When respondents from the communities were asked what they would like to do to improve their current latrines they stated that they would like to have a slab, a roof and to cement the inside. However, one community laughed at the thought of cement inside a toilet as they said, *“you can’t sleep in a house with fleas and put cement in a toilet”* (Int38 –

community). The same was found during a study conducted by Water for People in the Northern Province (Water for People, 2012, p.15). The problem of a 'modern latrine' being better than people's houses was recognised by over half the participants interviewed and there were many anecdotes given about people moving their families into latrines constructed by projects because the latrine was better than the house they had.

The use of cement is promoted by health workers because it is an impermeable surface and easier to clean and should result in a more hygienic latrine but it is also an expensive material. In the guidelines on latrine technologies it is shown that cement plastering can be replaced by mud plastering in order to reduce the cost of construction. This demonstrates an attempt to change existing perceptions about construction in order to make construction more affordable and therefore potentially more attractive to households.

Informal norm: Information availability

When asked where people got information about latrines before, participants from government, NGO, donor and private sector organisations referred to the presence of "small documents" (Int20 – private sector; Int35- donor) from MININFRA or MoH but they were difficult to find even at the ministry level. Other information came from training courses in other countries or study tours (Int23 –donor; Int29 - government).

"..so there is no standardisation but what the government said is that everyone should have at least a toilet which has minimum standard for being used by human being, so that is what is happening, it is only in talking, not written in anything, please do that, please do that" (Int20 – private sector).

6.3.4.5 The influence of project latrines

Closely linked to the problem of informal construction norms is the presence of project latrines in some areas which has influenced expectations on what certain types of toilet should look like. Over the years there have been a number of donor led pilot projects in Rwanda; Sanplat in the late 1980s, VIPs in the 1990s and ECOSAN today (WSP, 2012, p.25). In section 4.7, the cost of a project VIP from the PNEAR project is given as 183,500 RWF compared to a cost of 41,000 RWF presented in the guidelines on latrine technologies developed by MININFRA (2011). A typical ecosan toilet built in a school can cost 800,000 RWF per door (Int31-NGO) whereas the household ecosan presented in the guidelines costs 45,000 RWF (MININFRA, 2011, p.33). These types of project latrines leave people with unrealistic expectations about the costs of constructing more hygienic latrines and represent one form of informal standard that can be present in a country.

"Saying eco-toilet is very expensive, that was a misconception before, because eco-toilet, when the technology came, it was only at level of NGO, then they came with the technology, they built it with lot of money, but if you are government or local NGO you cannot build eco toilet without burnt bricks" (Int20- private sector).

Another example of this how an internationally recognised NGO cannot be seen to be promoting the construction of latrines that do not meet international definitions of improved sanitation can be seen with Wateraid Tanzania which recommends that an

‘agreed national latrine standard’ should be used in order to monitor progress in the sector and that the ‘UNICEF-WHO definition of improved latrines is the best option’ (Wateraid Tanzania, 2008, p.4).

The problem of people having high expectations for what certain latrine options cost was summarised by of the interviewees who gave an example from a recent survey their organisation had completed;

“When we visited a person we would ask are you happy with your toilet, if they said no we would ask why, so some said they needed flush toilet but some others said I need something which is proper which can be cleaned easily, but which is cheap. So we found that there is willingness to have good facilities but the capacity of those things they look at are very expensive, they don’t know a basis for what it costs” (Int31- NGO).

In the same study respondents were asked what it would cost to build an improved latrine and the responses ranged from 20,000 RWF to 150,000 RWF with a majority of the respondents wanting to build a VIP latrine (Water for People, 2012, p.12).

When community interviewees for this study were asked what latrines they would like to be able to build the responses were dependent on the project latrines built in the area which included VIPs in the east, urine diverting dry toilets (UDDTs) in the south and ecosan in the north. When a specific technology was named a follow up question of where they had learned about that technology was asked and in all cases the knowledge had come via a project. In one community two builders had been trained on how to build ecosan latrines so they brought that knowledge back to the community but no one in the community can afford to build that type of latrine(Int16 – builder). One community would like to build flush toilets because that would mean they have a “*very smart house*” (Int15 – community). For those who wanted ecosan latrines the reason was to produce fertiliser and in one peri-urban community where space for more pits is a significant challenge ecosan latrines are desired because they take up less space and are easier to empty than pits (Int18- CHW).

6.4 Understanding the role of the guidelines on latrine technologies useable in Rwanda

6.4.1 Process of developing the guidelines

The guidelines were developed through a review of existing projects and programmes and through interviews with government institutions, NGOs, private sector companies and communities. The author was a local consultant. The communities represented every district in Rwanda (MININFRA, 2011, p.11).

Int3 -donor describes the process of developing the guideline document;

“We said to people what has been built on this project here, come put here [taps the table], what has been built here, come put here, what has been built here, that meant the information was all out there but not in writing, is this to do with our oral tradition, I don’t know, maybe, so these guidelines, it’s bringing out a compilation of kind of auto accepted practice, it’s a kind of validation of what is already being done and giving a channel for officially becoming a reference and a guide”

Once drafted, the document was reviewed by representatives from government institutions, donor organisations, NGOs, universities and the private sector. Therefore, the guidelines have had inputs from a range of stakeholders and can be said to have been developed through consensus. It is understood that by including different stakeholders in the process, a stronger, more widely accepted document will be developed. The review and validation process is commonly used to develop public documents in Rwanda.

“When you look at the participation of people on something they’re aware of they’ll get what they want” (Int32 – donor).

6.4.2 Motivations for developing the guidelines

6.4.2.1 Promoting conformity

The responses from the interviews have shown that one of the main reasons the current guidelines from MININFRA were created was to introduce some conformity in latrine design used in WASH projects and programmes. Information on designs is scattered between the different ministries, agencies, donors and NGOs working in the sector.

“There was always a request we want to have 100% coverage of sanitation by this time, build your latrines and then we could see by visiting places there were everywhere something, sometimes terribly different” (Int3- Donor).

“Every project had their own design but now the guidelines are becoming accepted, they are open to everyone who wants them” (Int4 –Government).

This problem was expressed by a majority of the interview participants working in government, donor or NGO organisations and the builders confirmed that they build latrines according to the specifications given by the project they are working for or from what they have learnt previously. During the document analysis in section 4.7, the duplication and division of information between different departments in Rwanda was highlighted as a significant challenge for managing the information available for use by different stakeholders.

There are many well established WASH projects and programmes in Rwanda, however, as new projects are developed or new organisations enter the system, the chances of information becoming further disaggregated and confused are increased. Providing newcomers with a document like the guidelines helps to strengthen the existing knowledge within the sector.

“We originally thought we would have to make this kind of document at the beginning of the programme because nothing currently existed but now we know there is a document available it’s good not to repeat it” (Int36 – NGO).

Encouraging conformity is also useful for projects and programmes which include monitoring of what has been constructed or is being used. Respondents hope that the guidelines will enable better data collection on the current state of latrines once everyone involved in monitoring progress has a common understanding.

“There is a need to let those guidelines be disseminated to different stakeholders with a word that surveys being done make reference to this in order to have the same view and the same result on status of sanitation” (Int7 – academia).

During the Delphi study, promoting conformity was given as a motivation for developing a standard as discussed in section 5.4.1. Additional motivations for developing the guidelines that were also given as motivations for developing a standard during the Delphi study include; the protection of surface and ground water by containing excreta (Int1- government; Int3- donor; Int6- NGO; Int9- CHW; Int22-Donor); providing privacy to latrine users (Int3- donor) and ensuring the durability of a latrine to *“help those investing”* to make sure that households are getting value for money when they build a latrine (Int1- government; Int3 – Donor; Int25-NGO; Int27- Government).

“the households are the ones to fund them, to construct them so to avoid somehow no-one should just do whatever they want because it’s their own budgets, so we have developed the guidelines to make sure the money they have they can do something which are in-line with the construction of the better latrines” (Int1- government).

In the communities, the importance of containing excreta in a latrine was also discussed but was linked directly to improved health rather than to preventing the contamination of water sources.

6.4.2.2 Promoting knowledge acquisition

The main role that the guidelines are expected to fulfil is that of providing information. However, different users will require different types of information. The intended users of the guidelines are project and programme staff (e.g. field staff), sector staff e.g. government officers, technicians, NGOs, local authorities (e.g. district, sector and cell leaders) community based workers (e.g. CHW, local builders) and households. By including information on public latrines there is also the intention of encouraging more private sector investment.

“The guidelines are not channelled as a project, it is something which should be available to everyone, so everyone should just use it” (Int1 – government).

Providing information to households with the intention of supporting the construction or upgrading of household latrines was highlighted as a particular need during the interviews. A majority of the participants noted that there is a lack of information available to people

who want to construct a 'good' latrine.

"When people want to build a toilet he's somehow confused because he don't know what to do, what kind of toilet to build, because he don't even have information about his soil, most of them are not attended class so they don't know what to do" (Int20 –private sector).

As discussed in section 2.4.3.3 current practices are influenced by past behaviour and the knowledge of masons in the local area who construct the latrines.

"The construction of family latrines is dependent on two things, the knowledge that the technicians in the relevant area have and the capacity of the family" (Int32 – donor).

Several participants from NGOs, the government and donor organisations also highlighted the importance of the guidelines for community empowerment. Section 3.5.1 discussed that constructing a household latrine is the responsibility of individual households in Rwanda as it is in many countries from Sub-Saharan Africa. Empowering people to make their own decision about the type of latrine they want to construct was highlighted as an important step in increasing the adoption of latrines in a majority of the documents analysed in chapter 4, section 4.2.3.3. The guidelines on latrine technologies in Rwanda are viewed by interviewees as a tool for promoting household led decision making by giving them better access to the information they need in a long lasting format.

"..before you may make a big campaign without something tangible, something like tools to use and people forget it so guideline will help in continuous improvement of hygiene and sanitation in Rwanda" (Int20 – private sector)

This information is intended to serve a dual purpose; to support construction based decision making, i.e. the type of latrine that best suits the needs and financial capabilities of the household and to provide a reference against which households can judge whether or not the construction meets their needs.

"someone can say, now the toilet you're building for me it doesn't have ventilation and it should, they can hold the person accountable who's doing it" (Int31-NGO).

The other aspect of knowledge building and community empowerment is related to training the community health workers and empowering them to be more influential in their communities. Participants involved in CHW programmes and training expressed the hope that the guidelines will act as a reference document for CHW, which will standardise their knowledge and help them to *"talk the same language"* (Int12- donor) which should reduce the confusion caused by multiple sources of information. This links to the need for conformity discussed in section 6.4.1.1. Section 4.4.2 in the document analysis chapter highlighted that community health workers currently receive very little technically based training. Int12-donor also highlighted that community health workers can be nervous about advising people because they do not want to be held responsible for giving people incorrect information;

“Community Health Workers are not empowered to sit down and say ‘this is what we can afford’, they don’t want to be blamed for making modifications or modifying things to a lower level” (Int12- donor).

However, the role of advisor and innovator is exactly the role of a community health worker and the function of the community health club envisioned by a participant from the Ministry of Health who stated that;

“There’s also a specific topic in CBEHPP to help communities understand requirements of the latrine, we should empower them to discuss the requirements of an improved latrine but don’t tell them how to do it and get the hygiene clubs to propose new technologies based on key principles in the CBEHPP” (Int27 - government)

In the CBEHPP, the improvements discussed are limited to the construction of a VIP, as discussed in section 4.4.2.3. In communities where the VIP is the highest level of technology affordable, presenting them with all of the additional information in the guidelines would not necessarily be helpful. In the Delphi study, the highest ranked motivation for developing a standard was to provide households with a baseline standard for different types of latrines according to cost. Therefore, by providing people with more realistic information about the types of latrine they could afford, some households may be willing to adopt a different technology other than a VIP.

6.4.2.3 Promoting innovation and new technologies

Linked to the promotion of community empowerment is the ability to foster and acknowledge innovations and new technologies. It was discussed in section 2.4.3.4 that there is already an extensive range of technologies available to provide safe sanitation, however, it is also acknowledged that improved latrine technologies can be unaffordable and promoting innovation, especially at the local level should be encouraged. A number of participants expressed the hope that communities can find the solution to their own problems if given the correct information.

“One can say for urine collection I can use a jerry can, another can say for urine collection let’s make a trench up to my farm, another can say why cannot I make a channel of urine and produce biogas. This kind of innovation can come down but the main thing is to understand and be aware of the benefits of the technologies. Then they can work out how to meet their own means” (Int33- donor).

The possibility of testing technologies for suitability and acceptance was discussed by several participants during the interviews but was not raised as a consideration during the Delphi study. New models and designs which people are aware of at the national level are introduced through projects so there is usually a pilot study. This leads to the assumption that all new designs will go through some kind of ‘testing and approval’ phase, *“if they [a new business/entrepreneur] come with a new technology it will be tested and approved”* (Int29 – government). When asked what the testing and approval phrase was, participants referred to pilot studies but there are no criteria available in Rwanda against which the success or failure of a pilot study is tested. This lack of a standardised process for evaluating

and approving new designs makes it difficult for private sector developers to introduce and promote new technologies in Rwanda which in turn hampers the potential for innovation.

There is one private sector developer who is trying to introduce an alternative approach to latrines who is not linked to a project. This participant said that they would welcome more guidance on seeking approval to launch their product in Rwanda. They have been to various ministries and government offices but no one can provide the direction they need so they are effectively running their own pilot scheme to which they invite government representatives to come and view the technology in use.

“It would be incredibly helpful if there was some kind of testing process, a list of ‘to-do’s’ for approval of a sanitary system, right now you have to do it yourself and just try to make it” (Int24- private sector).

One of the participants suggested that the guidelines could be used to assess whether or not modifications and innovations are in line with this existing knowledge as a way to prevent the uncontrolled introduction of *“crazy innovations”* (Int8-NGO). The argument being that without some form of checks it will be impossible to objectively evaluate innovations and ensure that what is being introduced will support the long term national and international objectives. There is a fine balance between supporting innovation and wanting some level of conformity, especially for latrines, where service standards are so closely linked to specific technologies.

6.4.3 Implementing the guidelines

6.4.3.1 Dissemination

The current approach for dissemination of WASH related information is to sensitise and train local representatives (e.g. CHW, masons, local leaders) who are then given the responsibility of sensitising and training people in their communities. In the case of the guidelines, it is expected that national sensitisation programmes would be used to make people aware of the guidelines. Existing channels of communication can be used to disseminate the guidelines. For mass communication media options including television and radio are available, there is also an annual water and sanitation awareness week which is used to raise the profile of water, sanitation and hygiene issues nationally.

A majority of the participants expect the guidelines to be fully decentralised and made available at the lowest level of local government, which is imidugudu (village) and cell (neighbourhood) level. The guidelines are available in the three national languages, Kinyarwanda, English and French and it is understood that they will be published as a single large document. It is expected by the interview participants that MININFRA will take the lead on the guidelines because of their mandate to deal with the infrastructural aspects of sanitation but the role of the Ministry of Health also needs to be carefully considered as they are the ones responsible for the behavioural aspects of sanitation which includes managing the community health workers, the community hygiene clubs and the CBEHPP.

The provision of training is also anticipated, particularly for community health workers and masons as they would be key implementers in encouraging the construction of better

latrines. The importance of peer- to –peer learning and the application of peer pressure to encourage conformity to social norms in the community health clubs was discussed in section 6.3.2. These well recognised modes of dissemination were also suggested in responses to the Delphi study under section 5.2.5. However, despite being well established processes, the scale of dissemination is a key challenge.

“The standards are still at the ministry level but when you arrive at Kigali [the ministry] there is no standard for toilet” (Int6 –NGO).

The scale of dissemination is a very important consideration because of the financial implications. In the Water and Sanitation Sector Strategic Plan 2013 - 2018 (MININFRA, 2013) the sanitation sub-sector is allocated 10% of the water supply and sanitation 5 year budget. Water supply is allocated 89.5% with the remaining 0.5% allocated to ‘watsan capacity building’ (MININFRA, 2013, p.46). The sanitation budget covers studies, campaigns, construction and maintenance of sanitation facilities with 1.85% of the sanitation budget allocated for sensitisation and behaviour change programmes for sanitation and hygiene. However, the current budget deficit is 100% of the total sanitation allocation meaning that there is no public financing for any sanitation activities up to 2018. The scale of dissemination represents the biggest challenge to implementation. The guidelines are intended to be used in communities but the budget needed to disseminate them is unavailable. Under these circumstances, the guidelines stay at the national level, which supports the role of encouraging conformity of approach between government, donor or NGO led projects or programmes as discussed in section 6.4.2.1, but their role of promoting knowledge acquisition at the local level is not achieved. In this context, the guidelines can be viewed as an example of a private standard where organisations involved in activities related to household latrines have voluntarily come together to define codes of best practice which can be used to self-regulate their activities as discussed in section 2.3.3 but they cannot meet the wider objectives of promoting knowledge acquisition and innovation.

There was a concern expressed by some participants that the guidelines in their current format are too long for use by communities and households. Suggestions were given that the guidelines should be re-designed into smaller, more manageable ‘fact sheet’ type documents which can be easily disseminated to and understood by households (Int4- government; Int7- academia; Int8-NGO; Int21 – private sector; Int23 – donor; Int25- NGO; Int26-donor; Int33- donor; Int35- donor). Int33-donor expressed it as follows;

“As I said the document as a document you cannot like, nobody will read. It is too much information, it’s not user friendly, and your objective will not be reached” (Int33- donor).

Given that the guidelines are intended to be used primarily by CHW, local builders and householders, the choice to create and distribute one large text based document does not match the style of other documents used predominately in communities including PHAST training packages and those for the CBEHPP.

6.4.3.2 Regulatory implications of the guidelines

When discussing how the guidelines should be implemented, one of the most common statements given reflects the idea that although the guidelines are not regarded as standards, there is an expectation that new latrines should be constructed using the information in the guidelines and will therefore be *“in line with the guidelines”* (Int1-government; Int3-donor; Int8- NGO; Int21-private sector; Int 23- donor; Int25-NGO;Int31-NGO).

Other participants had the view that as long as the latrine met the minimum standard given in the guidelines it would be ok and people can make improvements over time. One participant suggested that during the construction of new imidugudus, the guidelines could be imposed to ensure that the infrastructure constructed in those new areas meets more modern building practices, rather than carrying on with village style practices (Int28 – national institution).

None of the interviewees felt that the use of punishments and fines was an appropriate method of implementing the guidelines.

“There should not be a punishment for people, it can be a problem. Progressively people will understand and it will help with local development. We should support and encourage people to make improvements instead, helping them to move up the steps and others will copy the good designs” (Int4-government).

Encouraging behaviour change and engaging in large scale community education combined with the use of peer-pressure are the preferred methods for encouraging adoption of the guidelines. Formalised punishments are associated with the use of formal standards which is one of the main reasons for negative perceptions on standards in Rwanda. Whilst enforcing the use of the guidelines is not expected, monitoring the use of them is. The purpose of the monitoring is to make sure that the guidelines are having the intended impact and it should be done by decentralised structures closest to the communities;

“They need to be monitored to make sure they’re going towards the intended goal. Need to develop indicators to measure success, if they’re agreed upon within the guidelines then everyone also knows the monitoring process” (Int12 – donor).

“Community based systems can monitor and evaluate what is happening, then the co-ordination can be done at district and national level but the way the monitoring should be conducted, it should be from down top approach, they are efficient in providing information” (Int23 –donor).

6.5 Stakeholder perceptions on the guidelines as standards

6.5.1 Standard development in Rwanda

A majority of the interview participants stated that Rwanda does not have standards for latrines.

“I know instructions are coming from the government saying every house must have a latrine but you don’t know which criteria you are going to use, a latrine, is it a structure, a slab a pit.... but now nothing is done so everyone is struggling himself how to build a latrine and this is not good” (Int33 –donor)

In order to understand the relationship between the guidelines on latrine technologies and standards for household latrines it was necessary to explore Rwandan stakeholder perspectives on whether the guidelines are viewed as a type of standard or not. Section 2.3.3 described the distinction between a formal standard and a private standard. A formal standard must be developed in accordance with the processes set out by the recognised standard accrediting body in country (e.g. BSI, ANSI). A private standard may not necessarily comply with the same development processes required by the standard accrediting body and consequently cannot be accredited as a formal standard. The Rwanda Bureau of Standards, as a signatory to the ISO conventions on standard development makes the same distinction between a formal ‘national standard’ and private standards. In order for a standard to be recognised as a national standard by RBS it must pass through a specific process, which includes being developed by consensus with the support of recognised technical committees. However, it is recognised that the role of RBS is not always clear to people, both at the institutional level and more broadly;

“There is a kind of confusion for people.... there are certain norms in society and some people used to call them standards but they are not standards they are norms in society. You see living standards, you hear people saying those words, and sometimes they get confused with national standards” (Int28-National Institute).

One example of a private standard that is commonly mistaken as a national standard in Rwanda are the building regulations, analysed in chapter 4, and known colloquially as ‘the building code’. RBS does not develop codes and does not recognise them as national standards.

“..if we take like a building code, it’s a sort of document in the form of a regulation that is there to be supported by specific standards e.g. for building materials” (Int28- National Institute).

RBS does develop standards in the form of guidelines but those guidelines are used to support the implementation of another standard rather than being standards in their own right. Guidelines are therefore considered as a different type of document. They can be developed by any relevant authority (e.g. a ministry) to support a specific activity but they are not recognised as standards by RBS. In some cases guidelines can eventually be superseded by national standards and use of the guidelines would be phased out.

“...that’s the main difference between guidelines and standards. The way they are developed and who approves those documents and of course the power of those documents. A standard is more powerful than guidelines” (Int28 – National Institute).

A national standard developed by RBS is voluntary but an enforcing authority e.g. MININFRA could link the standard to administrative clauses which would make compliance with the standard mandatory. Another option for making compliance with the standard mandatory would be to make it into a law. Technical regulations can be developed but these are not often used for a standard that is only applicable nationally because the development of a technical regulation has implications for international trade.

6.5.2 How stakeholders view standards

Based on the RBS understanding of guidelines, the guidelines on latrine technologies useable in Rwanda cannot be recognised as a national standard by RBS but they could be recognised as private standards from MININFRA. This is an important distinction to make, because as stated by Int28- national institute, the potential power of a guideline is limited compared to the power of a national standard made mandatory through legislation. However, one of the interviewees (Int6-NGO) considers the guidelines to be the same as a standard and they understand this to mean that the guidelines will have to be followed. This confusion needs to be addressed during the implementation of the guidelines.

6.5.2.1 Negative perceptions on standards

It has been discussed throughout this study that standards are not supposed to act as constraints but the perception that they do is difficult to change. Several of the interviewees view standards as negative instruments that bind people to specific ways of doing something and are used to punish people who do not comply with the specified approach, as one respondent stated *“standards are like a law”* (Int1 – government).

“Standards could go too far to start covering materials and exact specifications”
(Int3-donor).

When discussing standards, there is a strong perception amongst the interviewees that standards mean a ‘standard model’ of latrine. The following two quotes clearly capture this perception;

“they should remain guidelines, not legally binding, rather than standards. It will be too much to oblige people to respect certain models” (Int23-donor).

“if only a standard latrine is accepted new solutions like ecosan don’t fit the model and it’s difficult for it to get adopted” (Int24-private sector).

Participant Int4- government highlighted the negative perception that standards can act as constraints by saying;

“it’s better to have guidelines because standards can block them [households] to construct if it’s too high to reach, but the guidelines they can build according to their means”.

These interviewees prefer the use of guidelines instead of standards because of the “flexibility” of the guidelines (Int1 –government; Int3-donor; Int 4-government; Int12 – donor; Int24 –private sector; Int30-private sector; Int36 –NGO).

“Guidelines don’t fix you do this, you do this, but shows you the way how to do things” (Int1-governemnt).

However, what is not clear, and what there is little agreement on is the level of flexibility that the guidelines will have. Section 6.4.3.2 discussed that several of the participants expect latrines to be constructed ‘in line’ with the guidelines, but the meaning of ‘in line’ is not clarified. As discussed in section 6.4.2.2, community health workers are not yet empowered to make local modifications to existing latrine designs and informal construction norms are well established. Given that the guidelines are supposed to be used at the household and community level, their level of flexibility needs to be established as part of the implementation process. Users of the guidelines need to understand what aspects they are expected to adhere to, if any, or if they are intended solely to provide information that can be used or not as each household desires.

6.5.2.3 Positive perceptions on standards

Participants in favour of a standard are those at the community level or those involved in current monitoring activities. One of the communities commented that *“having the same standard would highlight the importance of having toilets for the village”* (Int17 – community) and in terms of monitoring it is much easier to make comparisons between similar types of latrine, especially as indicators for hygiene and cleanliness are highly subjective (e.g. the presence of flies and odour).

Ensuring that technologies are ‘certified’ as being safe to use was put forward as a motivation for developing a standard for latrines by one participant whose work includes sanitation as a business programmes. They felt that a certification would help people to feel confident in making a more substantial investment in a better latrine.

“You know, if standards will also come around it also helps so that someone will know this is a certified technology, this [type of latrine]can help in this [area], this can help in this etc” (Int 31- NGO).

One of the builders stated that having a standard for people to follow would make it easier for him to conduct business with his customers because they will have a better understanding of problems;

“if there’s no design to follow people like to argue, like if you are digging and reach water and want to stop they complain that you’re not following their wishes” (Int11- builder).

Three of the experts (Int1 – government; Int19 – government; Int35-donor) made the suggestion that the guidelines could eventually be formulated into standards but it would be something for future consideration.

“..the minimum for a latrine should be is like this and then give the minimum, from that general base now they can define standards for some specific types of latrine ecosan, VIP, and others” (Int35- donor).

6.5.2.4 Support for a minimum standard

One participant stated that standards are only really important for certain aspects that could impact on the user friendliness of the latrine;

“Standards really matter for technical specifications e.g. design of the hole, convenience, so it’s important for user friendly and convenience issues. You want the hole to be easy to use e.g. where you put your feet, you don’t want to have to mess around lining yourself up” (Int30-private sector).

The idea that a standard is only used for certain aspects of a latrine is reflected in the development of a ‘minimum standard’ which was put forward by a majority of the interviewees. The minimum standard would reflect the level of ‘upgrading’ that would be needed to make latrines safe to use and able to remove excreta from the environment.

“a minimum standard is best so that everyone can manage according to his means” (Int10-government).

The concept of a minimum standard which can be achieved by everyone reflects the principle of equitable resource allocation based on the principle of ‘some for all rather than all for some’ stated in the Environmental Health Policy (MoH, 2008, p.13). A ‘minimum standard’ is already presented in the guideline document from MININFRA which states that the absolute minimum standard for a pit latrine is that it is sealed (the drop hole is covered), cleaned and maintained (MININFRA, 2011, p.18). However, latrines which meet this minimum standard would not be considered as ‘improved’ latrines and would therefore not count towards the achievement of both national and international targets. They would not even meet the requirements for access to ‘basic sanitation’ as defined in the NPSWSSS for which a pit latrine with a slab is required as discussed in section 4.5.3. Therefore, a decision needs to be taken at the national level on what the minimum standard actually is and whether or not a compromise will be made in the short term between achieving 100% coverage at the minimum standard rather than 100% coverage of improved latrines.

6.6 Key findings from the semi-structured interviews

Table 43 shows the contributions that can be made to the conceptual framework as a result of the semi-structured interviews as a quick reference. The faded questions have already been addressed in chapter 4 or 5. Chapter 7 will discuss the findings from all three data collection methods and will present a consolidated version of the contributions made to the conceptual framework from all three methods.

Table 43 Contributions to the conceptual framework as a result of the semi-structured interviews

Concept	Consensus	Role	Use	Regulation	Development
Consensus		Do stakeholders consider role of standards differently?	Where should standards be used?	Levels of regulation?	What if views on standards are very different?
Role	What do stakeholders consider when developing a standard? Health, financial capacity of households, material availability, physical constraints		What role do existing standards play? GL: promote conformity in latrine design, knowledge acquisition and support innovation	How are standards viewed? Positively: beneficial for monitoring and certification, Negatively: standard models are undesirable	What role do stakeholders want standards to play?
Use	Intended users? GL: govt. staff, NGOs, technicians, masons, local authorities, CHW, households	What need do standards meet?		Are standards constraints?	Are informal standards known and recognised? Informal construction norms are in use
Regulation	Is regulation required?	Voluntary or mandatory?	How is the regulation done?		Where are standards found?
Development	Who is involved in the process?	Type of standard?	What do standards look like? GL: very long and information heavy in current format	Process of monitoring or checking? Household inspections done by CHW in some areas	

Are informal standards known and recognised? [Use and Development]

Section 2.4.3.1 discussed how the terms standards and norms are interlinked and commonly used together. In Rwanda, there is a social and cultural expectation that people will have a latrine. In this way, latrine ownership is a type of informal standard. This interpretation has consequences for the development of a standard because it indicates what type of role the standard should have. If people were unwilling to use a latrine the primary role of the standard would be to persuade or require people to use one. The fact that people are willing to have a latrine means that the role of the standard can focus on upgrading the level of service they currently have. Unwillingness to use a latrine could also indicate the potential for resistance should a standard be developed that forces people to use a latrine or a specific type of latrine.

Informal construction norms also represent types of informal standards currently in use. The use of deep pits was highlighted during the interviews as being particularly important to communities because of their longevity. If a new standard is developed that tries to persuade people to alter the depth of their latrine pit, some resistance to change should be anticipated. There are also construction norms around the types of materials used for different types of latrines, only people with better quality houses are expected to have better quality, more durable latrines using 'modern' materials such as cement.

Process of monitoring or checking? [Development and Regulation]

The monitoring and inspection of household latrines is already happening in some communities and the processes by which it can be carried out are well established. Should a standard be adopted that requires monitoring and checking the same processes could be used, providing that those expected to do the monitoring (e.g. the community health workers) are not already fully engaged with other activities. Section 4.6.3 highlighted that community health workers are responsible for a wide remit, of which a household latrine is just one small component, therefore, the ability of these people to take on an additional responsibility needs to be assessed.

What do stakeholders consider when developing a standard? [Role and Consensus]

In the communities, health concerns both household and communal played a central role in describing why there should be a standard for latrines. Interviewees from the communities did not discuss non-health related issues such as privacy and dignity but were more concerned about the financial capacity of households to construct a better quality latrine and the availability of materials in the local area. Interviewees with expertise at the national level also expressed the importance of considering financial and materials based constraints in addition to physical constraints such as space and rocky ground which is found in some locations.

The idea of developing a 'minimum standard' was put forward by a majority of the interviewees. The minimum standard would reflect the level of 'upgrading' that would be needed to make latrines safe to use and able to remove excreta from the environment.

How are standards viewed? [Role and Regulation]

Standards are viewed both positively and negatively by different stakeholders. In a positive light, standards are considered useful for people working at the community level or those involved in monitoring activities. The benefits of having a standard that promotes the 'certification' of different technologies that would help people to feel confident in making a more substantial investment in a better latrine was also recognised. However, for the interviewees who view standards in a negative light there is a fear that standards will force people into adopting a specific approach and will be used to punish people who do not comply with them.

Contributions made based on the guidelines

Section 6.5.1 discussed that a majority of the interviewees stated that there are currently no standards for household latrines. However, section 6.5.2.3 discussed that three of the interviewees expressed the potential for the guidelines to become standards over time. It is therefore useful to consider the contributions that can be made to the conceptual framework as a result of discussions about the guidelines.

What role do existing standards play? [Role and Use]

The motivations for developing the guidelines are that they can promote conformity in latrine design, promote knowledge acquisition and support innovation. Conformity relates to latrine designs and a consolidation of the information currently used by different WASH projects and programmes. Knowledge acquisition is aimed particularly at households with the intention of supporting the construction or upgrading of household latrines was highlighted as a particular need during the interviews. A majority of the participants noted that there is a lack of information available to people who want to construct a 'good' latrine. Promoting innovation and the adoption of new technologies is linked to both community empowerment and the testing of technologies for suitability and acceptance. The ability to use the guidelines to test technologies was considered useful from both the perspective of the public respondents (e.g. government officers, NGO staff) and the private sector.

Intended users [Use and Consensus]

The intended users of the guidelines are project and programme staff (e.g. field staff), sector staff e.g. government officers, technicians, NGOs, local authorities (e.g. district, sector and cell leaders) community based workers (e.g. CHW, local builders) and households. By including information on public latrines there is also the intention of encouraging more private sector investment. It is expected that the guidelines will be 'fully decentralised' and made available at the lowest level of local government. The current approach for dissemination of WASH related information is to sensitise and train local representatives (e.g. CHW, masons, local leaders) who are then given the responsibility of sensitising and training people in their communities.

What do standards look like? [Development and Use]

There was a concern expressed by some participants that the guidelines in their current format are too long for use by communities and households. Suggestions were given that the guidelines should be re-designed into smaller, more manageable 'fact sheet' type documents which can be easily disseminated to and understood by households. This would make the document similar to the style of other documents already used extensively at the community level including PHAST training packages and those for the CBEHPP.

6.7 Summary of key findings from the semi-structured interviews

The aim of research objective three was to understand stakeholder's perceptions on standards for household latrines and how a standard fits into the current sanitation system in Rwanda.

In Rwanda, there is a social and cultural expectation that people will have a latrine. The fact that people are willing to have a latrine means that the role of the standard can focus on upgrading the level of service they currently have rather than focusing on the earlier stage of encouraging latrine adoption.

Informal construction norms are being used by communities but there can be different norms in use within a single community. Knowledge acquisition, particularly for households, with the intention of supporting the construction or upgrading of household latrines was highlighted as a particular need during the interviews and therefore represents a key consideration for the future development of a standard. Promoting knowledge acquisition and conformity in latrine design were found to be motivations for developing the guidelines on latrine technologies useable in Rwanda.

Standards are viewed both positively and negatively by different stakeholders. For people working at the community level who are involved in monitoring activities, a standard is viewed as a useful tool for helping them in their activities. The ability to 'certify' different technologies was also suggested as a useful role for a standard. Standards that represent standard models of latrines or standards that are strongly regulated and enforced are viewed negatively.

Section 6.5.1 discussed that the guidelines on latrine technologies are not viewed as formal, national standards by RBS and they are also not viewed as standards by a majority of the interviewees. The guidelines provide information on a range of different technologies designed to suit a range of budgets. Consequently, the guidelines are fulfilling the role that the Delphi expert panel expect a standard to fulfil, which is to provide a baseline for everyone according to their financial capacity. Guidelines are considered by the interviewees to be more flexible than standards and for those that consider standards to mean a 'standard latrine,' the guidelines are preferred for their perceived flexibility. However, the extent of this flexibility has been highlighted as an area that would require further discussion and negotiation during the implementation phase because it is currently

not at all clear. Section 6.5.1 discussed that three of the experts proposed that the guidelines could eventually be turned into standards in the future.

6.8 Chapter summary

This chapter has presented the findings from the semi-structured interviews according to the principal categories established during the coding process which was described in detail in section 3.9.3. The semi-structured interviews have explored how stakeholders view standards and how the current guidelines on latrine technologies are considered in relation to formal standards from RBS.

Section 6.6 presents the contributions to the conceptual framework that can be made as a result of the data collected through the process. These contributions can be added to those from the document analysis presented in chapter 4 and the Delphi study presented in chapter 5. Chapter 7 presents a discussion of the findings from all three data collection and analysis methods and begins to draw the study to a conclusion.

7. Discussion of findings

7.1 Introduction

This chapter places the analysis of the data from this study within the context of the existing knowledge on standards for household latrines both in Rwanda and more broadly in Sub-Saharan Africa and reflects on how standards can operate within the wider sanitation system.

Section 7.2 presents all the contributions that can be made to the conceptual framework as a result of this study. The conceptual framework was originally presented in section 2.7 of the literature review chapter and has been used throughout the data collection and analysis process to define the boundaries of the study and to identify the relationships between the five concepts of consensus, role, development, regulation and use.

In sections 7.3 to 7.7, the contributions to the conceptual framework are categorised into the five key concepts and the discussion focuses on bringing together the contributions made to the study as a whole. Section 7.8 presents the key findings for each research sub-question and the key findings for the research question overall. Section 7.9 presents the decision process developed as a result of this research.

7.2 All contributions made to the conceptual framework

Table 44 presents the contributions which are specifically related to standards that can be made to the conceptual framework as a result of the three data collection processes. Contributions related to other documents such as the building control regulations (MININFRA, 2009), the construction instructions for rural houses (MININFRA, 2012) and the guidelines on useable latrine technologies in Rwanda (MININFRA, 2011) are included in the conceptual framework from section 4.8 which analysed the full range of documents available in Rwanda, but are not included here because according to RBS they are not considered standards (as discussed in section 6.5.1). The contributions to the conceptual framework provide a quick reference overview to the findings with each question elaborated on under the five key concepts of role; development; use; regulation and consensus.

Table 44 All contributions to the conceptual framework as a result of the three data collection methods

Concept	Consensus	Role	Use	Regulation	Development
Consensus		Do stakeholders consider role of standards differently? Standard can be based on best practice, current practice or be aspirational	Where should standards be used? Depends on location e.g. different standards for urban and rural areas	Levels of regulation? Confused role of regulation and level wanted/needed	What if views on standards are very different? Different levels of importance given to some considerations (ranking at opposite ends of scale in Delphi)
Role	Considerations when developing a standard? *See note 1		What role do existing standards play? No recognised standards	How are standards viewed? Positively: beneficial for monitoring and certification, Negatively: standard models are undesirable	What role do stakeholders want standards to play? Make life simpler Protect users Ensure quality, safety, performance, provide minimum standards
Use	Intended users? All stakeholders with a focus on builders, CHW and households	What need do standards meet? *See note 2		Are standards constraints? No recognised standards	Are informal standards known and recognised? Some technical specifications and latrine characteristics are already well established - Informal construction norms in use
Regulation	Is regulation required? No agreement	Voluntary or mandatory? Divided opinion on voluntary or mandatory status of standard	How can regulation be done? Imihigo contracts Law Technical regulation Potential use of penalty/sanction		Where are standards found? No formally recognised standards but existing documents are; - Building control regulations - Construction instructions - Guidelines on latrine technologies
Development	Who is involved in the process? All stakeholders should be involved, especially the people as users	Type of standard Technical rather than service based	What do standards look like No recognised standards but standards expected to include; Design and construction info. Technical specifications Siting info Instructions for use	Process of monitoring or checking Use of decentralised structures e.g. LA, EHO, CHW & peer pressure Household inspections done by CHW in some areas	

<p>*Note 1: What do stakeholders consider when developing a standard?</p> <p>Top factors:</p> <ul style="list-style-type: none"> • Affordability • Materials availability and durability • Siting on plot • Safety and protection • Accessible to all • Clean and hygienic • Prevents water contamination • Ease of applying standard • Traditional norms • Potential for recycling waste 	<p>*Note 2: What need do standards meet?</p> <ul style="list-style-type: none"> • Providing information and a common understanding (including evaluation criteria) • Supporting construction and adoption of good practices • Protects users safety • Prevents water contamination • Supports user friendliness
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7.3 Role

7.3.1 Where are standards found?

During the analysis of a sample of policies, strategies, guidelines and manuals in chapter 4 it was found that there were very few specific references to standards for household latrines.

Given that governments are expected to take on the role of developing standards it is surprising that there were not more references to standards in existing policies and strategies as these are the key documents which should, in theory, influence activities within the WASH sector. Only two policies and strategies set service standards based on the adoption of specific technologies, and only the Environmental Sanitation Policy from Ghana made specific reference to the use of building regulations. The majority of the documents sampled only referred to standards for sanitation, hygiene or environmental health more broadly.

In Rwanda, the building regulations only contain information about VIP latrine construction and their relevance outside urban areas is limited. Existing by-laws are also limited to urban or peri-urban areas with information limited to the construction of VIPs and connection to the sewerage network. Design manuals or guidelines from different organisations and BoQs do contain information about how to construct latrines of different types, so these can be said to contain information about standards.

7.3.2 What role do existing standards play?

In Rwanda, there are no existing 'formal' standards to assess but the role of other sources of standards and informal standards have been considered and are discussed under the concept of development.

In South Africa a VIP is considered to represent a 'basic' level of service whilst in Nigeria, service levels are set according to place of residence. In Malawi the requirement is that households have some kind of latrine but there are no references to specific types which should be used. It could not be determined from the desk study conducted for this research what role these service standards play in either South Africa or Nigeria. References to the use of standard models are implicit throughout the sample of guidelines and manuals

analysed from Sub-Saharan Africa and in both Kenya and Nigeria there are expectations set about latrine appearance which does act as a form of standardisation.

7.3.3 Do stakeholders consider the role of standards differently?

Yes, stakeholders do consider the role of standards differently.

This section outlines the different roles that a standard can have according to the experts and interviewees in Rwanda. The results of the third round of the Delphi process show that the expert panel expects a standard to have a dual role of providing knowledge and providing a tool for monitoring the construction and use of latrines (as discussed in section 5.4.1). These are not necessarily different roles if the standard is used voluntarily, however, if the standard is regulated, they would represent different roles because the standard would become a basis for enforcement rather than being used as guidance.

Potential role: to set a minimum standard

The aim of providing knowledge is linked specifically to the provision of a baseline standard, i.e. a minimum standard that everyone can achieve according to their financial capacity which would result in 100% coverage of latrines of some sort. Setting a minimum standard was discussed in section 6.5.2.4 which showed that there was support for a minimum standard from a majority of the interviewees. The concept of a minimum standard which ensures the safe removal of faeces and urine from the environment also corresponds with the strong health message put forward by the community health workers in Rwanda which was discussed in section 4.6.3.

Having a minimum standard would also support the realisation of the public benefits of latrine use which can only be achieved when a large majority of households use safe and hygienic latrines or toilets as discussed during the interviews by one respondent;

“When they started saying people should have toilet some people have put in place toilets which can end up being hazardous to their neighbours, but because people know drive is everyone should have a toilet you find everyone’s told how to do but your neighbour may not have the capacity to make the right standard and it might affect you because flies don’t have boundaries” (Int34-NGO).

The idea of setting a minimum standard also has particular relevance in the context of sanitation as a human right which has a focus on prioritising access for the poorest and most vulnerable (COHRE *et al*, 2008, p,31).

Potential role: allowing for certification and testing of technologies

The benefits of having a standard that promotes the ‘certification’ of different technologies that would help people to feel confident in making a more substantial investment in a better latrine was also recognised. The ability to use the guidelines on latrine technologies as a reference against which to test new technologies was considered useful from both the

perspective of the public interviewees (e.g. government officers, NGO staff) and the private sector interviewees.

“You know, if standards will also come around it also helps so that someone will know this is a certified technology, this [type of latrine] can help in this [area], this can help in this etc” (Int 31- NGO).

“It would be incredibly helpful if there was some kind of testing process, a list of ‘to-do’s’ for approval of a sanitary system, right now you have to do it yourself and just try to make it” (Int24- private sector).

In the case of the National Sanitation and Hygiene Strategic Action Plan from Ethiopia it is stated that artisans constructing latrines will be required to provide a guarantee or warranty for their products (Ministry of Health, 2011, p.44). It was also discussed in section 2.3.2 that one of the roles of a standard is to support consumer confidence in the product or service they are purchasing. This should in turn support the approaches of sanitation as a business and sanitation marketing as discussed in section 2.4.1.10.

Potential role: monitoring latrines

In terms of monitoring latrines, during the interviews it was found that a standard is considered useful for people working at the community level or those involved in monitoring activities because it can promote conformity in the information available to people, allowing them to *“talk the same language”* (Int12-donor) as expressed by this interviewee;

“For example, when we are doing the surveys, they say the latrine in full and full if you don’t explain it well, what is full? Someone will say no it is not full because there is a distance from the floor to the faeces which is needed and when I said the distance is 0.25 I say it is full, someone will not say it is full, they don’t know what is the meaning of full for a toilet” (Int7-Academia).

7.4 Development

7.4.1 What need do standards meet?

Standards are expected to provide a baseline for people according to their financial capacity.

The first stage in developing a standard is to identify the need it will meet (ANSI, 2012a, p.2; BSI, 2011b, p.8). In this study the need to be met was linked to the motivations for having a standard and during round1, question 3 of the Delphi process the experts produced a list of 32 motivations for developing a standard for household latrines (see section 5.2.3). The highest ranked motivation in round 3 was that ‘everyone has a baseline standard depending on his capacity in relation to his latrine’. This means that each household will have information on the minimum standard for a latrine that they are expected to have, based on their economic status.

In Rwanda, it is expected that people with better houses will have better latrines, therefore, by providing a range of options to suit the different economic statuses of families it is expected that even people with lower incomes and houses built with local materials will find a latrine that suits their living conditions and the use of dangerous or inappropriate latrines for a given area will come to an end.

7.4.2 What role do stakeholders want standards to play?

Stakeholders want standards to reduce the levels of confusion surrounding latrine choice and latrine construction.

In question 1, round 1 of the Delphi, experts were asked to define a standard and 30% of the experts consider a standard to be an 'accepted way' of doing something, which corresponds with ideas found during the document analysis that the information provided to communities and households is intended to represent 'approved' and 'allowable technologies' (see section 4.2.4.1). By promoting some level of standardisation in the designs the confusion over what is considered the 'right' kind of latrine should be reduced.

Encouraging households to take a more active role in the construction and use of their latrines is one of the core principles of supporting a demand-led approach and is particularly emphasised in the context of sanitation as a human right (CHORE *et al*, 2008, p.33).

During the document analysis of policies and strategies from Sub-Saharan Africa the idea that governments should support household decision making by providing information was found in all of the documents. The types of information to provide include national guidelines, approved standards, latrine options manuals, standard practice manuals and bills of quantities (see section 4.2.3.4 for full list). It is then expected that these documents will be disseminated and used as part of awareness raising programmes for sanitation and hygiene activities (section 4.2.6). In all of the documents, there is a focus on upgrading the knowledge and skills of those directly involved in latrine construction including local authorities, builders, technicians and community workers. Jenkins and Scott (2007, p.2430) identify a lack of knowledge as a temporary constraint in the decision making process that can prevent households from deciding to construct a latrine. It was also highlighted in section 2.4.3.4 that when people attempt to solve problems they are guided by their previous experience and existing knowledge (Koskinen and Vanharanta, 2002, p.58).

One of the criticisms of standards for latrines is that they can constrain innovation by being overly prescriptive. This was a particular problem in countries where 'standard' models were adopted (Evans, 2005). If the role of a standard is to develop community level knowledge then it can be argued that the main aim of the standard is to promote community empowerment to select the latrines which are the most suitable for each community. This was highlighted by Lenton *et al* (2005, p.101) as being particularly important for increasing levels of access to hygienic latrines and was discussed by one of the interview participants as being particularly relevant in Rwanda for community health workers;

“Community Health Workers are not empowered to sit down and say ‘this is what we can afford’, they don’t want to be blamed for making modifications or modifying things to a lower level” (Int12- donor).

Based on this understanding, decision makers in charge of sanitation policy need to decide which aspect of a latrine is more important; the use of one or the technical specification of one and to what extent they expect to have control over the different aspects of a household latrine. However, it was discussed in section 2.4.3.3 that for a government ministry or lead agency to relinquish control can be difficult (BSI, 2006, p.4).

One of the primary motivations for developing the guidelines on latrine technologies was to promote conformity in latrine designs currently in use in Rwanda because it is acknowledged that there is a lack of information available for households regarding latrine construction. People are taught by community health workers what a ‘good’ latrine should be like but they do not necessarily know how to achieve it;

“When people want to build a toilet he’s somehow confused because he don’t know what to do, what kind of toilet to build, because he don’t even have information about his soil, most of them are not attended class so they don’t know what to do” (Int20 –private sector).

In the NPSWSSS, the introduction of showrooms to support the development of a private sector in latrine construction is promoted in conjunction with the standardisation of technologies. The intention is for the builders in charge of the showrooms to act as material suppliers and therefore benefit from economies of scale on material purchases that cannot be achieved by single entrepreneurs (MININFRA, 2010, p.66). Despite this concept being in the national policy on water supply and sanitation, only Int22- private sector referred to the benefits of standardising the materials used in construction in order to support suppliers.

The guidelines, once disseminated, should fulfil of the role intended for a standard in Rwanda by providing information to people about the different latrine designs available and what the financial implications of each option are. However, it should be highlighted that the guidelines are considered different from a standard in that, whilst monitoring of them is expected, compliance supported by the use of regulation is not.

7.4.3 What do stakeholders consider when developing a standard?

Experts in Rwanda considered a broad range of factors including, technical, economic, physical, cultural and environmental considerations and those related to using latrines.

Once the need for a standard is established the scope of the standard can be agreed upon (BSI, 2011b, p.8). In this study, the scope of the standard that would be developed in Rwanda is based on the results from question 4 in the Delphi study. Section 5.2.4 outlines the full list of 44 factors that the Delphi expert panel considered relevant when developing a standard.

The scope of these considerations is far too broad to be addressed by a single standard so in this case, either several standards would need to be developed to tackle different elements of the latrines, e.g. environmental elements, safety elements etc. or the most important need should be identified so that the standard can focus on addressing that need first with the intention of addressing others later on. This is part of the compromise discussed by Jenkins and Sugden (2006, p.30) who argue that the most important step in the sanitation ladder is moving people from open defecation to using some sort of latrine, even if that latrine does not meet building standards, they consider it as a necessary trade-off to break the cycle of disease. However, the same view may not be shared by other stakeholders who instead have other priorities such as meeting a national target.

None of the documents analysed in chapter 4 discuss the factors to consider when developing a standard but they all listed considerations for selecting a latrine which are presented in section 4.2.4.2. Although not as broad as the list developed through the Delphi process, all factors in the list generated from the document analysis are included in the list of factors to consider which was developed by the expert panel. This would indicate that when deciding what factors to consider when developing a standard, the decision making process is actually based on the factors that people consider important when deciding or recommending what latrine to build. This would explain why the expert panel selected affordability of the technology as the most important factor to consider when developing a standard for household latrines. A combination of financial constraints, such as access to credit and high costs of construction were highlighted in the literature review, section 2.4.1.8 as one of the reasons which prevent households from constructing latrines. One interesting point to highlight is that when discussing standards for household latrines there is an automatic focus on the latrine itself, there has been no mention in this study of the final treatment and disposal of the wastes accumulated.

The idea of affordability is also linked with negative perceptions about standard model latrines. It can be concluded from this research that the use of standard model latrines has contributed to the negative perceptions about standards for latrines. Cairncross (2003, p.129) suggests that designing a latrine based on cost and affordability rather than a technical specification is one way that standards and regulations can be more supportive. By designing to a cost rather than a specification there is less focus on a specific type of latrine and more focus on flexibility in terms of the materials and building techniques used. Approaches used to increase access to latrines including CATS and CLTS discourage the use of 'standard model' latrines and through the document analysis of policies and strategies from Sub-Saharan Africa it is clear that the use of standard model latrines has fallen out of favour. None of the countries in the sample have the intention of using a standard model. The same unwillingness to adopt a standard model was also demonstrated through the semi-structured interviews in Rwanda with concerns being raised that if a standard is developed that represents a standard model, it will act as a constraint on households;

"It will be too much to oblige people to respect certain models" (Int23-donor).

7.4.4 Are informal standards known and recognised?

Yes informal standards are known and recognised, there are several informal standards operating in Rwanda which are discussed in this section.

Section 2.4.3.2 in the literature review discussed how in WASH sector literature the word *norms* is commonly used in conjunction with the word *standards* and that norms or informal standards can be difficult to identify (Gigerenzer, 2007, p.4). By identifying the informal norms that are already in place it is possible to see how a standard may interact with those norms and identify areas where potential problems can arise. Given that there is no history of having standards for any latrines in Rwanda before the building regulations were introduced in 2009, the knowledge that people have about latrine siting, construction and pit depth in particular has no formal, written basis and is therefore composed completely from unspoken rules of thumb. The health based knowledge about the need to have a latrine and the construction based knowledge on how to construct a latrine already exists as general information within society.

Latrine ownership

In Rwanda, there is a social and cultural expectation that people will have a latrine. In this way, latrine ownership is a type of informal standard. In several of the documents from the policy and strategy sample from Sub-Saharan Africa there is also the expectation that adopting hygienic sanitation practices will become a social norm (section 4.2.3.3). In addition to the social norms regarding use of a latrine there are also informal construction norms being used in Rwanda, most of which are related to the depth of the pit. This was shown during question 2 of the Delphi process and during the interviews with communities, community health workers and builders in particular.

The influence of project latrines

The influence of project latrines, especially VIP and ecosan latrines, has also created a type of informal standard about what these types of latrine should look like in Rwanda which can create resistance amongst households. Only people with better quality houses are expected to have better quality, more durable latrines using 'modern' materials such as cement.

"You can't sleep in a house with fleas and put cement in a toilet" (Int38 – community).

Putting a flush toilet inside a mud-brick house would go against social norms and if this became 'the standard' it would likely meet with resistance because accepting it goes beyond 'behaviour change' at the level of handwashing with soap or using a latrine to trying to change more deeply rooted social expectations. Consequently, it is important to consider the social norms as well as the construction norms that exist when developing a standard because these norms set social expectations. The influence of social norms was not directly considered in the original conceptual framework but as the research has highlighted it as a consideration it has been included in the decision process presented in section 7.9.

The following quote from Int20-private sector raises another type of informal standard which is the expectation that government projects and programmes or NGOs are expected to build better quality latrines with more durable materials.

“Saying eco-toilet is very expensive, that was a misconception before, because eco-toilet, when the technology came, it was only at level of NGO, then they came with the technology, they built it with lot of money, but if you are government or local NGO you cannot build eco toilet without burnt bricks” (Int20- private sector).

There is an argument that governments and NGOs would be criticised for building lower quality latrines because they are ‘supposed’ to set an example to follow, even if that example is unattainable by a majority of the population. Paterson *et al* (2006, p.905) and Lenton *et al* (2005, p.88) highlight the potential problem of persuading people to opt for different alternatives that could be seen as ‘sub-standard’ choices. This is relevant for the full range of stakeholders involved from the policy level through to households and communities.

“and you know all those things go every day with an awareness campaign, you can bring something good and you put it in front of a person but they don’t consider it, say no, this is from government so we don’t consider it, then slowly we teach them a little bit a little bit” (Int19-government).

Interviewees with experience of dealing with latrine building projects or programmes in different areas of Rwanda are aware that these informal norms exist but acknowledge that changing people’s mind can be a challenge.

“It is difficult to move people away from traditional latrines” (Int5-NGO).

“That is the fundamental idea of what we did, because toilet should always look like toilet, not like something new, even if it is new it will take a long time to love them and use them” (Int20-private sector).

Section 2.4.3.3 of the literature review discussed that changing behaviour takes time and there can be unwillingness from different stakeholders (Evans, 2005; Saywell and Cotton, 1998). One example of a new technology in Rwanda that is facing some resistance has been developed by Int24 -private sector, which aims to move composting toilets inside the house. The only toilets currently inside houses are flush toilets connected to either a septic tank or a sewerage system. Having a composting toilet inside the house therefore goes against social norms and this is one of the key challenges to be overcome in order to have the product accepted en masse.

Consequently it is useful to understand what behaviours or practices are currently in place so that it becomes possible to determine what needs to be changed in order to effect the desired outcome.

7.4.5 Who is involved in the process of developing the standard?

Five of the experts in the Delphi panel highlighted the role that people (i.e. the users) should play in the process of developing a standard. Other stakeholders listed included government authorities, engineers and financial providers (e.g. micro-financiers).

By striving for a consensus based development process, standard making bodies try to ensure that the interests of one stakeholder group do not outweigh the interests of another. The understanding is that if the standards are produced voluntarily, through consensus they should reflect the needs of all parties affected by the standards more accurately than if one group has a dominant voice. This level of acceptance by all parties makes the standard more likely to be voluntarily followed. Standard approving bodies such as BSI, ANSI and ISO require standards to be developed by consensus, as discussed in section 2.3.3, but private standards do not have the same requirements.

Involving 'all relevant stakeholders' in the decision making process is also recognised as an important concept of sanitation as a human right to ensure that the needs of people most affected by the decisions are 'adequately addressed' (CHORE *et al*, 2008, p.31).

Involving consumers

The benefit of involving consumers, i.e. the households, in the standard development process is to raise awareness about the standards and therefore create demand for products and services which meet these standards (ISO, 2003). Ensuring that households (i.e. the consumers of latrines) are placed at the centre of decision making processes regarding their own levels of access to a latrine or toilet is recommended in sector literature and is a core focus of approaches such as CLTS, CATS and Sanitation Marketing which are used to promote and increase levels of access. The development of a standard using a consensus based approach therefore compliments the existing activities of the WASH sector both internationally and nationally. In section 2.4.3.1 of the literature review which discusses how standards can act as constraints, one of the suggestions for mitigating the constraint is to involve households in the decision making process.

Whilst it is recognised that households do need to be involved, achieving that involvement is more difficult for two reasons. The first reason is related to social expectations and well-established roles. During the Delphi process expert 22 expressed the government's role in developing a standard by stating "*the government should make a standard and help people achieve it*". In a similar tone, expert 20 stated that "*if the government gives it then it is good for the household because they have their own technicians for testing them so they know it's good*". The responses were given by a local builder and a community health worker respectively.

Government roles

The expectation that the government will take a lead role in developing a standard was also found during the document analysis (see section 4.2.5.2). If the government and associated partners (i.e. other national level stakeholders such as NGOs and donors) take the

responsibility for developing the standard without input of the users (the households) the priorities can be skewed in favour of what the national expectations are instead of the local ones. This is an area where the public and private domains of latrine ownership and use interact and was first touched on during the introduction (section 1.1).

It is understood that households in Rwanda are responsible for their own sanitation needs, which includes a latrine, and that responsibility has existed for decades.

“Rwandan’s have the culture that they need to have their own property they need to have their toilets, they need to go secret, Rwandan culture is really strict they can’t do things openly” (Int25 – NGO).

However, the government has set ambitious targets for achieving universal access to sanitation by 2017 (Government of Rwanda, 2013, p.54). Therefore, private access to household latrines has moved into the public domain. Whilst there have not been large scale subsidised latrine building programmes in Rwanda, there have been several projects and programmes with latrine building components, most of which focus on institutional latrines and those for the vulnerable. This means that for the experts in the Delphi panel with national level expertise, a significant proportion of their experience is based on institutional latrines rather than household ones. The possibility that they are applying institutional latrine considerations to households must therefore be considered. For example, the potential to recycle wastes from latrines was given in response to both questions asked in the final round of the Delphi process. In terms of the motivations for having a standard it ranked joint last (out of 9) and in terms of what factors should be considered when setting a standard it also ranked last (out of 11) which would suggest that whilst the use of recycling and resource recovery latrine models may be popular amongst NGOs and donor funded projects for schools and as a way of promoting the technology in communities it is not the most important consideration for household latrines in most areas. This was supported by the responses from two of the builders interviewed for this study who have been trained to build ecosan latrines. Both found that people cannot afford to build them and in a rapid market assessment study by Water for People it was found that when presented with a choice of latrines, a majority of people would opt to build a VIP. However, the situation is different in the northern region of Rwanda because of the difficulty of digging through volcanic rock. Here ecosan latrines are preferred because they do not need to be dug so deep.

Allowing for disabilities and impaired use of household latrines was ranked joint 5th out of 11 factors to be considered when setting a standard for household latrines (see section 5.4.2). It was ranked higher than durability of materials which was surprising because poorly constructed latrines which are prone to collapse was highlighted in one community as a particular challenge. The guidelines on latrine technologies were originally sent back to the consultant who authored them with a request to include more on inclusive design because the review panel felt that information to be important in the guidelines (Int3-donor; Int8-NGO). However, the review panel is composed exclusively of national level professionals for whom inclusiveness and accessibility are more prominent considerations, especially for latrines in schools. Whilst it is acknowledged that the samples of participants from each

stakeholder group were small for both the expert panel and the interviews, the use of a larger group would make it possible to see how different groups rank the importance of different factors to consider when developing a standard. As the primary users of the standards, the views of households could then be incorporated more explicitly.

The second reason for why it is difficult to involve households in the process is that of logistics. The Delphi method has been useful for this study but it is cumbersome to use and when access to computers for online questionnaires is limited it requires the commitment of time and resources to travel to participants, complete the exercise and input the results which would make large scale participation more expensive. Locally held workshops or meetings with people interested in being involved in the process are likely to be a more effective way of including the views of more households but that process is also expensive and time consuming and as discussed in section 6.4.3.1, the lack of a budget for sanitation related activities is a huge constraint on national activities.

7.4.6 Type of standard?

More flexible, less prescriptive standards are preferred.

During the analysis of policies and strategies from countries in Sub-Saharan Africa there were references to both technological and service based standards but technological standards were more common. In terms of existing documentation from Rwanda which includes information on latrines, the building regulations provide a technical specification for a VIP latrine and the guidelines and construction instructions can be considered as codes of practice.

During the Delphi process in round 1 question 1 regarding the definition of a standard, some of the experts included specific technical specifications in their definition of a standard. Technical specifications are associated with high levels of control and are generally used when safety is an important factor (BSI, 2013), but in terms of latrine construction they are linked to subsidy based programmes in which there would be specific requirements to be met during the construction phase.

For example, in the Guideline Implementation Manual for Department of Water Affairs and Forestry Funded Household Sanitation Projects a VIP latrine is considered the minimum acceptable design for a basic level of service and there is a detailed checklist to be completed which covers all aspects of the construction (Mvula Trust, 1997, p.15 annex).

Section 2.3.3 outlines the five main types of standard developed by BSI but standards can take many additional forms. Based on the data collected in Rwanda, there was no preference shown for a specific type of standard. However, based on the interpretation of how standards are viewed in Rwanda it is unlikely that a standard representing a single standard model with corresponding technical specifications would be developed. During the interviews, the importance of remaining flexible was highlighted by several of the participants which would indicate that a less prescriptive standard would be more applicable.

7.4.7 What do standards look like?

The general consensus from this research shows that standards are expected to contain technical information including dimensions and material choices.

As discussed previously, the results from the Delphi process have shown that the experts expect a standard to be technically based rather than service based. The results in section 5.2.2, Table 23 show that all the experts expect a standard for latrines to include information on design and construction. The second most popular category was technical specifications, with instructions for use and siting and location both being selected by more than 60% of the panel.

The building regulations contain a technical specification for a VIP within a much larger document. The construction instructions contain one figure with limited dimensions towards the end of a larger document and the guidelines provide a list of characteristics for a sanitary latrine and drawings (both aesthetic and technical) for each type of latrine but it includes both household and institutions which increases the length of the document. The building regulations are intended to provide a baseline for those involved in construction and planning to work from. The construction instructions are intended to reduce the problems associated with poorly constructed housing in rural areas and consequently improve disaster resilience and the guidelines on latrine technologies are intended to provide information on the different types of latrine available to assist in household decision making. Therefore, the main purpose of these three documents is to provide information.

Information about what would be included in a copy of ‘technical guidelines’ was only provided in the National Sanitation Strategy from Namibia (Ministry of Agriculture, Water and Forestry, 2009) and the Environmental Sanitation Policy from Ghana (Ministry of Local government and Rural Development, 2010). In both of these cases the guidelines are expected to contain information on latrine designs and procedures for use which corresponds with the contents of the guidelines on latrine technologies from Rwanda.

The focus on the provision of technical information links to the acknowledgement that a lack of technical information, both for the households and the latrine builders can create a barrier for latrine construction as discussed in section 6.4.2.2.

“The construction of family latrines is dependent on 2 things, the knowledge that the technicians in the relevant areas have and the capacity of the family” (Int32-donor).

7.5 Use

7.5.1 Are standards constraints?

The two documents with the most potential to act as constraints are the building regulations and the construction instructions for rural houses.

These are two of several documents currently in existence in Rwanda that contain information related to the construction of household latrines. Although none of the documents can be considered formal standards by RBS, each one could be adopted as a private standard by the institution with primary responsibility for their development and compliance with the contents could be made voluntary or mandatory as desired by the lead institution.

The building control regulations document is the only one in Rwanda with specific regulatory implications and specifies that peri-urban households must have at least a VIP latrine. The regulations also contain the specifications for siting and constructing the latrine. The siting requirements could cause problems for households with small plots and for those who cannot afford to build a VIP which meets the specifications given, especially as it uses cement. Consequently, for peri-urban households there could be some constraints caused by the building regulations.

In the basic housing instruction document it is recognised that there are four different categories of housing which can be constructed according to financial capacity. However, there is only one type of latrine presented, a pour flush latrine, which is considered to be applicable across the four different categories. The pour-flush latrine presented for construction in all rural households is of a higher technical specification than the one required in peri-urban areas under the building regulations. It also requires the use of water which is not always so accessible in rural areas. The regulatory aspects of the basic housing construction instructions are unclear but there is an implication that residential buildings that do not comply with the guidelines will be penalised by not receiving a certificate of habitation, which is a legal requirement in Rwanda. The construction instructions therefore have the potential to place serious constraints on the construction of latrines in rural areas if all households are required to build a pour-flush latrine.

There are no references to regulation, monitoring or compliance in the guidelines on latrine technologies from MININFRA or in any of the documents from MoH. Both the construction instructions for rural households and the guidelines on latrine technologies were developed by MININFRA. Consequently, this overlap between the information provided and the regulatory implications of each document is an area of particular concern that needs to be addressed by MININFRA and other sector stakeholders.

Kvarnström *et al* (2011, p.6) highlight the problems caused when there is a lack of sector organisation and co-ordination which results in conflicts and causes confusion for people wanting to use the information provided. The construction instructions are an example of a

document that has not considered the wider system during development. Limiting the number of technology choices permissible in a given situation is highlighted in section 2.4.3.1 as one of the ways that standards can act as constraints. Placing households at the centre of the decision making process for selecting which latrine to construct and use is now a well-established concept in WASH sector literature but the construction instructions provide no options and present just one model, a model that is only used by 0.1% of households in Rwanda (NISR *et al*, 2010, p.20).

Developing a new standard without understanding the implications of both the building regulations and the construction instructions would lead to further confusion regarding the 'right' document to follow and could result in a duplication of efforts. As the guidelines were developed before the construction instructions for rural housing it would have been less confusing had the construction instructions made reference to, or included the guidelines on latrine technologies rather than presenting a single latrine option.

7.5.2 Where should standards be used?

Section 2.4.1.7 in the literature review discussed that service levels between urban and rural areas are expected to be different. The findings from this study have found this to be true for Rwanda as well.

The National Strategic Plan on Sanitation from 2008 anticipated that different 'norms and standards' would be developed for urban, semi-urban and rural areas (MININFRA, 2008a, p.14). The existing legislation on toilets and latrines applies primarily to Kigali City. Kigali City is usually considered as a separate entity and as such is subject to different by-laws. Kigali City Council recently passed a bylaw requiring the installation of flush toilets in all newly constructed houses (Babijja, 2012). The Rwanda Building Regulations state that building owners must convert to a waterborne system of excreta disposal when it becomes possible to connect with a water supply system providing a minimum of 75 litres per person per day (Rwanda Housing Authority, 2012a, p.42). The building control regulations are not considered formal standards by RBS but they are considered standards by RHA and there are provisions for enforcing their use. However, their application is limited to urban areas.

Although the regulatory implications of the construction instructions for rural households are unclear (see section 4.7.3), it is understood that the construction instructions will be used instead of the building regulations in rural areas which indicates that latrines in urban and rural areas are expected to be different, at least in the short term (to the end of EDPRS 2 in 2017). The guidelines on latrine technologies are intended for use primarily in rural areas because they focus on on-site options for capture and storage of wastes as opposed to networked services. They also make recommendations about which latrine options to use in each region based on geological differences.

Based on the findings from the interviews, it is expected that rural households will meet at least the 'minimum standard' set out in the guidelines on latrine technologies. During the interviews no references were made to the minimum standard set out in the NPSWSS,

which is different, and despite the absence of formal standards, people are not expected to be able to do anything they like;

“the households are the ones to fund them, to construct them so to avoid somehow no-one should just do whatever they want because it’s their own budgets, so we have developed the guidelines to make sure the money they have they can do something which are in-line with the construction of the better latrines” (Int1-government).

Once again there is an interaction between the public and private spheres of latrine construction and use that standards can influence. Despite the fact that households have the responsibility for their own latrine, the government feels it is appropriate to set at least a minimum standard and retain an influence over the type of latrine constructed which links to the idea of providing lists of ‘approved’ and ‘allowable’ technologies as discussed in section 4.2.4.1.

7.5.3 Intended users?

During question 1, round 5 of the Delphi, six experts identified intended users, with all of them expecting national and local dissemination to ‘all actors’.

It is also expected that the standard should be something that ‘*all people can follow*’ (Expert 19). Three experts stated that the standard should be published and five experts included the development of training materials in their responses. In terms of training, builders and technicians received more specific references than any other group of stakeholders. The style of the document and how it is disseminated is therefore very important if it is expected that anyone should be able to read it. However, at the same time, such a wide range of stakeholders, with different needs for the document could result in a document that in trying to satisfy everyone, eventually satisfies no one.

The current approach for dissemination of WASH related information in Rwanda is to sensitise and train local representatives (e.g. CHW, masons, local leaders) who are then given the responsibility of sensitising and training people in their communities. During the document analysis of policies and strategies from Sub-Saharan Africa the same approaches were presented in a majority of the sampled documents (see section 4.2.6). The remaining documents in the sample made no references to implementation approaches.

Understanding the intended users is one of the most important steps in the early stages of developing a standard because it influences several other considerations. The need that a standard will meet and the role it will play should be based on the needs of the intended users and the only way to understand these needs is to involve the consumers (communities and households) in the standard development process (ISO, 2003, p. 4).

Ensuring that the standard is designed to meet the needs of the right users also influences how the standard will be presented and the type of information it will include because different users require different information. During the interviews, nine of the respondents expressed a particular concern over the length and style of the current

guidelines on latrine technologies (as discussed in section 6.4.3.2).

“As I said the document as a document you cannot like, nobody will read. It is too much information, it’s not user friendly, and your objective will not be reached”
(Int33- donor).

During the analysis of guidelines and manuals from Sub-Saharan Africa it was noted that the documents aimed specifically at communities or household are predominately picture based and usually only contain instructions for one type of latrine whilst those for builders and technicians contained more technical information for construction and those for health workers contained information on health and hygiene generally with few references to latrines in particular.

The type of information included directly influences the way that the information can be transmitted to the intended users, for example, transmitting technical information verbally (over the radio) is more difficult than transmitting more general information about how to keep a latrine clean. One of the interviewees highlighted in section 6.4.3.1 that even at the ministry level, latrine designs were not available to those looking for them. Printing a large glossy document and sending it to locally based staff is one of the most expensive methods for disseminating information, but this is the approach anticipated by national level stakeholders in Rwanda and it was also presented as the approach to use in the National Sanitation and Hygienic Strategic Action Plan from Ethiopia and the National Sanitation Strategy from Namibia which were the only documents in the samples from Sub-Saharan Africa to acknowledge the need to disseminate information beyond the national level (see section 4.2.6).

Communities and households currently receive much of their information on sanitation and hygiene from community health workers. Providing the standard in a format that is conducive to this approach would make the dissemination easier.

The intended users of the guidelines on latrine technologies are project and programme staff (e.g. field staff), sector staff e.g. government officers, technicians, NGOs, local authorities (e.g. district, sector and cell leaders) community based workers (e.g. CHW, local builders) and households. By including information on public latrines there is also the intention of encouraging more private sector investment. It is expected that the guidelines will be ‘fully decentralised’ and made available at the lowest level of local government. The guidelines are therefore expected to follow the same implementation process as a standard, with the same target users. However, almost 3 years after development the guidelines have still not been disseminated beyond the national level.

7.6 Regulation

7.6.1 Process of monitoring or checking the standard?

Experts in the Delphi panel expressed the expectation that monitoring activities would focus on the construction and use of latrines to make sure that poorly constructed latrines do not impact on the safety and health of the wider community.

The type of standard developed and the needs that it is expected to meet has a significant influence on the monitoring activities that could take place. The National Environmental Sanitation and Hygiene Policy from Kenya was the only document analysed that made a specific reference to the need to monitor the construction of latrines in order to meet national targets (Ministry of Public Health and Sanitation, no date, p.11).

In Rwanda, the groups of people identified as being responsible for monitoring the standard are those who are closest to the communities and households which include; local leaders (umudugudu, cell or sector leaders), community health workers, environmental health officers and members of community hygiene clubs. Once again the fact that the expert panel members expect there to be some kind of monitoring, whether or not that leads to enforcement, reflects the dynamic between household latrines as a private concern and as a public good.

During both the Delphi process and the interviews there were discussions about setting a minimum standard that all household latrines should meet. The minimum standard presented in the NPSWSS is different to the minimum standard given in the guidelines on latrine technologies because the one in the NPSWSS is technologically based whereas the one in the guidelines is service based. Given that monitoring activities in Rwanda are expected to focus on the construction and use of a latrine it would suggest that whilst a technical standard would be used during construction, after the latrine is constructed a service based standard would be used and these have different implications for monitoring.

The monitoring and inspection of household latrines is already happening in some communities and the processes by which it can be carried out are well established in Rwanda. The same was found as a result of the analysis of documents from Sub-Saharan Africa in which local staff including those from local government, and community WATSAN groups are expected to take on the role of monitoring. Should a standard be adopted that requires monitoring and checking the same processes could be used, providing that those expected to do the monitoring (e.g. the community health workers) are not already fully engaged with other activities.

Section 4.6.3 highlighted that community health workers in Rwanda are responsible for a wide remit, of which a household latrine is just one small component. The document analysis from Rwanda showed that community health workers currently receive very little technical training and information about latrines. Therefore, the ability of these people to

take on an additional responsibility needs to be considered whilst the standard is being developed.

7.6.2 Are standards voluntary or mandatory?

This is one of the areas from this study over which there is the most confusion. There is no agreement on whether a standard should be voluntary or mandatory.

In the study by Ekane *et al* (2012) the phrase ‘prescribed standards’ is used to refer to the guidelines on latrine technologies. The word ‘prescribed’ is associated with rules and the use of this word reinforces the perception that standards are rules to be followed. Ekane *et al* consider the guidelines to be rules which are supposed to be followed, further reinforced by the assumption that ‘local authorities should monitor how latrines are being constructed’ (ibid, p.14) and that there should be ‘effective enforcement’ especially at the local level (ibid) to make sure that latrines are ‘conforming to prescribed rules’ (ibid, p.15). They state that a majority of the toilets surveyed do not meet ‘minimum standards’ (ibid, p.13) but do not clarify which ‘minimum standards’ are being referred to.

In the 2008 National Strategic Plan from Rwanda it is anticipated that in conjunction with the development of ‘norms and standards’ and a ‘minimum standard for sanitary facilities’ there will be a technical team established that will be responsible for inspecting latrines in buildings, including domestic ones (MININFRA, 2008a, p.16). However, the lead institutions for this activity are MININFRA and Kigali City Council therefore the extent to which inspections will be done in rural areas is questionable. In the Environmental Health Policy active enforcement of standards is discouraged in favour of voluntary compliance (MoH, 2009 p.13).

7.6.3 Is regulation required?

During the Delphi process one expert stated a very clear need to regulate household latrines because of their role in wider community health but there were very few references to regulation overall.

7.6.4 How can the standard be regulated?

The options presented for regulating the standard in Rwanda were given as, the creation of a technical regulation; enforcement of the standard through law and enforcement of the standard through the imihigo contracts.

The imihigo contracts, highlighted by 2 experts provide Rwanda with a built-in mechanism for implementing and monitoring the standards at the community level, they can therefore be used to support dissemination, implementation and regulation if required. The use of penalties as a deterrent, particularly the use of fines, was suggested by three experts. In the document analysis from Sub-Saharan Africa the use of fines and traditional sanctions was

proposed in half of the sample of policy and strategy documents (6 documents). The same findings were not found during the interviews when participants were discussing the potential regulatory implications of the guidelines on latrine technologies. None of the interviewees felt that the use of punishments and fines was an appropriate method of implementing the guidelines as these are associated more with the use of standards.

In the policies and strategies analysed from Malawi, Namibia, Nigeria, Sierra Leone and Ethiopia there is an intention to regulate and enforce standards for sanitation and hygiene generally but there are no specific references to household latrines (see section 4.2.5.1). In the cases of Kenya and Ghana references to regulation of household latrines specifically are much stronger with the intention of using the building code for all premises in Ghana. In the documents from Nigeria and Sierra Leone there are also references to the use of by-laws as a means of regulation, which are also stated in the manual on sanitation as a human right as a way to 'promote the construction of toilets' (CHORE *et al*, 2008, p.22).

7.6.5 Levels of regulation?

There is very little agreement on the level of regulation needed.

Enforcement measures and inspections are related to regulation but as discussed throughout this study a standard does not have to be regulated and enforced. One of the motivations for having a standard taken through to the final round of the Delphi was that it could provide acceptable evaluation criteria for latrines that could be applied by health workers without bias. In round 1 it was given independently by 3 experts (out of 27). In round 2 the number of experts that selected it as a response rose to 10 (out of 23) and in round 3 it was ranked 7th (out of 9) motivations for having a standard for household latrines. It was the only motivation from the list of 9 to be ranked in every position, with 7 experts ranking it in the top 3 (position 1-3), 7 ranking it in the middle 3 (position 4-6) and 6 ranking it in the bottom 3 (position 7-9) which indicates that the panel had very little agreement on its overall importance in the development of a standard.

The use of evaluation criteria would indicate that some level of monitoring is expected to take place and that was found during the interviews as well (see section 6.4.3.2) and from the document analysis (see section 4.2.5.1) but the extent to which monitoring is expected to turn into regulation and enforcement could not be identified from the data collected.

Although the number of people interviewed from each stakeholder group is small and the effect of interviewee experience on the responses given cannot be identified in this study, it can be assumed that the engineering staff working in MININFRA are more likely to be used to working with standards in the context of building and construction which would usually be more rigorously enforced because of public safety concerns. Conversely, staff in the Ministry of Health are more used to dealing with the behaviour and social change aspects of sanitation which are more difficult to enforce. As stated by one of the experts on the Delphi panel, "*it is difficult for people to change their behaviour so it takes a long time*" (expert 21).

Section 6.5.2.1 discussed that in terms of the guidelines on latrine technologies, there is little agreement on the level of flexibility that the guidelines will have but it is important that users of the guidelines understand what aspects they are expected to adhere to, if any, or if they are intended solely to provide information that can be used or not as each household desires.

In section 2.3.6 it was discussed that there is a trend for BSI in the UK to move away from the regulation of standards and rely more on their voluntary acceptance because of the time and bureaucracy involved in regulation (BSI, 2006, p.8). The understanding is that as people become aware of the standard, they become 'informed consumers' (ISO,2003, p.4) and demand products that meet the required standard so it becomes a form of self-regulation. This approach would be more in line with the views of the Ministry of Health. The issue of regulation would therefore need to be discussed further during the standard development process.

7.7 Consensus

7.7.1 How are standards viewed?

Standards are viewed negatively but standardisation is viewed positively.

All references to the use of standard or prescribed models in the sample of documents from sub-Saharan Africa are negative. The use of standard models is also perceived negatively in Rwanda as shown through the interviews. However, in a majority of the documents from Sub-Saharan Africa there is a general acknowledgement that some form of standardisation of latrines would be useful. This is an important distinction to make; standards are viewed negatively but standardisation is viewed positively. In reality, standardisation is the result of having a standard but the findings from this study suggest that the ideas of standards and standardisation are considered to be different.

In the documents from Sub-Saharan Africa it is understood that standardisation will be achieved through the promotion of 'approved' or 'allowable' models which were discussed in section 4.2.4.1. These 'approved models' are not supposed to represent a 'standard model' but instead they are supposed to form part of a selection of latrine options that households can choose from. Section 4.2.3.4 listed the different names for guidelines, manuals and standards that were found in the sample of policy and strategy documents which governments intend to develop or re-publish which contain information on 'approved' latrine models. The intention of these documents is to provide households with relevant information to support the demand responsive approach.

Training activities identified in the sample documents are focused on technology choice and appropriate construction methods which reinforces the understanding that the presentation of 'approved models' is designed to support standardisation. Promoting conformity in latrine design was highlighted as one of the key roles for the guidelines on latrine technologies from Rwanda as discussed in section 6.4.2.1. The idea that 'approved models' will be used also supports the expectation that a standard for latrines will be

technically based rather than service based which was found in section 5.2.2 as a result of the first Delphi round. The concept of standardisation is also linked to the idea of certifying different technologies which is discussed under 'do stakeholders consider the role of standards differently'.

7.7.2 What if views on standards are very different?

In the analysis of documents from Rwanda it can be seen that the terms norms, standards and guidelines are all used interchangeably yet during the semi-structured interviews, there is a clear distinction made between standards and guidelines.

Section 2.3.2 discussed the purpose of standards and highlighted that the main aim of a standard is to make our lives easier, safer and more convenient. However, Section 2.4.3.1 discussed that there is a confusion surrounding the use of standards for household latrines and that standards can be viewed as constraints with authors of WASH sector literature using terms such as 'prescribed standards' or 'standards and rules'. The way that standards are viewed and interpreted has relevance both nationally and internationally. In the study of Rwandan communities in the Northern Province by Ekane *et al* (2012) the authors used the following terms to refer to the guidelines on latrine technologies useable in Rwanda;

- 'guidelines and standards' (p.3)
- 'prescribed guidelines' (p.9)
- 'formal standards and guidelines' (p.11)
- 'prescribed sanitation and hygiene guidelines and standards' (p.12)
- 'prescribed sanitation guidelines and standards' (p.13)
- 'national standards' (p.13)
- 'prescribed guidelines and standards' (p.14)
- 'prescribed minimum standards' (p.14)
- 'prescribed guidelines for toilets' (p.15)
- 'prescribed rules' (p.15)

During the analysis of policy and strategy documents from Sub-Saharan Africa there were thirteen different names given for types of documents intended to provide information to stakeholders, including households and communities. These names included; 'approved standards'; 'national norms' and 'standard sketches and drawings' (see section 4.2.3.4). The extent to which any of these would be considered formal standards in each country could not be identified but it further demonstrates how many different terms are used interchangeably to discuss standards in their broadest terms. This confusion of language makes it more difficult to understand how to develop a 'well-written' standard because it makes it harder to establish what type of standard is needed in any given context.

Understanding that knowledge about standards is confused and dis-jointed is a useful finding from this study because it shows that the misunderstandings need to be addressed before and during the development of a standard and that the process needs to remain flexible because initial understandings of standards may change as the need for and role of a standard develops clarity.

As discussed in section 6.5.1, RBS do not consider the guidelines to be national standards because they have not followed the established process for development and approval. A majority of the interviewees in this study also make a clear distinction between standards and the guidelines that have been developed. Only one participant understood the guidelines to be standards as discussed in section 6.4.3.2. Ekane *et al* (2012, p.14) state that 'although participants were aware of the existence of national standards they didn't know the exact specifications'. The field work for this study was completed by August 2012 and at that time the guidelines had not been finally approved and were therefore not disseminated beyond the sector working group participants which include representatives from NGOs, donor organisations, the private sector and government. The fieldwork by Ekane *et al* was completed in July 2011 so when participants were asked in that study if they were aware of national standards for latrines they could not have been referring to the guidelines.

This raises an interesting finding about the understanding of standards by different stakeholders. Interview participants from the national level (e.g. government technicians, project managers, heads of departments, NGO staff) have said that standards for latrines do not exist (see section 6.5), whereas, in the minds of the participants in the study by Ekane *et al*, standards do exist and are given by the government. Despite this understanding that standards do exist, having an improved latrine was still not found to be a priority during the study (Ekane *et al*, 2012, p.12). The combination of these findings can be interpreted in two ways; that either the households do not 'conform' to the perceived 'national standard' because, as shown by the study, they do not know what it is, or that they are unwilling to conform to it. Both of these interpretations could influence how a standard for household latrines is developed. If the problem is related to a lack of knowledge about the standard, then any standard must be fully disseminated to make sure that it is widely known about, and as discussed in section 6.4.3.1, dissemination relies on having a budget and the correct format for dissemination and use (e.g. a pamphlet rather than a large report). If the problem is with acceptance and voluntary conformity, awareness about the role and importance of the standard would need to be raised in conjunction with additional supporting measures, including access to credit with the potential development and use of a regulation to promote conformity if required.

7.8 Key findings from the research

It was stated in the introductory chapter that nobody would want a standard that is not 'well-written'. However, the fact that standards for household latrines are perceived as a constraint on increasing access to latrines indicates that current standards are not well written or are not fit for purpose. The literature review in chapter 2 highlighted how different elements from the sanitation system interact to influence and be influenced by standards for household latrines. Section 2.5 highlights that many of the elements are interwoven with each other, further increasing the complexity of the system. Standards should be designed to make our lives easier, not more difficult. Therefore, it is not enough to just identify the need for a standard in isolation, the complexity of the system within

which it operates should be considered so that the standard developed works with the system, not against it.

This section presents the key findings from the three sub-research questions. Establishing what the sanitation system looks like in Rwanda and the factors that influence it was relatively straightforward but understanding the role that a standard would play in that system was more complicated.

The general findings presented for sub-question 1 apply to Rwanda as well as other countries in Sub-Saharan Africa, particularly those from which documents were analysed. However, the added detail that came from focusing on Rwanda in particular allowed more specific findings to be drawn out. Whilst these are applicable to Rwanda, their generalisation to other countries is limited because the research did not go into sufficient detail for other individual countries to assess their validity in other contexts. For sub-questions 2 and 3 the findings all relate specifically to Rwanda.

Section 7.9 presents a decision process which is the culmination of all the findings presented so far, both in this section and in chapter 4, 5 and 6 and which is designed to address the main research question of '*how to develop standards for household latrines in Rwanda*'.

7.8.1 Addressing Research Question 1

SQ1: How are standards viewed, discussed and presented in existing documents?

General findings

- During the analysis of a sample of policies, strategies, guidelines and manuals there were very few specific references to standards for household latrines.
- The use of standard model latrines in the past has contributed to the negative perceptions about standards for latrines.
- Knowledge about standards is confused and dis-jointed. It is difficult for people to separate the idea of a standard from the notion of a standard model for a latrine.
- There is no common understanding of what a standard is and what one might look like from the documents sampled in this study.
- The confusion around the different terms used to discuss standards makes it more difficult to understand how to develop a 'well-written' standard because it makes it harder to establish what type of standard is needed in any given context.
- Standardisation will be achieved through the promotion of 'approved' or 'allowable' models. These 'approved models' are not supposed to represent a 'standard model' but instead they are supposed to form part of a selection of latrine options that households can choose from.

- There is an assumption that a standard would be applied to the whole latrine rather than specific parts of it e.g. just the pit or just the superstructure.
- During the document analysis of policies and strategies from Sub-Saharan Africa the idea that governments should support household decision making by providing information on approved latrine options was found in all of the documents.

Rwanda specific

- Standards are viewed both positively and negatively by different stakeholders. For people working at the community level who are involved in monitoring activities a standard is viewed as a useful tool for helping them in their activities. Standards that represent standard models of latrines or standards that are strongly regulated and enforced are viewed negatively.
- The terms norms, standards and guidelines are all used interchangeably in documents but during the semi-structured interviews, there was a clear distinction made between standards and guidelines for most participants.
- The guidelines on latrine technologies are used as a proxy for standards in Rwanda.
- There is an overall lack of clarity and co-ordination between the different documents from different departments and organisations in Rwanda which presents a serious challenge for co-ordinating the information in the sector and for gaining consensus on how a standard could be developed and used.
- The two documents with the most potential to act as constraints are the building regulations and the construction instructions for rural houses.

7.8.2 Addressing Research Question 2

SQ2: Is there a consensus between stakeholders in Rwanda about the need for a standard, the role it can play and how it can be used?

- Standards are viewed negatively but standardisation is viewed positively. In reality, standardisation is the result of having a standard but the findings from this study suggest that the ideas of standards and standardisation are considered to be different.
- The idea of standardisation is closely aligned with ideas of approved, acceptable and allowable models which meet international standards of being improved whilst providing householders with some choice over the type of latrine they choose to use.

- A standard is expected to be technically based rather than service based but decision makers in charge of sanitation policy need to decide which aspect of a latrine is more important; the use of one or the technical specification of one and to what extent they expect to have control over the different aspects of a household latrine.
- More flexible, less prescriptive standards are preferred.
- Although levels of consensus amongst the expert panel are low, agreement amongst respondents is higher than it would be by chance.
- The development of a standard using a consensus based approach compliments the existing activities of the WASH sector both internationally and nationally.
- Individual experts were willing to change their opinion throughout the Delphi process when they were presented with alternative considerations, which shows flexibility and a willingness to engage with the process which is important for developing a standard.
- Overall, stakeholders want standards to reduce the levels of confusion surrounding latrine choice and latrine construction.
- When deciding what factors to consider when developing a standard, the decision making process is actually based on the factors that people consider important when deciding or recommending what latrine to build.
- Some of the experts included specific technical specifications in their definition of a standard. Technical specifications are associated with high levels of control and are generally used when safety is an important factor but in terms of latrine construction the focus on the provision of technical information links to the acknowledgement that a lack of technical information, both for the households and the latrine builders can create a barrier for latrine construction.
- There is no agreement on whether a standard should be voluntary or mandatory.
- It is expected that rural households will meet at least the 'minimum standard' set out in the guidelines on latrine technologies even though it is different to the minimum standard set by the national policy and strategy on water supply and sanitation (but the guidelines are not considered a standard by the majority of participants).
- The issue of regulation, the need for it and the process through which it can be done is one of the areas which is likely to be the most difficult to achieve consensus on.

- There is an assumption that household latrines should be monitored and that a standard can play a role in the monitoring.
- Monitoring activities would focus on the construction and use of latrines to make sure that poorly constructed latrines do not impact on the safety and health of the wider community which points more towards regulation than simple monitoring, but overall, agreement on the need for regulation is not at all clear.

7.8.3 Addressing Research Question 3

SQ3: How does a standard for household latrines fit into the current situation in Rwanda?

- Despite the fact that households have the responsibility for their own latrine, the government feels it is appropriate to set at least a minimum standard and retain an influence over the type of latrine constructed.
- The idea of setting a minimum standard has particular relevance in the context of sanitation as a human right and having a minimum standard would also support the realisation of the public benefits of latrine use which is where the interest of the policy makers is.
- Involving ‘all relevant stakeholders’ in the decision making process is recognised as an important concept of sanitation as a human right as well as the standard development process.
- Developing a new standard without understanding the implications of both the building regulations and the construction instructions would lead to further confusion regarding the ‘right’ document to follow and could lead to a duplication of efforts.
- There is a social and cultural expectation that people will have a latrine in Rwanda. The fact that people are willing to have a latrine means that the role of the standard can focus on upgrading the level of service they currently have rather than focusing on the earlier stage of encouraging latrine adoption.
- Given that there is no history of having standards for any latrines in Rwanda before the building regulations were introduced in 2009, the knowledge that people have about latrine siting, construction and pit depth in particular has no formal, written basis and is therefore composed completely from unspoken rules of thumb.
- The influence of project latrines has left people with unrealistic expectations about the costs of constructing latrines higher up the sanitation ladder.
- Interview participants from the national level have said that standards for latrines do not exist whereas in the minds of households and communities standards do

exist and are given by the government. Communicating the role that the standard will play becomes more significant in this environment so that all stakeholders understand what the implications of the standard are in reality rather than in theory.

- The benefits of having a standard that promotes the ‘certification’ of different technologies that would help people to feel confident in making a more substantial investment in a better latrine was recognised.
- Communities and households currently receive much of their information on sanitation and hygiene from community health workers. Providing the standard in a format that is conducive to this approach would make the dissemination easier.
- When standards are used to promote knowledge acquisition they can play a positive role in social learning and the development of social norms which is an important part of the behaviour change approaches used to increase demand for latrines such as CLTS, sanitation as a business, CATS and sanitation marketing.
- It is important to consider the existing social norms as well as the existing construction norms during the development of a standard for household latrines.

7.8.4 The implications of these findings for developing a standard in Rwanda

One of the most significant challenges facing Rwanda in terms of encouraging people to move to more improved forms of latrines is related to the confusion caused by having multiple sources of information. This need was recognised and action was taken to create a solution in the form of the guidelines on latrine technologies. It is hoped by national level stakeholders that by developing the guidelines there will be more clarity on what a ‘good latrine’ looks like in different geographical areas of Rwanda and greater standardisation overall which will improve additional aspects such as safety, durability and hygiene. In terms of satisfying international requirements under the CPAF for 2010/2011 to ‘put in place norms and standards of sanitation in Rwanda’ (MININFRA, 2008b, p.8) the guidelines are considered to have met this need.

Therefore, in the case of Rwanda, it can be said that the need and the role of ‘a standard’ have both been recognised and a standard, in the form of guidelines, has been developed that can be used. However, the guidelines were not developed with easy implementation and dissemination in mind and this is now the major challenge for raising awareness about the guidelines and what they are intended to do. Given that there is no budget for sanitation activities of any kind the likelihood of the guidelines being ‘*fully disseminated*’ to ‘*all levels*’ in their current format is limited and therefore, the potential of the guidelines to meet their intended purpose is also limited. Communities and households currently receive much of their information on sanitation and hygiene from community health workers. It is therefore recommended that the guidelines are provided in a format that is conducive to this approach, which would make wider dissemination easier and less expensive.

7.9 Decision Process

7.9.1 Overview

Complete consensus is a difficult thing to achieve, especially when the interests of so many different parties need to be considered, as is the case for household latrines. It is unlikely that it will be possible to create a perfect standard that will suit every person in every situation. Consequently, the overall process of developing a standard is about making appropriate compromises in order to create a useful tool rather than making something that creates additional problems.

The overall aims of the decision process are to;

- Provide a framework for considering the whole system
- Act as a tool to guide and help decision makers in developing a standard that meets the needs identified
- Identify the boundaries of the standard (i.e. what it can achieve and what it can't)
- Identify where compromises will most likely need to be made
- Highlight the importance of involving a full range of stakeholders in the process

Figure 22 presents the quick reference version of the decision process which has been developed as a result of this research. There are six steps to follow. Steps one and two focus on understanding the system within which the standard will operate. Steps 3, 4 and 5 focus on the more practical aspects of the development process and step 6 is the final cross checking stage to make sure that there are no contradictions along the way.



Figure 22 the Decision Process

Section 7.9.2 presents the expanded version of the decision process and the rationale behind the development of each step is presented in appendix 6 along with images showing how the process evolved from the initial stages through to what is presented here.

7.9.2 Following the process

It was stated at the beginning of this research that it is important to consider how a standard for household latrines will operate within the wider sanitation system of a country. By following this decision process it is possible to identify the most important elements of the sanitation system that can influence a standard. This results in a standard that compliments the system within which it operates rather than working against it.

The decision process is based on a series of key questions that should be answered during the development of a standard for household latrines. The intention is to work through the steps in turn, developing the standard throughout rather than trying to create the 'end result' and the end of step one. Whilst it is important that one organisation takes the lead responsibility for developing the standard, it is expected that a range of stakeholders will be involved throughout the process. Figure 23 presents the more detailed version of the process and should be read in conjunction with the expanded steps shown after Figure 23.

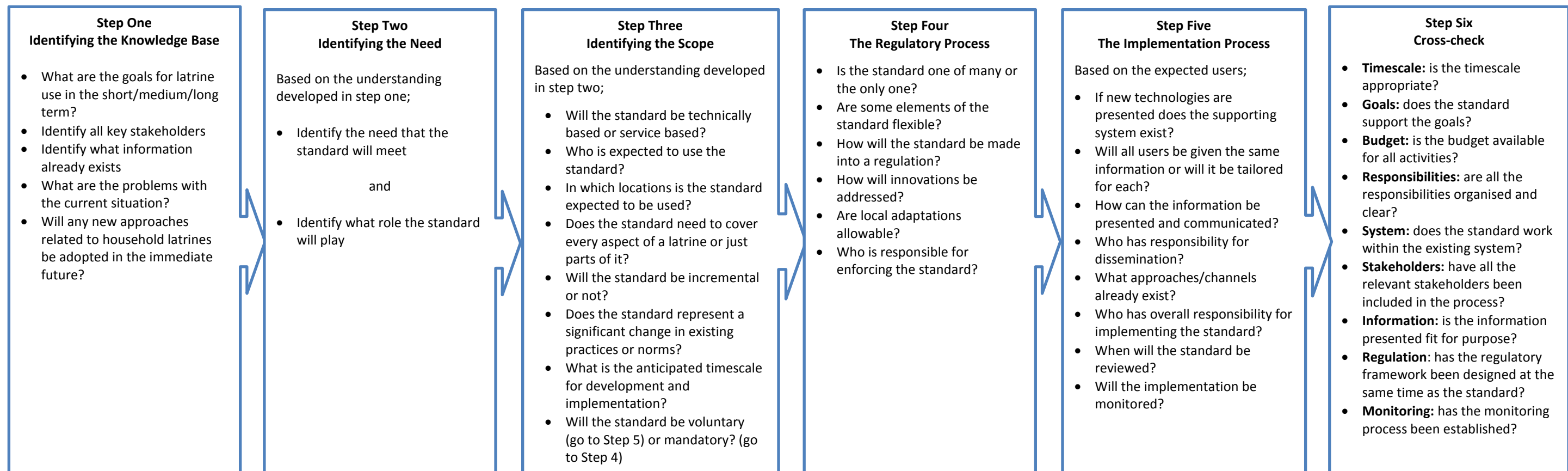


Figure 23 Detailed Decision Process

Step One Expanded: Identifying the Knowledge Base

Step one requires the most analytical work in order to understand what information already exists and how that can influence the development of a standard. It builds the knowledge base needed to answer the 2 key questions in step 2.

Identify all key stakeholders

Consider:

- The whole process (development to implementation)
- Who has what responsibilities and are there any conflicts, overlaps or challenges?
- How and when will each stakeholder be involved in the process?
- Who has what budget available?
- Who has what capacities (i.e. staff) available?
- Who will have the overall responsibility for the process (make the final decision?)

Potential stakeholders include:

- Households
- Community representatives/local leaders
- Health workers
- Local government staff (e.g. district officers)
- Training/vocational schools for builders
- Womens groups
- NGOs, CBOs, INGOs
- Donors
- Government representatives
- Standard making body representatives
- Academia
- Politicians

Identify what information already exists (both tacit and documented)

Consider:

- What documents exist, where they are found and what roles they play
- Who does what? - what happens in existing projects and programmes (including geographical location)
- Who knows what? – what informal standards exist e.g. behavioural, social, technical
- Does this existing knowledge create any specific restrictions on the type of standard than can be developed?

What are the problems with the current situation?

Consider:

- Physical (e.g. space)
- Natural (e.g. flooding)
- Financial (e.g. cost of materials)
- Technical (e.g. construction is not understood)
- Institutional (e.g. confusion over responsibilities)
- Knowledge (e.g. people don't know what to build)
- Geographical (e.g. are there different problems in different areas? – problems could be highlighted on maps for ease of visualisation)

Will any new approaches related to household latrines be adopted in the immediate future?

Consider:

- How approaches such as community led total sanitation (CLTS), Sanitation as a Business, Sanitation Marketing or any others can influence the type of standard developed

Step Two Expanded: Identifying the Need

Step two is designed to focus on the need for the standard and make sure that the end standard is outcome oriented. The aim is to establish at this early stage what it is that the standard should achieve because the rest of the decisions taken throughout the development process will be based on this understanding.

The two key actions required in this step are to;

- **Identify the need that the standard will meet:** this should be based on the most important problem or problems identified during step one, e.g. existing latrines are not safe to use.
- **Identify what role the standard will play:** i.e. what the standard should do, for example, ensure latrines are safe.

Key discussion point for this step:

If in order to solve the problem identified there needs to be a compromise made between technological choice and level of service will the compromise be accepted?

– If the compromise cannot be accepted then need for a standard should be reassessed

Step Three Expanded: Identifying the Scope

Step Three is designed to identify the scope of the standard and answer some of the initial questions about the intended users and about how it will be implemented as these answers have an impact on the more practical aspects of the design of the standard explored in steps 4 and 5.

Will the standard be technical based or service based? this points to the type of information that will be included in the standard and should correspond with the intended users of the standard.

Who is expected to use the standard? A full list of those expected to use the standard should be made, for example, it could include health workers for training, households and builders for construction, environmental health officers for monitoring and politicians for assessing national achievement of targets.

In which locations is the standard expected to be used? For example just one of rural, peri-urban, urban areas or all of them? Does this fit with the intended users?

Does the standard need to cover every aspect of a latrine or just parts of it? for example, the standard could be related to just the pit, or just the superstructure, or just the siting of it

Will the standard be incremental or not? This is based on understanding the overall aim of the standard. For example, will the standard work towards the achievement of incremental improvements in household latrines over time or will it be used to set the 'best' standard right from the outset?

Does the standard represent a significant change in existing practices or norms? if yes, has this been accounted for in the setting the timescale for development and implementation?

What is the anticipated timescale for development and implementation? changing the way things are done takes time and this should be accounted for.

Key discussion point for this step;

Will the standard be voluntary or mandatory? If the standard will be voluntary there is no need to regulate it and step 4 can be missed out. If the standard will be mandatory step 4 is a critical step in the development process.

Step Four Expanded: The Regulatory Process
(Only necessary if regulation of the standard is needed)

The aim of step four is to make sure that any regulatory implications of the standard are considered as an integral part of the standard development process rather than only being considered at the end. If the standard will be voluntary then this step is not needed.

The following considerations all require careful deliberation by decision makers during the development process.

Is the standard one of many or the only one? e.g. will there be just one standard related to household latrines or several? If the standard is one of a suite of standards then great care must be taken to ensure that the new standard does not contradict any of the other standards. The regulatory implications of each standard must also be made clear – are users expected to comply with the full range of standards or just one of them? If multiple standards are developed is the capacity available to regulate them all?

Are some elements of the standard flexible? For example, the standard may state that a latrine must have a superstructure but does not dictate the shape of it. If there will be some elements which are flexible and some which are mandatory this must be made clear to the users.

How will the standard be made into a regulation? for example will it be done through creating a by law and are there any constraints on using that type of approach, for example, the time required to modify a by-law once it is created.

How will innovations be addressed? what will happen if a new technology or approach is found? will the standard be reviewed and updated based on the innovation or is innovation discouraged?

Are local adaptations allowable? if yes, how will this be accounted for in the regulatory process and are the resources available to regulate locally adapted standards?

Who is responsible for enforcing the standard? what tools/checklists/equipment do they need in order to enforce the standards and do they have the capacity and the budget to enforce the regulation? – if no, consider a voluntary option instead.

Step Five Expanded: The Implementation Process

The aim of step five is to consider the most important aspects of the implementation process, identify what options already exist and what would need to be organised in order to make the implementation successful. If the standard does not get to the people who need to use it then it cannot be used.

If new technologies are presented does the supporting system exist? For example if the intention is to encourage the construction of latrines that can be emptied are the materials available, are pit emptiers and sludge treatment facilities available etc.?

Will all users be given the same information or will it be tailored for each? What type of information does each of the users need? The needs of someone in charge of monitoring are different to the needs of a person who will use the standard to construct a latrine. If some of the information provided is very geographically specific e.g. due to high water tables or difficult digging conditions does everyone need to be given the same information or will it create confusion?

How can the information be presented and communicated? For example, does it have to be printed, can it be delivered by word of mouth or over the radio. This links to ***what channels and approaches already exist***. It may be more economical to use an existing channel such as a community health worker rather than developing a new approach.

Who has responsibility for dissemination? do they have the capacity and budget? – if not can an alternative method be used?

Who has overall responsibility for implementing the standard? do they have the capacity and budget to follow the whole implementation?

When will the standard be reviewed? Set the timetable for the review process to ensure that the budget will be available when necessary e.g. 5 years

Will the implementation be monitored? if yes, how will it be done (e.g. quarterly reporting based on information from community health workers), who has responsibility to do it and do they have the capacity and budget available? – if not can an alternative method be used?

Step Six: Cross-Check

Step six is a final checking stage to make sure that the standard developed does not contradict itself or any existing standards. Any problems raised through the cross-checking process should be dealt with before the standard is finally accepted.

7.10 Chapter summary

The discussion in this chapter focuses on bringing together the contributions made to the study as a whole, based on all three methods. It places the analysis of the data from this study within the context of the existing knowledge on standards for household latrines both in Rwanda and more broadly in Sub-Saharan Africa and reflects on how standards can operate within the wider sanitation system. The completed conceptual framework, presented in section 7.2 Table 44 shows all the contributions that can be made as a result of the three data collection processes and has been used throughout the research to define the boundaries of the study and to identify the relationships between the five concepts of consensus, role, development, regulation and use.

The key findings presented under section 7.8 begin to draw this research to a close and the decision process presented in section 7.9 represents the culmination of guidance developed through this research on how to write a '*well written*' standard for household latrines in Rwanda and beyond.

8. Conclusions

8.1 Introduction

This chapter discusses the success of the research in meeting the three research objectives and answering the overarching research question. It confirms the contribution to knowledge made by this study and discusses the implications of the findings on future policy and practice in the WASH sector. The last section presents potential areas for further research with a view to the future and continuing the work on understanding more about the role of standards in sanitation.

8.2 Meeting of research objectives

The overall aim of this study was to address the overarching research question;

“How to develop standards for household latrines in Rwanda?”

The three research objectives were based on three sub-questions used to address different parts of the overarching question with the key findings from each presented in chapter 7, section 7.8.

8.2.1 Research objective 1

RO1: *To understand what information on standards already exists, how that information is used, where it can be found, how it is communicated and what it looks like.*

Research objective one was to analyse how standards are presented in different national documents from countries in Sub-Saharan Africa in general and Rwanda in particular, with a view to understanding how standards for household latrines are viewed, discussed and presented in existing documents. The discussion in chapter 7 highlights several areas where the findings from Rwanda have been supported by findings from the broader analysis of documents from Sub-Saharan Africa.

Until now, there has been no review of the different types of documents available which present information to households related to the construction of latrines. Starting this process and presenting the results from a small sample of documents provides the base from which the discussion can be continued and allows a review of individual country documents to be placed in the wider context of those from Sub-Saharan Africa. The quick reference tables presented in annex 2 can be used as they are or adapted for use by other researchers wishing to carry out a similar type of review in the future with a different sample of documents. Overall, this objective has been achieved.

8.2.2 Research objective 2

RO2: *To establish what levels of consensus exist between stakeholders in Rwanda and identify areas where gaining consensus could pose a particular challenge.*

Objective two was to explore if there was consensus between stakeholders on the influences which can affect the process of developing a standard. By using the Delphi method, it was possible to explore and understand what a wide range of stakeholders would expect a standard to do, what it would look like and how it would be developed in a way that supported contributions from a non-homogenous group of experts who would not normally be brought together. It has also shown that consumers (i.e. households and communities) can be successfully included in the debate about developing a standard for household latrines at the national level. Overall this objective was achieved.

8.2.3 Research objective 3

RO3: *To understand stakeholder's perceptions on standards for household latrines and how a standard fits into the current sanitation system.*

Objective three was designed to understand what role stakeholders want standards to play, how standards can be developed that meet these roles and what influences the development of standards in Rwanda. In the context of Rwanda, it was also possible to explore how existing guidelines on latrine technologies are considered in relation to the development of a standard.

The semi-structured interviews used for objective three added depth and keen personal insights to the data collected under the other two objectives to result in a detailed understanding of the overarching research question. Overall, this objective was achieved.

8.3 Limitations of the research

The primary limitation of this research is that the urban context is not included. The relevance of the findings can therefore not be applied to an urban context with any confidence. The research has shown that it is expected that urban households will be required to meet different standards to those in rural areas. In Rwanda, the building control regulations are intended to set the required standards for both on-site and off-site toilet systems in both urban and peri-urban areas. It would be interesting to explore the role that the building regulations play in practice rather than in theory and to understand whether they act as constraints on latrine construction and use or whether they have a more positive role in supporting the construction of better quality latrines, especially in peri-urban areas where sewerage networks are non-existent and piped water is less easily available within a households compound.

8.4 Original contribution to knowledge

It is acknowledged that nobody would want a standard that is not 'well-written'. However, the fact that standards for household latrines are perceived as a constraint on increasing access to latrines indicates that current standards are not well written or are not fit for

purpose. The primary aim of this research was to address the knowledge gap relating to the lack of guidance on the development of 'well-written' standards for household latrines.

There are currently no frameworks that deal specifically with the topic of standards for household latrines so by using a conceptual framework developed specifically for this study, this thesis takes a new approach to the discussion of standards for household latrines and opens the debate to explore and understand how standards can play a more positive and constructive role. The conceptual framework can be used to understand how a standard for a household latrine functions within the sanitation system of a country where a standard already exists and how a standard could function within the sanitation system where a standard does not currently exist.

The research highlights and explains how different elements from the sanitation system interact to influence and be influenced by standards for household latrines and demonstrates that it is not enough to just identify the need for a standard in isolation, the complexity of the system within which it operates should be considered so that the standard developed works with the system, not against it. As part of this process, this thesis presents a review of standards in policies, strategies, guidelines and manuals for Sub-Saharan Africa and corresponding quick reference tables containing the key information extracted from each document. These tables represent an original contribution to the sector because no review of this sort has been done before. The tables also provide a template for other researchers and interested parties who may want to consider the role of standards in household level sanitation in Sub-Saharan Africa. The thesis also provides previously unavailable guidance on how to develop a 'well-written' standard in the form of a 'decision process' which has been developed as a result of this research. Although this decision process has been developed using the findings from Rwanda, it is expected to have wider applicability to other countries. The ability for the process to be used in countries other than Rwanda was explicitly considered during the design phase and as such the decision process has been designed primarily as a tool to guide and help decision makers in developing a standard that meets specific needs identified nationally, rather than providing 'an answer' for what a standard should look like in a given context.

This research comes at a time when the need for standards in sanitation generally is being more widely recognised by both international and national stakeholders as a way to increase access to sanitation. The focus on household latrines is particularly significant in the context of improving sanitation generally because of their nature as a public good. Ensuring that households (i.e. the consumers of latrines) are placed at the centre of decision making processes regarding their own levels of access to a latrine or toilet is a core focus of approaches such as CLTS, CATS and Sanitation Marketing. The development of a standard using a consensus based approach therefore compliments the existing activities of the WASH sector both internationally and nationally.

The use of standards is also gaining significance in the debate between donors about how to move forward with approaches such as CLTS and CATS which have previously resisted the use of standards because of their negative connotations. Standards can also play a positive role in social learning and the development of social norms which is an important

part of the behaviour change activities used to increase demand for latrines using approaches such as CLTS, sanitation as a business, CATS and sanitation marketing. In addition to these considerations, there are also implications for standards within the context of sanitation as a human right, particularly the adoption of a 'minimum standard' for latrines in countries that want to support greater equity in levels of access.

8.5 Implications of this study

This research has shown that there is a general acknowledgement that some form of standardisation of household latrines would be useful as long as standard models are not put in place.

Section 4.2.1 in the document analysis chapter discussed how policies and strategies play a part in setting the 'rules of the game' for activities carried out in a specific sector. The policy provides the long term goals and objectives whilst the strategy provides the courses of action and allocation of resources for achieving the end objectives. If developing or using a standard for household latrines is considered important to meeting the overall objectives of a sanitation related policy and strategy in a country, then there is an expectation that the standard will play a role at the policy and strategy level.

It is not possible to create a perfect standard that will suit every person in every situation, consequently compromises are needed and any compromises related to levels of service provided by latrines are likely to have an impact at the policy level because of their status as a public good. The decision process developed as a result of the findings from this research is a useful tool for helping decision makers to identify where these compromises are most likely going to be needed which in turn allows decision makers in charge of sanitation policy to strike a balance between encouraging standardisation in order to gain from the benefits associated with it and allowing people some flexibility in what they choose to build and use.

In terms of the implications for practice, the decision process developed as a result of this research emphasises the need to involve a wide range of stakeholders throughout the process of developing a standard, rather than relying primarily on inputs from stakeholders working at the national level. Achieving this level of involvement takes time and it would need committed leadership from the organisation in charge of developing a standard.

At a country level, changing the way a standard is perceived and following the decision process to develop a standard that fits within the system rather than working against it could have implications for the way that latrines are promoted and supported through the different projects and programmes operating nationally. In the case of Rwanda, the focus is on providing information to people in a consolidated manner in order to reduce the confusion caused by having multiple sources of information. This has implications for the way that individual projects and programmes are conducted and how they can be co-ordinated to provide a common message. This requires strong leadership and a clear designation of roles and responsibilities within the sector which in the current state needs further work.

8.6 Personal reflections on the research

Over the past four years I have learnt new skills and further developed existing ones as well as gaining a greater understanding of the water, sanitation and hygiene sector more broadly. This section reflects on how the methods used in this study have added to my research experience.

Using documents as a form of data collection is a time consuming process but it adds additional depth to the research and expands your knowledge on issues that are broader than the research question. The use of documents also allows you to consider the research problem from a different angle and as such provides interesting insights into the research topic.

The biggest challenge in using the Delphi method in this research was dealing with the large range of responses collected through the use of a qualitative approach. However, by using a qualitative approach the expert panel were able to develop their own responses to the questions asked in order to explore the development of standards from their own perspectives rather than those of the researcher.

I enjoy interacting with people and you can learn a lot by listening to what other people have to say. Because of this, I particularly enjoy using interviews in my research and it is a constant learning process because each one is slightly different to the last. Overall, it has been a privilege to be able to interact with so many people throughout this research and it has been a good learning experience to try a new method. I look forward to being able to apply the skills I have learnt throughout this process in future studies.

8.7 Areas for further research

This research has broken new ground on the discussion surrounding standards for household latrines in Rwanda in particular and Sub-Saharan Africa more generally. There are four main areas where additional research would continue to support this discussion and increase our understanding further.

1: To expand the study into urban areas. As discussed in section 8.3, the findings from this current study cannot be applied to urban areas but there are lessons to be learnt about how standards operate within an urban context.

2: It was acknowledged that the samples of participants from each stakeholder group were small for the Delphi study. By expanding the study to include more participants from each group it would be possible to see how different groups rank the importance of different factors to consider when developing a standard. As the primary users of the standards, the views of households could then be incorporated more explicitly if they differ from stakeholders who take a more nationally influenced perspective.

3: The decision process can be assessed in other countries including those outside Sub-Saharan Africa to see how applicable it would be in other contexts.

4: One particular area of interest would be to follow up the release and dissemination of the guidelines on latrine technologies in Rwanda to see how they are received by their intended users and how well they work within the system. Given that all of the countries sampled in this study intend to develop some sort of guideline or technical manual for households latrines it is important to understand how these documents work in reality, which allows for continual learning and improvement over time; because as one expert so clearly put it;

“You see, standardisation is a journey, it’s not a destination and standards, they are there just to improve things”.

(Int28)

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Appendices

1. Research permit from MINEDUC Rwanda and letter of affiliation from MININFRA Rwanda
2. Document analysis tables
3. Delphi questionnaires in English and Kinyarwanda
4. Delphi outputs from SPSS (version 21)
5. Node list from NVIVO
6. Development of the Decision Process
7. Some example photographs of latrines found during the fieldwork in Rwanda, 2012

1. Research permit from MINEDUC Rwanda

REPUBLIC OF RWANDA

Kigali, 18 APR 2012



MINISTRY OF EDUCATION
P.O. BOX 622 KIGALI

Permission to Research in Rwanda

No: MINEDUC/S&T/0076/2012

The Permission is hereby granted to **Louise Medland** of **Loughborough University, UK**, to carry out research on: **"Developing National Standards for household latrines in sub-Saharan Africa"**

The research will be carried out in the whole of Rwanda. Interviews will be conducted through expert panels which will be selected based on their levels of experience within the sector. Panel members could include; ministers, ministers of state, country programme managers donors, non-government projects and academics.

The research will be carried out during the period between 1st May to 31st August 2012.

The reference number of this letter shall be cited in the final research report as follows:

'Research conducted under permission No: MINEDUC/S&T/0076/2012'

Please allow **Louise Medland** any help and support she might require to conduct this research

Yours sincerely,
MINISTRY OF EDUCATION
GASINGIRWA Marie-Christine, PhD
Director General of Science,
Technology & Research

Dr. Marie Christine Gasingirwa
Director General Science Technology and Research
Ministry of Education



Letter of affiliation from MININFRA Rwanda

REPUBLIC OF RWANDA

Kigali 09 APR 2012
Ref. N°: 693/P3/012



MINISTRY OF INFRASTRUCTURE
P.O. Box 24 KIGALI

Permanent Secretary
Ministry of Education
P.o. Box 622, Kigali

Dear Permanent secretary,

Re: Acceptance of research affiliation with the Ministry of Infrastructure for Louise Medland

Reference is made to the letter dated 13th March 2012 from Louise Medland requesting for her affiliation with the Ministry of Infrastructure for her research into "Developing national standards for household latrines in Sub-Saharan Africa" as part of her PhD studies with the Water Engineering Development Centre, Loughborough University, UK.

We are pleased therefore, to inform you that the Ministry of Infrastructure accepts the above affiliation from May to August 2012. The contact person in the ministry will be Mr. HATEGEKA Emmanuel, the Director of Energy, Water and Sanitation and can be contacted at **Tel. 0788 62 09 30**.

We look forward to seeing the outcomes of this research.

Yours sincerely,

James KAMANZI
Permanent Secretary



- Cc
- Honourable Minister of Infrastructure
 - Honourable Minister of Education
 - Honourable Minister of State in MININFRA (All)
 - **KIGALI**
 - Louise Medland: 110Alan Moss Road, Loughborough, LE11 5LY, UK

Tél: +250 252 58 26 19
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2. Document analysis tables

Standards in policies and strategies from Sub-Saharan Africa

	Country				
	Malawi	Namibia	South Africa	Kenya	Kenya
Overview					
Year	2008	2009	1996	2007	No date
Title	National Sanitation Policy	National Sanitation Strategy 2010/11 – 2014/15	National Sanitation Policy	National Environmental and Sanitation Hygiene Policy	National Environmental and Sanitation Hygiene Strategy 2010 -2015 (draft)
Lead institution/ organisation	Ministry of Irrigation and Water Development	Ministry of Agriculture, Water and Forestry	National Sanitation Task Team	Ministry of Health	Ministry of Public Health and Sanitation
Household latrine encouraged or mandatory?	Mandatory	Encouraged	Encouraged	Encouraged	Not stated
Purpose of document	To establish mechanisms at national level to bring about effective integrated multi-sectoral planning, coordination, implementation and monitoring of sanitation and hygiene promotion.	Improve overall co-ordination of the sanitation sector	Providing a foundation on which future sanitation improvement Programmes can be built.	For the provision or improvement of environmental sanitation and hygiene.	To maintain an acceptable standard of health and prevent public health disasters
Terms used related to standards	Standards Guidelines	National guidelines Standards	Guidelines	Standards Guidelines Approved technology options National norms	Appropriate technology options Standard practice manuals Relevant existing technologies
Technology choices					
Technologies specified	None	Conventional waterborne sanitation system Vacuum / small bore sewer system Biogas system DEWATS modular system Septic tanks and drains system Enviroflush-type system Dry system (VIP pit toilet) Ecosan toilet (Enviroloo, Otjitoilet, UDS) Composting toilets	Ventilated improved pit toilets; Low flow on-site sanitation (LOFLOS); Septic tanks and soakaways; Septic tank effluent drainage (solids-free sewerage) systems; Full water-borne sewerage.	None	None
Key considerations in selecting latrine options	Safe disposal of faeces into a pit or other receptacle Privacy Safe to use, (e.g. not in a dangerous	5 key criteria: Accessible, Acceptable (social and cultural), Affordable,	Affordability Environmental impact Social issues Water supply service levels	Cost effective Affordable Appropriate for needs of all Environmentally friendly	Cost-effective Sustainable Appropriate for different geographic, social, cultural and

	state, liable to collapse or unhygienic) latrine pit or receptacle should be functional Siting (away from water sources) Allow for recycling or re-use of wastes where possible	Environmentally sustainable Appropriate.	Reliability Upgrading Site specific issues Use of local resources Settlement patterns	Sustainable Affordable O&M	physical requirements
Approaches banned or discouraged	Open defecation	Bucket systems	Traditional pit latrines, bucket toilets, portable chemical toilets	Open defecation	Open defecation
Technical specifications given	None	None	None	None	None
Types or use of materials stated?	Not stated	Not stated	Use of local materials encouraged	Not stated	Not stated
Testing or approval of technologies proposed?	Not stated	Pilot testing and approval of imported technologies by Habitat Research & Development Centre	Not stated	Field testing of technologies. Research and testing of technologies to find community acceptability	Not stated
Research on latrine designs proposed?	Yes, for improved sanitation technologies	Research and development of further dry systems and low cost solutions for poor. Develop a 5 year R&D plan	Not stated	Identify feasible technological alternatives to suit needs and abilities of government and communities	Product improvement and development of range of plastic latrines with a focus on easy emptying
Regulation and monitoring					
Organisation responsible for setting standards	Ministry responsible for Sanitation Affairs	Directorate of Water Supply and Sanitation Coordination	National government to set basic minimum standards Local government to set local standards	Ministry of Health	Ministry of Health - Department of Environmental Health: Division of Sanitation and Hygiene
Enforcement of standards expected?	Yes	Yes	Not stated	Yes	Yes
Responsibility for enforcing or monitoring standards	Not stated	Water and Sanitation Forum (regional level)	Not stated	Public officials, Public technicians, community workers	Public Health Office and Department of Environmental Health
Method of enforcing standards	Not stated	Monitoring and inspection system to be developed. Apply fines and penalties	Not stated	Regulation to promote conformity to national norms and standards interventions to improve performance and ensure compliance	Bye-laws, ordinances, public health act. Financial incentives or fines
Education and Training					
Education and awareness raising activities proposed	General sanitation and hygiene education and awareness programmes	Development of technical guidelines for professionals and promotional guidelines/leaflets for beneficiaries	General sanitation and hygiene education and awareness programmes	Provide information on a range of safe sanitation options and services for households	Update existing sanitation manual based on new technologies for dissemination and use throughout sector
Training on /about standards required?	Not stated	Training at all levels (community to management) Develop step- by-step manuals for communities on construction, O&M	Not stated	Yes (for artisans, operators and monitors of environmental health)	Yes (for political and administrative heads at district level) Training of private sector on environmentally friendly technologies

	Country					
	Ghana	Ghana	Nigeria	Sierra Leone	Ethiopia	Ethiopia
Overview						
Year	1999	2010	2004	2007	2005	2011
Title	Environmental Sanitation Policy	Environmental Sanitation Policy	National Water and Sanitation Policy	Water supply and sanitation policy for Sierra Leone	National Hygiene and Sanitation Strategy	National Hygiene & Sanitation Strategic Action Plan for Rural, Peri-Urban and Informal Settlements 2011 – 2015
Lead institution/ organisation	Ministry of Local Government and Rural Development (MLGRD)	Ministry of Local Government and Rural Development (MLGRD)	Federal Ministry of Water Resources	UNECA	Ministry of Health	Ministry of Health
Household latrine encouraged or mandatory?	Mandatory	General encouragement	Mandatory	Encouraged	Strongly encouraged	Strongly encouraged
Purpose of document	To define a systematic approach and framework within which resources can be used most efficiently.	To develop a clear and nationally accepted vision of environmental sanitation as an <i>essential</i> social service and a major determinant for improving health and quality of life in Ghana	For all Nigerians to have access to adequate, affordable and sustainable sanitation through the active participation of all stakeholders	To manage the water resources of Sierra Leone in an integrated manner to support social and economic development in the fields of health, agriculture, and energy and to maintain the productivity and integrity of the environment on a sustainable basis.	To improve coverage of latrines to 100%	Support the achievement of minimum improved hygiene and 'on-site' sanitation standards in households
Terms used related to standards	Approved standards Recommended technologies Technical guidelines Allowable toilet systems	Community sanitation norms Technical guidelines	Accepted sanitation norms	National standards Standard material schedule Equipment and material specifications Standard designs and specifications Engineering standards	Appropriate technology solutions Basic minimum level Technical manuals Guidelines, rules and regulations	Appropriate technology Rules Standards
Technology choices						
Technologies specified	<ul style="list-style-type: none"> - WC - Pour flush - VIP - Aqua privy - Chemical toilet (emergency/temporary usage) - Any other proven technologies recommended by MLGRD. - District Assemblies to decide on acceptability and extent of use of VIP latrines 	(In Annex 3) <ul style="list-style-type: none"> - WC - Pour flush - VIP - Aqua privy - Chemical toilet (emergency/temporary usage) - Any other proven technologies recommended by MLGRD. - District Assemblies to decide on acceptability and 	Rural: at least upgraded pit latrine Semi-urban: at least sanplat latrine using superstructures which blends very well with other buildings within the community Urban: at least pour-flush toilet (uses affordable water conveyance systems)	Includes but not limited to: Rural communities Rectangular single pit VIP (lined and unlined) <ul style="list-style-type: none"> • Mozambique single pit VIP (lined and unlined) • Double pit VIP • San plat <i>Small Towns</i> <ul style="list-style-type: none"> • 1-3 seater KVIP • Pour Flush • Neighbourhood KVIP up to 4 seater 	None	None

	in urban areas. - For VIP and septic tanks sludge must be removed by service tanker (private sector) - Alternating pit VIPs only to be used where it can be guaranteed that users will allow sufficient time for sludge digestion before manual removal.	extent of use of VIP latrines in urban areas. - For VIP and septic tanks sludge must be removed by service tanker (private sector) - Alternating pit VIPs only to be used where user population is low to allow sufficient time for sludge digestion	Other options listed: VIP Septic tank/soakaway Conventional sewerage	• WC/Septic tanks For households: two units - one for male and one for female.		
Key considerations in selecting latrine options	Avoid pollution of surface and ground water Minimise health risks Promote affordable services	Avoid pollution of surface and ground water Minimise health risks Promote affordable services	Affordable Prevent contamination of water sources and environmental degradation. Health impacts prioritised Social and cultural factors	Protect health Protect eco-system Store human excreta Treat excreta to eliminate or reduce pathogens; Resource recovery-oriented, Affordability Easy to construct, operate and maintain Less-dependant on water; Prevent ground water pollution Odourless and flyless	Affordable Sustainable Users engage in design Culturally and socially acceptable Water saving User-friendly (privacy, safety) Recycling	Affordable Sustainable Users engage in design Culturally and socially acceptable Water saving User-friendly (privacy, safety) Recycling
Approaches banned or discouraged	Pan latrines phased out and banned by 2010. Discourage open trench latrines	Discourage and phase out pan and open trench latrines.	Open defecation	Open defecation	Open defecation	Open defecation
Technical specifications given	None	None	None	None	Key features will include: Secure, stable pit Solid, sealed (tight lid) platform – with termite resistant logs and smooth plastered finish to ease cleaning Secure, stable (preferably moveable) superstructure strong enough to resist rain, wind and animals Ventilation with locally available materials.	Key design features include: stable pit Sustainable platform which can be cleaned and where possible moved when the pit is full. Cover to inhibit flies and bad smells. Some system for hand washing Superstructure should be strong enough to resist extreme weather and animal incursion but not over-designed for the available foundations.
Types or use of materials stated?	Not stated	Not stated	Not stated	Use of local available and traditional materials supported	Local material use supported	Local material use supported
Testing or approval of technologies proposed	Not stated	Not stated	Not stated	Not stated	Not stated	Not stated

Research on latrine designs proposed?	Local universities/research organisations will conduct studies into promising foreign technologies and adapt as needed.	Not stated	Advancement and upgrading of appropriate and affordable technologies through R&D. Specific research on aqua-privy and ecosan designs.	Not stated	Yes - on non-local models to test applicability in Ethiopia	Assess relative value of different demand creation techniques for different circumstances
Regulation and Monitoring						
Organisation responsible for setting standards	MLGRD Ministry of health	MLGRD	Federal and State Government	Ministry of Energy and Power	National co-ordinating forum (nationally) Regional health bureaus (to reflect local conditions)	National co-ordinating forum (nationally) Regional health bureaus (to reflect local conditions)
Enforcement of standards expected?	Yes	Yes	Yes	Yes	Yes	Yes
Responsibility for enforcing standards	District assemblies (Health Inspectorate)	District Assemblies	Environmental Health Officers at community level	Communities, District Councils WATSAN committees	Kebele/community and Woreda administrators	Communities and health extension workers (monitoring activities at all levels)
Method of enforcing standards	Education and persuasion to enforce standards Community Tribunals for more serious offences	All residential premises to be periodically inspected By-laws Building code	By-laws Community to establish sanitation norms accepted by all members Community sanctions for non-compliance and self-monitoring	Enactment and Enforcement of by-laws Use of court system and/or traditional sanctions and arbitration to ensure compliance with the basic rules and regulations	Performance contractual agreements at Woreda and Kebele administration level Bylaws and sanctions Communities to set rules and standards on non-compliance subject to local sanctions	Behaviour change communication approach and enforcement of minimum standards.
Education and Training						
Education and awareness raising activities proposed	Educational and information campaigns Provide technical assistance on latrine construction. MLGRD to issue and circulate technical guidelines	National and District educational campaigns	Government at all levels shall regularly present a list of technology options to satisfy demands of communities and individuals	District councils to provide information to community on technology, choice and design	A review and evaluation needs to be done of different latrine technologies in use and preparation of simple guidelines/manuals for construction (with regional variations)	Implement appropriate, simple and easy to follow manuals and other job aides using local languages for technicians at local level (CLTSH, Sanitation Marketing, etc).
Training on/about standards proposed?	Not stated	Not stated	Not stated	District Councils to co-ordinate training of latrine artisans	Yes – at all levels but especially for local service providers	Continue training of artisans, sanitation promoters and health extension workers

Standards in guidelines, manuals and training manuals from Sub-Saharan Africa

	Country						
	Lesotho	Zimbabwe	Zimbabwe	Nigeria	Kenya	Kenya	Liberia
Year	No date	1988	2011	1990	1987	1991	2010
Title	A VIP Latrine Builders Manual	Double Compartment Blair Latrine Builders Instruction Manual (2 nd edn)	The Blair VIP a Construction Manual	VIP latrine construction. Do it yourself manual	Sanitation field manual for Kenya	How to construct a brick VIP latrine	The guidelines for water and sanitation service in Liberia
Lead institution/organisation	No author	Ministry of Health	Aquamor	UNICEF and MoH	MoH	Greenacre N	Ministry of Public Works
Role of document	To explain to builders how VIPs are built	To provide instructions to health assistants and builders	To provide guidance on upgrading a pit latrine towards a brick VIP over time	Intended as a guide for individuals/communities and builders who wish to construct VIP latrines	Manual aimed at planners and implementers of sanitation projects in Kenya	Step by step manual for training public health technicians.	Used as tools for technicians, as a guideline for monitors and evaluators and for decision-makers
Standard discussed?	No	No – but states at the bottom of each page 'build according to instructions'	Existing policy requirement recognised	No	No	No	Standards to exhibit best practice and represent state of the art.
Contents							
Key considerations	Soil condition Ability to move superstructure Material choices Proximity to house Away from water Away from obstructions	Proximity to house Away from water Soil condition Away from obstructions	None given	Proximity to house Away from water Easy removal of material from pit digging Walls must be weatherproof, provide privacy exclude vermin and be architecturally compatible with the main house	Cost Culture Siting Soil condition Comfort and convenience Religion Environmental impact	Proximity to house Away from water Away from obstructions	Safe to use Dispose of excreta safely Privacy
Description of technology or technologies	Basic difference between a single and double pit	Yes - picture and simple text to explain VIP functions	Yes – picture and text to explain how a VIP works	Basic overview of VIP	Overview of VIP, alternating twin pit, pour flush and septic tank. Text and pictures	Yes – detailed overview of VIP	No
Pictures of technologies	Yes	Yes accompanied by simple text	Step by step photographs and text	Yes	Yes	Very simple text with step by step pictures of tools, materials and process	No

Dimensions given	Pit size Ring beam thickness Slab including cement mix ratios Superstructure	Dimensions of: Pit, slab, foundations, superstructure. Cement and concrete mixing ratios given.	All dimensions and cement and concrete mixing ratios given	Dimensions of: Pit depth, superstructure and vent pipe. Cement and concrete mixing ratios given	Siting (10m from dwelling, 30m from water) Pit depth – ‘as deep as practicable, 10m where possible’ (p.28) Door to be self closing	All dimensions and cement and concrete mixing ratios given (pit depth of 5.5m for 10 year use)	Flat and domed slab dimensions and cement mix given (from referenced source)
Drawings given	Several dimensioned drawings to go with each stage of construction	Several dimensioned drawings to go with each stage of construction accompanied by simple text	Yes but primarily relies on the use of photographs	Several dimensioned drawings to go with each stage of construction	Yes for most components: floor plan, drop hole, vent pipe, pit lining and depth. Other dimensions found in text e.g. superstructure	Several dimensioned drawings to go with each stage of construction	Only for institutional latrines
Advantages and disadvantages stated	Yes between single and double pit and advantages of having a latrine generally	Advantages of using a VIP	Advantages of using a VIP	Yes - both	Yes - both	Yes – advantages	No
Instructions for using latrine	Yes	Yes	Yes	Yes	Limited	Yes	No
Instructions for maintaining latrine	Yes	Yes	Yes	Yes	Limited	Yes	No
Costs	No	No	Cost estimated at \$200 for full brick VIP	BoQ with approximate costs for different materials	No	No	No
Types of materials	Example uses stone but use of other materials is encouraged	All given in text and picture form	Types and quantities given	Chosen according to local availability and family means	BoQ in annex for VIP with concrete block and local materials. Use of local materials encouraged but should conform with or be better than house	Local materials encouraged	Supports use of local materials
Upgrading possible	Not stated	Not stated	Yes – encouraged	Small section on how to upgrade to a VIP from a traditional pit latrine (no pictures)	Not stated	Dig and bury method for families who can’t afford a latrine	Not stated

	Country					
	Tanzania	Sudan	South Sudan	Zambia	Uganda	Uganda
Year	2009	1987	2009	No date	2000	2003
Title	Training of Trainers Manual on: Sanitation Marketing, Community-led Total Sanitation, Handwashing with Soap	Small Project Training Manual: Volume 3 Sanitation	Technical Guidelines for the Construction and Management of Household Latrines: A Manual for Field Staff and Practitioners	Why A Pit Latrine: A manual for latrine builders and extension workers	National Sanitation Guidelines	Ecological sanitation: Design and Construction
Lead institution/organisation	WSP Tanzania	Not stated	Ministry of Irrigation and Water Resources – Government of National Unity	Mate J (Independent author)	Ministry of Health	Ministry of Lands, Water and Environment: Directorate of Water Development
Role of document	Provide consistency in approach to training	Training manual from beginners to senior staff (197 pages long)	Reduce disparities, improve standards, accelerate implementation, standardise design and costs. Primarily intended as a reference for field staff and practitioners	For extension workers and the community. A do it yourself manual for anyone who wants to build a latrine for themselves	Promote a standardised approach for sanitation and hygiene promotion by the different institutions and projects involved in this sector Specifically written for the use of district, urban and sub-county authorities, but are available for use by all involved in sanitation and hygiene promotion.	To provide extensive information on different variations of ecosan models for people wanting to build an ecosan latrine
Standard discussed?	No	No	Minimum standards: one latrine per family, pit dimensions and depth, distance from water source	No	No	No
Contents						
Key considerations	Safely contain excreta Have a platform with squatting hole Privacy and protection	Protect ground water Protect health Save water Acceptable Cost	Affordability Aesthetics Social customs and habits Soil conditions Contamination of ground water Availability of water Maintenance/replacement of facilities Sustainability	Materials Privacy Protection Proximity to house Away from water	Safely contain excreta	Materials Proximity to house Safely contain excreta
Description of technology or technologies	Yes – VIP and Pour flush	Yes, local pit latrine, VIP and composting latrine	Yes	Yes – pit latrine, VIP and Blair latrine	Yes – mainly text with very simple drawings	Yes – all text

Pictures of technologies	Some photographs	Yes – simple drawings and materials for use in communities	No just of lined pit	Yes	Just very simple drawings	No
Dimensions given	No	Yes	All given with calculations for pit volume	Pit size and depth, roof height, thickness of concrete slab. Cement mix for slab. Vent pipe diameter.	No	All aspects but in text format
Drawings given	No	Yes for VIP and composting in both local and permanent materials	Detailed drawings for every technology	Simple drawings with some measurements for some of the construction steps (relies more on text)	No	Detailed drawings in appendix
Advantages and disadvantages stated	Yes - both	Yes – complete overview of all options but composting type is most heavily promoted in document	Yes – comparisons made between each type	Yes	Yes in detail	Yes
Instructions for using latrine	No	Yes – pictures for communities in different languages	Yes	Yes – pictures and text	Yes	Yes
Instructions for maintaining latrine	No	Yes - pictures for communities in different languages	Yes	Yes – pictures and text	Yes	Yes
Costs	No	No	No	No	No	No
Types of materials	Local materials strongly promoted	BoQ for composting latrine without superstructure	Use of local materials promoted. Choice of materials according to financial capacity.	Local materials strongly promoted	Use of local materials supported.	Choice of materials according to financial capacity but local materials supported. BoQ in appendix
Upgrading possible	Not stated	Not stated	Not stated	Not stated	Yes	Not stated

	Country				
	Ghana	Ghana	Ethiopia	South Africa	Malawi
Year	2010	1991	2004	2002	2011
Title	Sector Guidelines: Small Communities Design Guidelines	Sanitation: A construct it yourself manual on VIP latrine	Construction Usage and Maintenance of Sanitary Latrine Extension Package	Sanitation Technology Options	Sanitation Trainers Guide
Lead institution/organisation	Community Water and Sanitation Agency (CWSA)	Wateraid	Ministry of Health	Department of Water Affairs and Forestry	Ministry of Irrigation and Water Development
Role of document	To ensure design of Small Communities water supply schemes are in accordance with the CWSA Design Criteria and Guidelines.	For households and communities it replaces the former manual that was deemed too technical.	Help the community to build and use a sanitary latrine system. Intended for people working with communities rather than households themselves	Provides information on various technical options that meet the requirements for basic sanitation.	To give direction to trainers and facilitators on latrine construction processes and how to train masons on sanitation as a business
Standard discussed?	Basic design criteria given	No	No	No	No
Contents					
Key considerations	Away from water Avoiding obstructions Safe Safe disposal of excreta Free from flies Privacy	None stated	Acceptable Affordable Safe storage of excreta Away from water Prevent pollution Protect from vermin	None stated	None stated
Description of technology	Very basic	No	Yes	Yes	Yes
Pictures of technologies	No	Step by step process for different types of VIP - all pictures very little text	Yes	Yes	Yes
Dimensions given	Sludge accumulation rate Min. retention time Max. pit depth Siting latrine	Pit depth and size. Slab size and depth	Some dimensions given in text: Pit depth and diameter Superstructure height Squat hole location	No	Dimensions given in text form for all designs Cement ratios given
Drawings given	No	Basic dimensions given on drawings	No – step by step instructions are written as text	No	No
Advantages and disadvantages stated	Brief	No	Yes	Yes	Advantages
Instructions for using latrine	No	No	Yes	No	No
Instructions for maintaining latrine	No	No	Yes	No	No
Costs	No	No	No	Yes	Instruction on how to calculate costs
Local materials encouraged	Local materials encouraged	Pictures of materials to use	Local materials encouraged	Local materials encouraged	BoQs in annex for each design
Upgrading possible	Not stated		Encouraged	Not stated	Not stated

Standards in policies and strategies from Rwanda

	Rwanda	
Overview		
Year	2008	2010
Title	National Strategic Plan on Sanitation	National Policy and Strategy for Water Supply and Sanitation Services
Lead institution/organisation	MININFRA	MININFRA
Household latrine encouraged or mandatory?	Encouraged	Encouraged
Purpose of document	Improving living conditions of the population through a better access to sanitation services.	Presents the sector's approach on how to achieve the Vision 2020, MDG and EDPRS objectives based on concrete principles, objectives and statements.
Terms used related to standards	Norms and standards Minimum standards	Norms and standards Minimum standards Standardization
Technology choices		
Technologies specified	None stated	Flush or pour-flush to piped sewer system, septic tank or pit latrine, VIP, pit latrine with slab, composting toilet, or other ecosan toilet.
Key considerations in selecting latrine options	None stated	People's expectations and preferences e.g. comfort, status, health benefits, value or safety Environmental protection Affordability
Approaches banned or discouraged	None stated	None stated
Technical specifications given	None stated	None stated
Types or use of materials stated?	None stated	None stated
Testing or approval of technologies proposed?	None stated	Practical field testing and construction of sanitary showrooms
Research on latrine designs proposed?	Study to reduce the cost of latrines, making them more affordable for the population	Research and development of affordable hygienic onsite individual sanitary solutions
Regulation and Monitoring		
Organisation responsible for setting standards	MININFRA	RBS and MININFRA
Enforcement of standards expected?	Compliance with norms and standards expected	Not stated
Responsibility for enforcing or monitoring standards	Not stated	Not stated
Method of enforcing standards	Not stated	Not stated
Education and Training		
Education and awareness raising activities proposed	Promotion of simple methods and techniques for hygiene and sanitation according to financial capacity and technical capacity building at all levels	More training of qualified craftsmen e.g. masons including streamlining technology know-how into the curriculum of vocational schools and universities. Hygiene promotion and awareness raising for communities
Training on /about standards required?	Not stated	Not stated

Standards in guidelines, manuals and training manuals in Rwanda

	REMA	REMA	MININFRA	MININFRA/PNEAR	MININFRA
Overview					
Year	2010	2010	2012	2011 (drawing date)	2011
Title	Practical Tools for Sectoral Environmental Planning #1	Practical Technical Information on Low-cost Technologies such as Composting Latrines and Rainwater Harvesting Infrastructure #9	Basic Housing Construction Instructions for Protection Against Natural and Manmade Disasters in Rural Areas	Project de construction de latrine familiale VIP non vidangable	Guideline of Latrine Technologies Usable in Rwanda
Role of document	To strengthen environmental management capacities of districts, sectors and towns. Explains how to mitigate against environmental impacts of latrines.	Used as field guide or checklist of elements for discussion during training and during implementation of low-cost water and sanitation investments.	To reduce disaster risks caused by heavy rains with wind and storms. For anyone who wants to build a house in the rural area	Working drawings for project latrines	Provides readers with several models of latrines technologies appropriate to the natural region of Rwanda.
Standard discussed?	No	Reference made to compliance with the Rwanda Sanitation Code.	No	No	Yes
Contents					
Key considerations	Population density Demand and preferences Existing sanitation and hygiene practices/customs; Financial capacity of users Technical capacity of users Environmental protection Distance from water Geology Natural hazards Ensure international and national/local policies, standards, and regulations are respected	Affordability User awareness of alternatives Technical knowledge available Geological conditions (e.g. high water table, dense rock) Susceptibility to flooding Culture	No	No	Hygienic Environmentally friendly Sound infrastructure Durability of materials Ease of emptying Dignity Privacy Geology and soil structure Distance from water source
Description of technology or technologies	Not stated	Brief: pit latrines, arborloo and fossa alterna. Detailed: VIP (single or double pit), sky loo and ecosan.	Not stated	2 designs: Single pit for normal conditions Twin pit for hard to dig areas	Yes – very detailed
Pictures of technologies	No	Some basic pictures for each type	No	No	Yes
Dimensions given	No	Provides calculations for pit size based on sludge accumulation rates	No	No	Yes
Drawings given	No	1 very basic drawing copied from another document.	Very basic – slab with some dimensions and superstructure with some dimensions	Yes- very detailed	Yes but very small so difficult to see detail

Advantages and disadvantages stated	Not stated	Yes	Not stated	Not stated	Yes
Instructions for using latrine	Not stated	Yes	Not stated	Not stated	Yes
Instructions for maintaining latrine	Not stated	Yes. Provides efficiency rating on reduction of solids in composting latrines.	Not stated	Not stated	Yes
Costs	Not stated	Not stated	Not stated	Single: 183,504 RWF Twin: 429,550 RWF	Pit latrines: Wood: 36,000 RWF Mud mortar: 41,000 RWF Burnt bricks: 200,000 RWF VIP latrine: Mud mortar & bamboo pipe: 41,000 RWF Ecosan: Mud mortar: 45,000 RWF Flush toilet 200,000 RWF * Prices in BoQs higher than in document.
Types of materials	Not stated	Local and more permanent materials can be used	Not stated	BoQ given	BoQs given
Upgrading possible	Yes	Yes	No	No	Yes

Additional documents not included in the content analysis

Country	Document	Reason for not being included in the analysis
Ethiopia	The WaSH Implementation Framework (2011)	Focus on providing a guiding framework for WASH programmes and activities nationally, no references to standards
	Ethiopia: Building on Progress A Plan for Accelerated and Sustained Development to End Poverty (2005/06-2009/10) (2006)	Focus on development of Ethiopia as a nation rather than a specific focus on WASH
	Sustainable Development and Poverty Reduction Programme (2002)	Focus on development of Ethiopia as a nation rather than a specific focus on WASH
Ghana	National Environmental Sanitation Strategy and Action Plan (2010)	Focus on environmental sanitation as a whole with little reference to household latrines
	Manual for District Water and Sanitation Teams (1997)	Manual on how to run a WASH programme, no references to standards
	Rural water supply and sanitation sector strategy (1991)	No references to sanitation, focused entirely on water
Kenya	Ministry of Public Health and Sanitation Strategic Plan 2008-2012 (2008)	Strategic plan for all MoH activities with no particular focus on WASH
Lesotho	Lesotho Water and Sanitation Policy (2007)	Focused entirely on water, sanitation is only referred to as part of the phrase 'water and sanitation'
Liberia	Water Supply and Sanitation Policy (2009)	Only very general references to standards, primarily focused on water quality
Malawi	Open Defecation Free (ODF) Malawi 2015, Strategy Document (2011)	No references to standards (focus on CLTS process to reach ODF targets)
Namibia	Water Supply and Sanitation Policy (2008)	Very general references to WASH services as a whole
Sierra Leone	Policy for Community Health Workers in Sierra Leone (2012)	Very general references to WASH services as a whole
	National Health Sector Strategic Plan 2010 -2015 (2002)	Strategic plan for all MoH activities with no particular focus on WASH
	National Health Policy Ministry of Health and Sanitation (2002)	Policy for all MoH activities with no particular focus on WASH
South Africa	Guideline for the costing of household sanitation projects (2007)	A costing focused manual
	Guidelines on appropriate technologies for water supply and sanitation in developing communities (2002)	Focused entirely on water, the sanitation section was prepared but not published
	White Paper on Basic Household Sanitation (2001)	No references to standards
	Guideline Implementation Manual for DWAF Funded Household Sanitation Projects (1997)	A manual for a subsidy led programme
	Water Supply and Sanitation Policy (1994)	Defines basic and adequate sanitation which is used in 1996 version
Uganda	Sectoral specific schedules/guidelines 2009/10 (2009)	Focus on water supply services
	National Environmental Health Policy (2005)	Very general references to WASH services as a whole
	Rural water supply and sanitation Strategic Investment Plan 2000 – 2015 (2000)	Limited to descriptions of latrines available
	The Kampala Declaration on Sanitation (1997)	No references to standards

3. Delphi questionnaires in English and Kinyarwanda

Expert Panel Questionnaire: FIRST ROUND

Notes for completing the questionnaire

- This questionnaire contains 5 questions
- For questions 2, 3 and 4 please try and list as many responses as possible (preferably at least 6)
- For each response in questions 2, 3 and 4 please include a short description or definition.

(This enables the researcher to identify if the same term is being used by different participants to describe different things. For example: If participants write 'paper' this could mean 1: paper to write on, 2: a document, 3: a newspaper).

- This questionnaire can be completed electronically (email or word processing) and emailed back or it can be printed and filled in by hand for collection.

Thank you for agreeing to take part in this research exercise. Your contributions are valued and greatly appreciated.

Contact details:

For any additional information please feel free to contact me by email at lsmedland@gmail.com or by telephone on (+250) 07860 41040.

Questions

Question 1: How do you define a standard?

Question 2: What should a standard for household latrines include?

Question 3: What are the motivations for having standards for household latrines?

Question 4: What factors should be considered when setting standards for household latrines?

Question 5: How should a standard for household latrines be implemented?

Urutonde rw'ibibazo bisubizwa n'itsinda ry'impunguke: icyiciro cya mbere

Amabwiriza ngenderwaho mu kuzuzura urutonde rw'ibibazo

- Uru rutonde rugizwe n'ibibazo 5.
- Ku kibazo cya 2, icya 3, n'icya 4 usubiza agerageza gutanga ibisubizo bishoboka byose (Byibuze 6)
- Buri gisubizo kukibazo cya 2,3 n'icya 4 usabwe kugisobanura mu nshamake cyangwa ugatanga ibisobanuro nyabyo byaco.

(Ibi bifasha umushakashatsi kumenya ko ijambo rimwe ririgukoreshwa n'ababazwa batandukanye mu gusobanura ibintu bitandukanye. Urugero: Niba ubazwa yanditse "urupapuro" ibi bishobora gusobanura urupapuro rwo kwandikaho, inyandiko cyangwa ikinyamakuru cyanditse.

- Uru rutonde rw'ibibazo rushobora kuzurizwa kuri mudasobwa (hakoreshejwe e-mail cyangwa word processing) rukoherezwa hakoreshejwe ikoranabuhanga rya interineti , rushobora no gusohorwa muri mudasobwa rukandikishwa intoki.

Murakoze kugira uruhare mutanga amakuru kuri ubu bushakashatsi.Ubufasha bwanyu n'ingirakamaro.

AhoWabariza

Ku bindibisobanuroshoborakoherezaubutumwabwawekuri ismedland@gmail.com cyangwaugahamagarakuri (+250)0786041040.

Ibibazo

Ibibazo cya mbere : Ni gute wasobanura amabwiriza y'ubuziranenge?

Ibibazo cya kabiri : Ni ibihe bintu byagenerwa ibipimo ngenederwaho mu mabwiriza y'ubuziranenge agenga imisarane yo mu ngo ?

Ibibazo cya gatatu : Ni izihe mpamvu wagaragaza zatuma habaho amabwiriza y'ubuziranenge ku misarane yo mu ngo ?

Ibibazo cya kane : Ni ibihe bintu byakwitabwaho mu gushyiraho amabwiriza y'ubuziranenge ku misarane yo mu ngo ?

Ibibazo cya gatanu : Ni gute amabwiriza y'ubuziranenge ku misarane yo mu rugo yakubahirizwa?

Expert Panel Questionnaire: SECOND ROUND

In this round, the responses from the whole expert panel are presented. As you will see the list of responses given in the first round was extensive due to an excellent response from you – the experts. It is therefore important to reduce the lists to a more manageable number for the 3rd (and last) round.

For Question 1: Please select any responses which you agree with. (These lists were extensive so the responses have been categorised and a short list of examples has been included).

For Question 2 and Question 3: Please select the **10 responses** from **each list** which most accurately reflect your thoughts on the questions.

Responses in each list have been randomly ordered.

Thank you for your continuing participation in this research exercise. Your contributions are valued and greatly appreciated.

Question 1: What should a standard for household latrines include?

Please select any of the key responses (**in bold type**) that you agree with by putting a Y in the small column (any number of responses can be selected, total of 6)

<p>Design and construction Including: Details of technology options available Cost and affordability Safety and durability (of materials) Comparative advantages/disadvantages</p>	
<p>Siting and Location Including: Site selection within the house Geographic zones the standard can be applied in (e.g. south region)</p>	
<p>Technical Specifications Including: Depth of pit Slab/floor materials and dimensions Superstructure (roof, walls and door) and dimensions</p>	
<p>Use (including Operation and Maintenance) Including: Ventilation, no flies and not accessible to animals Accessibility Hygienic (to use) Privacy Cultural acceptance Operation standards: mode of use, mode of emptying, mode of cleaning, mode of maintenance,</p>	
<p>Definitions of generally used latrines related terms e.g. a glossary of terms and technical language used</p>	
<p>Situational analysis of the latrines in the region where the standard has to be applied e.g. current practices and possible challenges</p>	

Question 2: What are the motivations for having standards for household latrines?

32 responses given: Please **select 10** of them by putting a Y in the small column.

• For ease of construction (technicians have a reference and do not have to make their own)
• To promote good quality of life (to impact positively on sustainable economic growth and reduce poverty)
• To promote smart styles of latrines
• Assists in management of land use for the population (e.g. implementation of settlement plans, master planning)
• Everyone has baseline standard depending on his capacity in relation to his latrine
• To stop open defecation
• Provides harmonisation according to physical conditions (e.g. soils, water table)
• Allows for monitoring of national targets and data collection (e.g. percentage of people who have achieved a good standard)
• Time-saving benefits (e.g. less days spent suffering from illness)
• Minimise air pollution from offensive gases
• To ensure safety during use (durable latrines to prevent accidents due to collapse etc)
• Provides privacy for users
• Provides acceptable evaluation criteria that can be applied without bias by inspectors or health workers
• Provides a common understanding to all stakeholders (so they can be understood and used by many people)
• For harmonisation of approaches
• Ensures latrines are user friendly (e.g. easy to clean, comfortable, convenient)
• To ensure compliance with good hygienic practices (and stop unhygienic ones)
• To promote good sanitation practices in the community
• Can apply penalties to individuals who do not adhere to the standards
• Provides alternative options for waste treatment or recycling of wastes (especially in urban areas)
• Teach children how to be healthy and avoid diseases
• To promote affordability of the different technological options (including options for hand washing)
• Encourages continuous improvement for achieving a higher level of development/ improvement over time
• Provides dignity to users
• Support behaviour change (to adopt the use of a hygienic latrine)
• To guarantee ease of use and access by all
• To prevent contamination of water sources
• Allows users to gain the most benefits from each technology according to their capacity (financial capacity to build)
• Can include researched information and data which is beneficial to the user
• To make it easier to train people on the requirements needed (provides a tool to help with national education programmes)
• To make training of builders and technicians easier
• To standardise maintenance work, spare and replacement parts

Question 3: What factors should be considered when setting standards for household latrines?

44 responses given: Please **select 10** of them by putting a Y in the small column.

Affordability of Technology
Consideration of traditional factors (Ubudehe, Umuganda, Umusanzu)
Income levels of the community and ability to make the investment in the latrine
Prevention of erosion around the latrine
Geography (location e.g. northern region, southern region)
Traditional village norms and cultural taboos (for cultural acceptability and use)
Choice and availability of construction materials in the area
Distance from the household, nearest cooking area and water source
Direction of latrine door (should not open into a public place)
Space needed to build and allow for emptying
Gender
Disability or impaired use (e.g. elderly people, pregnant women, children)
Availability of spare parts
Local and semi-skilled persons should be able to construct it
It should be low-cost compared to a conventional sewerage system
It should be free from bad odours, inaccessible to insects, flies and animals
It should not contaminate ground water
Safety and protection of users (to prevent collapse and exposure of user to bad weather)
The Rwanda building control regulations
Availability of skilled persons (builders/technicians) in the area to build the latrine
It should allow for regular use without interruption
Have a suitable sub-structure to safely store excreta and prevent leakage (lined)
Use of materials which will not cause environmental damage
Standard minimum depth vs average usage
Size (depending on number of individuals)
Management and maintenance (skills needed should not be very specialized)
Accessibility (e.g. slope/steps, general design)
Durability of materials
Technical details (e.g. slab composition, size of drop hole, type of platform, lining etc)
Aesthetics of the latrine
Local physical conditions (soil, weather, topography)
Availability of water
Category of the plot (i.e. high standing, medium standing, and low standing)
Should be applicable to all Rwandans based on living conditions (e.g. Rural areas, urban areas, agglomerations, commercial centres)
The acquisition process (i.e. steps to build a typical latrine)
Options for recycling or enhancing the value of wastes
Sustainability (longer use or ease of moving to a new location)
Ease of applying the standards
Language of the standards (e.g. Kinyarwanda, English, use of complicated or technical terms)
Distance of the hand washing facility from the latrine
How the users (beneficiaries) can be included in the design of the standards
Willingness of people to adopt a specific type of latrine technology
Presentation format of the standards (e.g. manual, posters, how to inform the population)
Should allow the health inspectors to give instructions based on the information presented

IBIBAZO BIJYENEWE ITSINDA RY’ INARARIBONYE: ICYICIRO CYA KABIRI.

Kuri iyi nshuro, ibisubizo byatanzwe n’ itsinda ry’ inararibonye zose biragazwa. NK’ uko muri bubone urutonde rw’ ibisubizo byatanzwe mu cyiciro cya mbere kubera ibisubizo byanyu byiza mwe inararibonye. Niyo mpamvu rero ari ibya gaciro kugabanya urutonde kugeza k’ umubare muto ushobora gukurikiranwa byoroshye kugeza ku cyiciro cya gatatu ari nacyo cya nyuma.

Ku kibazo cya mbere : Nyabuna hitamo ibisubizo wemeranya nabyo. (izi ntonde zarizagutse none ibisubizo byashyizwe mu byiciro kandi hashyizwemo intonde ngufi).

Ku kibazo cya kabiri n’ icya gatatu: Nyabuna hitamo ibisubizo icumi(10) uhereye buri rutonde cyane ruhuje n’ ibitekerezo byawe kuri ibyo bibazo.

Ibisubizo muri buri cyiciro byashyizwe ku rutonde hakurikijwe tombora.

Murakoze ku bufatanye mudahwema kutugaragariza muri uyu mwitozo w’ ubushakashatsi. Umusanzu wanyu uhawe agaciro kandi turawushima cyane.

Ikibazo cya 1: Ni ibihe bipimofatizo bikwiriye kugirwa n’ ubwiherero mu ngo?

Nyabuna muhitamo ibisubizo byingenzi(mu cyiciro gikwiye)wemeranya nabyo ushyira inyuguti “y” mu kazu gato(buri nomero y’igisubizo ishobora gutoranwa).

<p>Gushushanya no kubaka Hashyizwemo: Uburyo by’ikoranabuhanga busesuye ku kiguzi gifatika kandi zihendutse Uburyo bukwiye n’ uburambe bw’ ibikoresho Ibyiza n’ibibi</p>	
<p>Gushyira no Kugenera Habonekamo: Guhitamo aho kuzishyira mu nzu Zone zikurikije imiterere y’ ubutaka zishingiye ku bipimofatizo bishobora gukurikizwa urugero: agace k’ amajyepfo</p>	
<p>Isobanukirwa rya tekhnike ryihariye Including: Uburebure bw’ imyobo Ibikoresho byo gutunganya pavoma Ibindi nkerwa [idari ibikuta n’ inzugi] ndetse n’ urungano</p>	
<p>Imikoreshereze(harimo imikorere no gusana) Harimo: Ubuhumekero, nta masazi ndetse tukaburinda amatungo Isuku (uko yakoreshwa) Kuburyo bwihariye Kwemerwa n’ umuco Ibipimongenderwa bw’ ibikorwa: uburyo bw’ imikoreshereze, uburyo bwo kuyividura,uburyo bwo gusukura,uburyo byo kuyitaho</p>	
<p>Ubusobanuro bw’ amagambo ajyanye n’ ubwiherero ajyanye n’ ubwiherero. urugero ubusobanuro bw’ amamwe mugambo akashyirwa ku buryo bw’ umwihariko.</p>	
<p>Iseengura ry’ ubwiherero risesuye aho ibipimongenderwa bwakurijwe. urugero: ibirimo bikorwa n’ imbogamizi zishoboka.</p>	

Ikibazo cya 2: Ni ibihe byiza byo kugira ubwiherero bukurikije ibipimo ngenderwaho ku miryango?

Ibisubizo 32 byatanzwe: Nyabuna **hitamo 10** muri byo ushira “Y” mu kazu kabugenewe.

Byorohereza ubwubatsi(abubatsi bakubaka badahuzagurika kuko baba bafite ibyo bareberaho badakurikije ibyabo)
Guteza imbere ubuzima bwiza (Kugira ingaruka nziza ku iterambere ry'ubukungu rirambye no kugabanya ubukene)
Guteza imbere ubwiherero bwo ku rwego rwo hejuru
Gufasha abaturage mw' inshungwa ry'imikoreshereze ry'ubutaka (urugero: ishyirwamubikorwa itegurwa ry' imiturire n' ibishushanyo mbonera)
Ev Buri wese afite igipimo ngenderwaho hashingiwe ku bushobozi bwe mu rwego rw'ubwiherero bwe
Kubuza abantu kwituma mubihuru
Gushyira ihuzwa hashingiwe imitere y' akarere(urugero: ubutaka, ibipimo by' amazi)
Kwemerera igenzura ry'itegeho zi gihungu no gukusanya amakuru (urugero: Ijanisha ry'abantu bageze kunengo zokubaka imisarane ifite ibipimo byagenwe)
Inyungu zo gukoresha neza igihe(urugero, iminsi mike)
Kugabanya imyuka mibi yangiza ikirere
Gushyiraho uburyo kubungabura umutekano mugihe ikoresheya(kuba ari umusarane ushobora kuramba kugirango urinde impanuka zawuturukaho)
Gutanga ubwiherero kuba yikoresheya
Gutanga ibipimo byemewe kuburyo mukubishyira mubikorwa bitazana amakimbirane hagati yabaturage na bagenzuzi cyangwa nabashinzwe ibyubuzima
Gutanga ubumenyi bungana kubabugenerwa(kugira ngo ibyo bumvise babikoresheye kubantu benshi)
Mu rwego rwo guhuza imikorere
Kuba imisarane yorohereza abayikoresheya (urugero.koroshya isukura, ikomeye kandi kuburyo bukwiye)
Guhamba ikurikizwa ry'ibikorwa by' isuku ihagije(ntihongere kubaho ibitarangwa n'isuku)
Gukangurira abantu gukora ibikorwa by'isuku
Gufatira ibihano abatazakurikiza ibipimo ngenderwaho.
Gutanga ubundi buryo bwo kwita ku myanda no kongera kuyibyaza umusaruro(by'umwihariko mu turere tw' imijyi)
Kwigisha abana isuku nokurwanya idwara
Guteza imbere ishoboka ry'uburyobw' ikoranabuhanga ritandukanye(harimo uburyo bwo gukaraba ibiganza).
Byongerera inononsora risesuye kandi rikomeza mu kugera ku iterambere ryo ku rwego rwo hejuru ibihe byose
Gutanga agaciro kubayikoresheya
Gushyigikira umuco wahindutse(kumenyera gukoresha imisarane ifite isuku)
Uburyo bworoshye bwokuyikoresheya kandi bubonekera abantu bose
Ntigomba kwanduza amasooko
Kwemerera abayikoresheya kuyibonaho inyungu nyinshi kuri buri koranabuhanga bitewe n'ubushobozi bwabo (ubushobozi bw'imitungo mu kubaka)
Kongeramo amakuru ava mu bushakashatsi bwakozwe n'ibyavuyemo kugirango bigirire umumaro abayikoresheya
Koroshya uburyo bwo guhugura abantu ku bikenewe(gutanga igikoresheho gifasha imyigire kurwego rwigihugu)
Korohereza itangwa ry'amahugurwa ku bubatsi ndetse nabatekinisiye
Gushyiraho uburyo bwo gusana n'ibikoresheho bisimbura ibishaje

Ikibazo cya 3: Nizihe mpamvu ngenderwaho zikwiye kuzirikanwa mu gushyiraho ibipimo nyabyo kumisarane yabaturage?

Ibisubizo 44 byatanzwe: Nyabuna **hitamo 10** muri byo ushira “Y” mu kazu kabugenewe.

• Ikoranabuhanga riciriritse
• Kuzirikana umuco gakondo(ubudehe,umuganda,umusanzu)
• Urugero rw’imitungo y’abaturage n’ubushobozi bwabo mugushora imari mumisarane
• Kurwanya isuri mu nkengeru z’imisarane
• Ubumenyi bw’isi(akarere.urugero:Amajyaruguru,Amajyepfo)
• Imijyenzo n’imiziro gakondo(bishingiye ku myemerere na kirazira by’umuco).
• Ihitamo n’imibonekere y’ibikoresho by’ubwubatsi mu gace
• Intera iri hagati y’umugarane n’inzu yo guturamo,igikoni n’amasoko y’amazi
• icyerekezo cy’umuryango w’umugarane (ntabwo ugomba gufungurirwa ahantu habantu bakunda kuba bari)
• Umwobo kuba wubakiye kandi wemerara gukishwamo umwanda mugihe bakeneye kuwusohora hanze
• Igitsina
• Abamugaye cg ab’intege nke. (abakuze ,abagore batwite,abana)
• Iboneka ry’ibikoresho byo gusimbura ibishaje.
• Abaturage nab’ubumenyi buciriritse bagomba kuba bafite ubushobozi bwo kuyiyubakira
• Igomba kuba ihendutse ugereranyije nimisarane isabwa.
• Igomba kuba:itanukaitagerwaho namasazinutundi dukoko kandi ikaba kure y’inyamaswa.
• Ntigomba kwanduza amasooko
• Umutekano n’umudendezo w’abayikoresha (ngenderwaho bishobora kurinda umugarane kugwa n’ibihe bibi by’ikerere).
• Amategeko agenga imyubakire mu Rwanda.
• Iboneka ry’abakozi babifitiye ubumenyi(abubatsi/abatekinisiye)mu karere kubakwamo imisarane.
• Kuba ishobora gukoreshwa igihe cyose nta mbogamizi
• Kuba ifite imyobo yimyunganizi ishobora kubika imyanda ndetse itava
• gukoresha ibikoresho bitangiza ibidukikije
• Ibipimo fatizo nnyakuzimu ugereranyije n’ibikoreshwa
• Ingano y’umugarane (hashingiye ku mubare w’abawukoresha).
• Imicungire n’isukura y’imisarane (ubumenyi nkenerwa ntibugomba kuba bwihariye).
• Imibonekere y’umugarane(ubuhaname,igishushanyo rusange)
• Uburambe bw’ibikoresho
• Ubusobanuro tekinike burambuye (e.g. slab composition, size of drop hole, type of platform, lining etc)
• Ubwiza bw’umugarane
• Imiterere y’akarere (ubutaka, iteganya gihe, ubutumburuke)
• Iboneka rya mazi
• icyiciro cy’ikibanza i.e. ikibanza kinini, igiciriritse n’igito
• Igomba kugera ku banyarwanda bingeri zose bishingiye ku mibereho yabo(Icyaro, imijyi, centre y’ubucuruzi)
• Uburyo bwo kuyibona (inzira zokubaka uwo musarane)
• Gushobora kubanza cyangwa guteza imbere agaciro k’imyanda yo mu musarane
• Kuramba (gukoreshwa igihe kirekire, gushobora kwimurirwa ahandi)
• Gushyira mu bikorwa ibipimo mu buryo bworoshye
• Ururimi ry’ibipimo biteguwemo (Kinyarwanda, gukoresha amagambo agoranye)
• Intera iri hagati yaho bobogereza intoki naho umugarane uri
• Uko abawukoresha bashobora kugira uruhare mugushyiraho ibipimo
• Ubushake bw’abantu kugirango bemere gukoresha ubwoko runana bw’imisarane y’ikoranabuhanga
• Uburyo bwo kumenyesha ibipimo (amatangazo, uburyo bwo ku menyesha abaturage)
• Kwemerera abangezuzi b’ubuzima gutanga amabwiriza hashingiye ku makuru yatangajwe

Expert Panel Questionnaire: THIRD ROUND

These two lists represent the most popular answers given in round two by the whole panel.

Question 1 has 9 responses: Please rank them 1-9 (1 being the most important and 9) being the least important).

Question 2 has 11 responses: Please rank them 1-11 (1 being the most important and 11 being the least important).

Responses in each list have been randomly ordered.

Thank you for your continuing participation in this research exercise. Your contributions are valued and greatly appreciated.

Question 1: What are the motivations for having standards for household latrines?

For ease of construction (technicians have a reference and do not have to make their own)	
Everyone has baseline standard depending on his capacity in relation to his latrine	
To ensure safety during use (durable latrines to prevent accidents due to collapse etc)	
Provides acceptable evaluation criteria that can be applied without bias by inspectors or health workers	
Provides a common understanding to all stakeholders (so they can be understood and used by many people)	
Ensures latrines are user friendly (e.g. easy to clean, comfortable, convenient)	
To ensure compliance with good hygienic practices (and stop unhygienic ones)	
Provides alternative options for waste treatment or recycling of wastes (especially in urban areas)	
To prevent contamination of water sources	

Question 2: What factors should be considered when setting standards for household latrines?

Affordability of Technology	
Traditional village norms and cultural taboos (for cultural acceptability and use)	
Choice and availability of construction materials in the area	
Distance from the household, nearest cooking area and water source	
Disability or impaired use (e.g. elderly people, pregnant women, children)	
It should be free from bad odours, inaccessible to insects, flies and animals	
It should not contaminate ground water	
Safety and protection of users (to prevent collapse and exposure of user to bad weather)	
Durability of materials	
Options for recycling or enhancing the value of wastes	
Ease of applying the standards	

IBIBAZO BIJYENEWE ITSINDA RY’ INARARIBONYE: IGICE CYA GATATU

Aya malisiti abiri aragaragaza ibisubizo byahuriweho cyane mu gusubizwa mu kicyiro cya kabiri

Ikibazo cya 1 gifite uburyo bwo gusubiza 9: subiza ikibazo wifashishije 1-9 (1

ikingirakamaro cyane na 9 igifite umumaro muke)

Ikibazo cya 2 gifite uburyo bwo gusubiza 11: subiza ikibazo wifashishije 1-11 (1

ikingirakamaro cyane na 11 gifite umumaro muke)

Ibisubizo muri buri cyiciro byashyizwe ku rutonde hakurikijwe tombora.

Murakoze ku bufatanye mudahwema kutugaragariza muri uyu mwitozo w’ ubushakashatsi. Umusanzu wanyu uhawe agaciro kandi turawushima cyane.

Ikibazo cya 1: Ni ibihe byiza byo kugira ubwiherero bukurikije ibipimo ngenderwaho ku miryango?

Byorohereza ubwubatsi (abubatsi bakubaka badahuzagurika kuko baba bafite ibyo bareberaho badakurikije ibyabo)	
Ev Buri wese afite igipimo ngenderwaho hashingiwe ku bushobozi bwe mu rwego rw’ubwiherero bwe	
Gushyiraho uburyo kubungabuga umutekano mugihe ikoreshwa(kuba ari umusarane ushobora kuramba kugirango urinde impanuka zawuturukaho)	
Gutanga ibipimo byemewe kuburyo mukubishyira mubikorwa bitazana amakimbirane hagati yabaturage na bagenzuzi cyangwa nabashinzwe ibyubuzima	
Gutanga ubumenyi bungana kubabugenerwa(kugira ngo ibyo bumvise babikoreshe kubantu benshi)	
Kuba imisarane yorohereza abayikoresha (urugero.koroshya isukura,ikomeye kandi kuburyo bukwiye)	
Guhamya ikurikizwa ry’ibikorwa by’ isuku ihagije(ntihongere kubaho ibitarangwa n’isuku)	
Gutanga ubundi buryo bwo kwita ku myanda no kongera kuyibyaza umusaruro(by’umwihariko mu turere tw’ imijyi)	
Ntigomba kwanduza amasooko	

Ikibazo cya 2: Nizihe mpamvu ngenderwaho zikwiye kuzirikanwa mu gushyiraho ibipimo nyabyo kumisarane yabaturage?

Ikoranabuhanga riciriritse	
Imijyenzo n’imiziro gakondo(bishingiye ku myemerere na kirazira by’umuco).	
Ihitamo n’imibonekere y’ibikoresho by’ubwubatsi mu gace	
Intera iri hagati y’umusarane n’inzu yo guturamo,igikoni n’amasoko y’amazi	
Abamugaye cg ab’intege nke. (abakuze ,abagore batwite,abana)	
Igomba kuba:itanukaitagerwaho namasazinutundi dukoko kandi ikaba kure y’inyamaswa.	
Ntigomba kwanduza amasooko	
Umutekano n’umudendezo w’abayikoresha (ngenderwaho bishobora kurinda umusarane kugwa n’ibihe bibi by’ikerere).	
Uburambe bw’ibikoresho	
Gushobora kubyaza cyangwa guteza imbere agaciro k’imyanda yo mu musarane	
Gushyira mu bikorwa ibipimo mu buryo bworoshye	

4. Results from SPSS

Round 3: Question 1

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Construction	20	4.250	2.2682	1.0	8.0
Baseline	20	3.000	2.2711	1.0	9.0
Safety	20	4.350	2.1343	1.0	9.0
Evaluation	20	5.200	2.5464	1.0	9.0
Understanding	20	4.850	2.6413	1.0	8.0
User_friendly	20	5.000	2.1521	2.0	9.0
Hygenic	20	4.150	2.3681	1.0	7.0
Recycling	20	7.100	2.1001	2.0	9.0
Contamination	20	7.100	2.1981	3.0	9.0

Kendall's W Test

Ranks

	Mean Rank
Construction	4.25
Baseline	3.00
Safety	4.35
Evaluation	5.20
Understanding	4.85
User_friendly	5.00
Hygenic	4.15
Recycling	7.10
Contamination	7.10

Test Statistics

N	20
Kendall's W ^a	.243
Chi-Square	38.907
df	8
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Round 3: Question 2

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Affordability	19	2.3158	1.91638	1.00	6.00
Trad_norms	19	8.1579	3.33772	2.00	11.00
Materials	19	4.5263	2.96963	1.00	10.00
Distance	19	5.3158	2.88776	1.00	11.00
Disability	19	6.0526	2.17239	3.00	9.00
No_odours	19	6.0526	2.09427	3.00	10.00
Water	19	6.4211	2.79515	1.00	10.00
Safety	19	5.9474	2.83772	1.00	10.00
Durability	19	6.1579	2.14121	2.00	9.00
Recycling	19	8.5789	2.73487	1.00	11.00
Application	19	6.4737	4.19482	1.00	11.00

Kendall's W Test

Ranks

	Mean Rank
Affordability	2.32
Trad_norms	8.16
Materials	4.53
Distance	5.32
Disability	6.05
No_odours	6.05
Water	6.42
Safety	5.95
Durability	6.16
Recycling	8.58
Application	6.47

Test Statistics

N	19
Kendall's W ^a	.254
Chi-Square	48.287
df	10
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

5. Node list from NVIVO

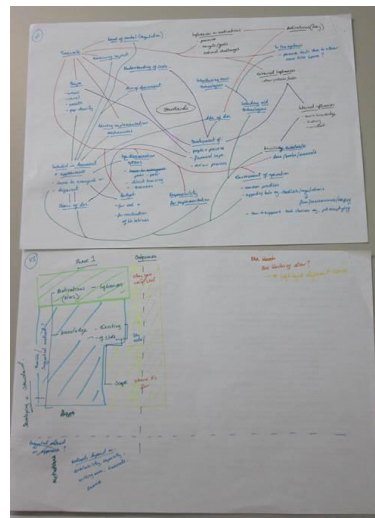
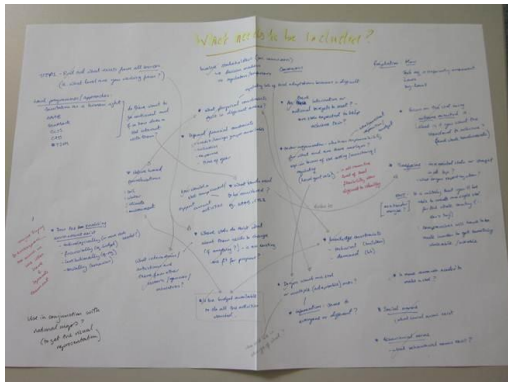
Name	Sources	References
Current Situation	0	0
Accepting technologies	0	0
Cultural influences	8	10
Favoured designs	11	13
Awareness and sensitisation approaches	8	13
Before introduction of the Guidelines	9	11
Types of documentation currently used	12	15
Current practices in households	9	18
Building practices	10	21
Types of latrine in use	10	13
Latrine construction	0	0
Actual costs and options for financing	7	14
Assessing quality of built latrines	2	2
Responsibility for quality of latrine	7	10
Challenges for building a latrine	0	0
Access to materials	18	25
Re-use of materials	2	2
Design problems	6	6
Variations in technologies	5	5
Finances or cost	10	12
High water table	5	5
Lack of space	6	9
Lack of understanding	7	7
Soil	10	17
Willingness to build a latrine	7	8
Challenges for managing a latrine	4	5
Current standards	7	9
Monitoring latrines	4	6
Monitoring latrine construction	4	6
Penalties applied	5	5
Supporting vulnerable families	4	4
Training of CHW	4	4
Training of masons	4	7
Training of villages or communities	8	14
Descriptive nodes	0	0
Descriptive development of a standard	1	9
Descriptive Development of the guideline	6	10
Descriptive Historical references	4	6
Descriptive how standards are understood outside	2	6

Name	Sources	References
Descriptive Institutional arrangement	1	1
Descriptive Project	0	0
Boundless and WFP	3	4
Care	1	4
COFORWA	2	3
Ecosol	1	1
FEA	1	1
JICA	1	1
PEPAPS	2	4
PNEAR	1	6
RWASEF	1	1
WASH	4	7
Descriptive Regulating a standard	1	3
Descriptive Training of EHOs	3	5
Sector stakeholders	0	0
Districts	1	1
Government	1	3
NGOs	1	1
Private sector	0	0
Encouraging private sector participation	5	7
Private sector involvement in public latrines	4	4
Design or style of the guidelines	0	0
Information in the guidelines	0	0
Contents of guidelines	11	21
Geographically specific	4	7
Innovation and new technologies	0	0
Innovation	3	5
Introduction of new technologies	6	8
Testing of technologies (old and new)	12	19
Language used	2	4
Users of guidelines	3	8
What should it look like	7	10
Developing guidelines or standards	0	0
External influences	5	7
Flexibility of the Guidelines	13	19
Further or future anticipated development of the gui	8	11
How standards are understood	7	14
Influences of the guidelines	0	0
On Innovation	1	2
on national planning	9	13
On the private sector	5	5

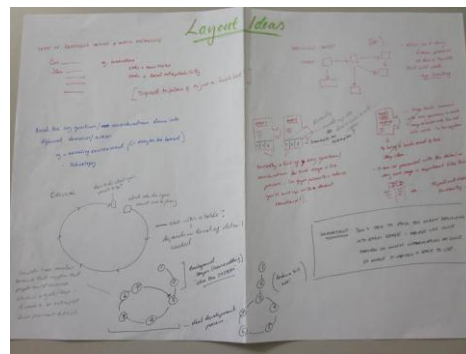
Name	Sources	References
Motivation for having guidelines	7	8
Comparability for M&E	2	2
Environmental considerations	2	2
Give basic requirements	2	2
Public health	1	1
Support construction of latrines	4	4
People involved in setting standards	3	4
Role of a standard	2	6
Willingness to have a standard	5	6
Factors to consider when building latrines	0	0
Environment	2	2
Financial influences	0	0
Household capacity	13	16
New approaches for accessing finance	4	6
Inclusiveness	5	6
Influence of international targets	2	2
Stakeholder desires for tech types	1	1
Ecosan	10	19
Sustainability	3	3
Systems considerations	4	5
Urban and rural differences	5	13
Implementing the guidelines	0	0
Challenges for implementation	0	0
lack of empowerment	1	1
lack of willingness to invest	1	1
not accepting new technologies	3	3
Scale of dissemination needed	4	5
Enforcement of guidelines	10	14
Monitoring use of guidelines	10	13
Process of dissemination	0	0
Existing channels or current approaches	6	8
Meetings and trainings	5	9
Key people to target	0	0
Communities	6	9
Peer to peer learning	1	6
Community Health Workers	6	7
Local government	2	2
New suggestions	2	3
Organisations assisting with dissemination	5	9

Name	Sources	References
Role of the guidelines	0	0
Assist in data collection	4	4
Building knowledge	2	4
Provide information to people	4	5
Community empowerment	6	8
Formalising knowledge	9	11
Help people to construct latrines	3	4
Improve quality	3	4
Improve sanitation	2	2
Improve use of materials	1	2
Promote construction of hygienic latrines	1	1
Provide a basis for M&E	6	8
Providing a minimum standard	3	3
Sector co-ordination	4	5
Teaching or training tool	8	9
to create a common understanding	8	12

6. Development of the Decision Process



Two photographs showing the initial brainstorming for the decision process (Photo: Author, 2014)



Two photographs showing the continuing development of the decision process (Photo: Author, 2014)

Rationale behind each of the questions in the decision process

Step	Question	Reasoning behind the question
One	What are the goals for latrine use in the short/medium/long term?	To identify if these goals require specific standards or types of standard to be set
	Identify all key stakeholders	To make sure that all interested parties are included in the process
	Identify what information already exists (both tacit and documented)	To avoid duplication. It also highlights current practices that might need to be changes which points to the types of information that could be needed in the standard
	What are the problems with the current situation?	Points to the problems that a standard can help solve
	Will any new approaches related to household latrines be adopted in the immediate future? (e.g. CLTS, CATS, SanMark)	To make sure that developing a standard is compatible with the approaches used and will not act as a constraint
Two	Identify the need that the standard will meet	These are the two most critical questions to answer because the rest of the development process is entirely based on the responses.
	Identify what role the standard will play	
Three	Is the standard technically based or service based?	This points to the type of information that will be included
	Who is expected to use the standard?	This points to the type of information that will be included because the information included should be based on what the users are expected to do once they know about the standard
	Where is the standard expected to be used?	To consider if the standard will be applicable everywhere or just in specified locations
	Will the standard be incremental or not?	To establish if the standard is seen as part of a staggered process or as a one off exercise.
	Does the standard represent a significant change in existing practices or norms?	If yes – then these needs to be considered when establishing the timescale for development and implementation
	What is the anticipated timescale for development and implementation?	To consider if the timescale is realistic given the starting situation (e.g. if the standard requires a significant change in behavioural or social norms)
	Is the standard voluntary or mandatory?	To identify if regulation will be necessary or not
	Does the standard need to cover every aspect of a latrine or just parts of it?	To consider if the standard has to apply to the whole latrine as a complete item or whether there are some components which should be given a higher priority over others, for example, focusing on the structure of the pit rather than the superstructure

Four	Is the standard one of many or the only one?	If the standard is one of many there must be no contradictions with the other standards
	Who is responsible for enforcing the standard?	To highlight the importance that whoever has the responsibility for enforcing the standard must also have the capacity to do it otherwise enforcement is not realistic.
	How will the standard be made into a regulation	This may be subject to national processes which are beyond the control of the standard development committee.
	How will innovations be addressed	To consider what happens if new innovations are identified and build that into the process rather than dealing with it when it happens. If no allowances are made then innovations cannot work.
	Are local adaptations allowable?	To consider where a standard will be used and what level of flexibility exists.
	Are some elements of the standard flexible?	
Five	If new technologies are presented does the supporting system exist	To highlight there is no point introducing a technology for which the supporting environment does not exist because it will not be used.
	Will all users be given the same information or will it be tailored for each?	To highlight that not all users want or need the same type of information and the more useable the information is the more people will use it
	How can the information be presented and communicated? And What approaches/channels already exist?	To consider what already works and use the same approach rather than designing a new one which requires time and resources
	Who has responsibility for dissemination	To highlight that dissemination needs both capacity and budget for it to be successful
	Who has overall responsibility for implementing the standard?	To highlight that there must be a lead organisation
	When will the standard be reviewed?	Standards are part of an ongoing process and should be reviewed but this needs to be accounted for in planning and budgeting
	Will the implementation be monitored?	To highlight that monitoring needs resources and a budget.

7. Some example photographs of latrines found during the fieldwork in Rwanda, 2012



Two views of a latrine that is no longer used in the Southern Province (Photo: Author, Rwanda, 2012)



Two views of the replacement semi-ecosan latrine built with support from an NGO (Photo: Author, Rwanda, 2012)



Two views of a double vault ecosan latrine built by and NGO in the western province (Photo: Author, Rwanda, 2012)