Sustainable Sanitation in Rural Tanzania; Its Measurement and Determinants at Village level

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The work presented in this thesis is that of the candidate. All other cited material has been duly acknowledged and referenced in the appropriate way.

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Abstract

The main aims of this study were to "develop and test a classification system for sustained village sanitation uptake" and to "identify and confirm which village-level factors influence the sustained uptake of latrines". Household survey data are generally considered to be more reliable than administrative data, and in order to monitor development and identify the needs of specific locations, there is a need to be able to obtain data at a neighbourhood level rather than district or ward level. The data collection strategy developed for Phase 1 enabled household data to be collected by each village for all households, rather than a small sample, with minimal instruction from District Government staff. These data were entered onto computer and combined to generate village sanitation profiles. Individual village sanitation profile graphs (latrine acquisition curves (Smith 1988)) were produced and adding trend lines to these demonstrated that both individual village sanitation coverage levels and the rates of change of coverage could be easily quantified and thus compared. Categories of high, medium and low coverage were established and rates of change in sanitation coverage were observed to be falling, rising or constant. Combining these village sanitation characteristics led to the proposed village classification system for sustainability. Each village was duly classified as having sustained, intermediate or unsustained sanitation.

The perspective of villagers, village leaders, District Government and WaterAid staff were sought and combined to formulate a list of factors perceived to influence local sanitation uptake. The sustainability classification system enabled the subsequent testing of these factors in both sustained and unsustained sanitation villages to confirm which factors proved to be statistically significant. Both physical and social factors proved to be significant for sustainable sanitation though only the social factors were seen to have the potential for influence or change.

The key findings were:

- Villages were able to successfully collect their own historical household sanitation data with minimal input from District Government staff.
- The greatest increase in overall District sanitation coverage would result from enabling those villages classified as having intermediate or unsustained sanitation to reach their individual village MDG targets.
- Replacing full/collapsed latrines is happening across the study area but not always straight away.
- Sharing of household latrines between two or more households is commonplace.
- Physical determinants of sustained sanitation relate to village size/status, housing density/spread, level of infrastructure, remoteness of services, distance to an urban centre, and level of bush cover within the village.
- Social determinants of sustained sanitation relate to the quality of village leadership, level of activity of the Village Health Committee, openness of local people to new ideas, education level of village, exposure to more than one sanitation intervention.

Acknowledgements

The research, which has resulted in the production of this thesis, has been made possible by the invaluable contributions of so many people. I will try to list those whose input has been critical throughout, but I am aware that there have been so many others along the way, whose input at that specific time was no less significant. Therefore, I would like to thank all those who have collaborated with me in this work, whether your name appears in writing below or not.

Firstly, I would like to thank my wife Isobel for encouraging me to formalise my sanitation promotion experience in this way. The past years have seen many journeys to and from airports as I returned to Africa yet again. Isobel, and our children Kirsty, Gilly and David, have put up with my travelling and associated absences. Even while at home, I have often been hidden away behind a computer. Without their support and encouragement, I could not have made it to the end. Thank you all for believing in me.

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WaterAid staff have helped to give this research particular direction. I initially met Vicky Blagborough at a conference in 2002. Following various meetings with her in the WaterAid London office, she put me in touch with Dave Mather, then WaterAid Country Representative for Tanzania. He invited me to visit the Dodoma office and to consider basing my research in that region. Musa Mpinga was the Dodoma programme manager who graciously added my needs to his extensive workload, and duly introduced me to the various members of District Government staff whom I needed to contact. He facilitated and provided insight for my many visits, and has been an invaluable asset throughout. Dominick de Waal coordinated the collection of

programme reports, which were vital in the formulation of chapter 4. Vivienne Abbott, the current Country Representative for Tanzania, and her staff in the Dar es Salaam office have supported the research over the years, given time, and input to the factors influencing sanitation as mentioned in chapter 5. I should like to acknowledge the particular support of all the WaterAid staff in Dodoma who have made room for me and allowed me to feel an integral part of their office for the past six years.

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The following served as research assistants and data entry clerks during the various phases of the study. Obadia Zerubabeli was the research assistant for Phase 1, and the data gathered during that phase was entered onto computer by Mwende Senyagwa, and Beatrice Mcharo. Semu Nassari facilitated all the meetings and interviews for the remaining phases while Gloria Ambroce and Augustino Rukeha recorded the responses for Phase 1½, and Joseph Malolwe and Oliver Mbise did the recording during Phase 2. Each of these fulfilled a vital role for this research and I am indebted to them in a way that this paragraph could never sufficiently describe.

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List of abbreviations

AEW	Agricultural Extension Worker
CLTS	Community Led Total Sanitation
DG	District Government
DHO	District Health Officer
DLST	Dissemination of Low-cost Sanitation Technologies
DPLST	Demonstration Project on Low-cost Sanitation in Tanzania
DWSP	Domestic Water Supply Programme
FGI	Focus Group Interview
GIS	Geographical Information Systems
GoT	Government of Tanzania
GWSSA	Global Water Supply and Sanitation Assessment
GWT	Ground Water Table
H/hld	Household
HESAWA	Health through Sanitation and Water
HRD	Human Resource Development
JMP	Joint Monitoring Programme
MAMADO	Local non-government organisation in Dodoma
MDG	Millennium Development Goal
MoH	Ministry of Health
NGO	Non-Government Organisation
PHAST	Participatory Hygiene And Sanitation Transformation
SM	Sanitation Marketing
TBA	Traditional Birth Attendant
TH	Traditional Healer
Tsh	Tanzanian shillings
UN	United Nations
Unicef	United Nations Children's Fund
VC	Village Chairperson
VEO	Village Executive Officer
VERC	Village Education Resource Centre
VG	Village Government
VHC	Village Health Committee
VHP	Village Health Post
VHW	Village Health Worker
VIP	Ventillated Improved Pit (latrine)
WA	WaterAid
WAMMA	Collaboration of departments of Water, Health & Community Development
WEC	Ward Education Coordinator
WEO	Ward Executive Officer

WG	Ward Government
WHO	World Health Organisation
WSP	Water and Sanitation Program (World Bank)
WSSCC	Water Supply and Sanitation Collaborative Council

1 Introduction and background

1.1 Introduction

A press release from the United Nations (UN) in New York on the 22nd July 2004 (U. N. 2004) contained the following quote from the Secretary-General, Kofi Annan to his Advisory Board on Water and Sanitation:

> ***"Today, one person in six will drink unclean water. One person in three will not have access to proper sanitation. And around 10,000 people will die today as a result of this preventable situation. That is unacceptable. The world has recognized that it is unacceptable. And it has also recognized that if we don't address water and sanitation issues, we can't have effective development strategies. That's why commitments were made in the Millennium Declaration in 2000, and at Johannesburg in 2002. The commitments were to halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation..."***

Faecal-oral disease, which includes diarrhoeal diseases, is only one of several disease categories influenced by sanitation or essentially the lack of sanitation (Esrey, Potash et al. 1991; Cairncross and Feachem 1993). Diarrhoeal disease alone leads to the death of 1.8 million people a year (WHO 2004), i.e. more than 4,900 per day, 205 every hour, 3.4 people each minute, or one person dying every 17.5 seconds. Over 100 infections can be transferred between people by direct or indirect routes involving excreta, one gramme of which can contain 10,000,000 viruses, 1,000,000 bacteria, 1,000 parasite cysts, and 100 parasite eggs (WSSCC 2004).

During the 1970s, it was thought that since diarrhoea was caused by ingesting polluted water, the emphasis should be to provide access to better water supplies. Water supplies also were easier to market in the political arena where politicians could actively promote their interest in clean water. The water problem has been, and continues to be addressed, although the resulting reduction in disease has been less than initially expected. More recently, the role of hand-washing and good hygiene behaviour was also shown to have a great potential to reduce disease transmission (Curtis and Cairncross 2003). Sanitation is the third but no less important weapon in the war against preventable faecal-oral disease. Moraes et al from their study in Brazil found that households with a toilet experienced fewer than 50% of diarrhoeal incidence compared with those without a toilet (Moraes, Cancio et al. 2003). In 1994, Esrey showed that improving sanitation produced a greater reduction in diarrhoeal disease than improved water quality, greater water quantity or improved hygiene (Esrey 1994). Indeed, the installation of an "improved" toilet has been shown to reduce the diarrhoeal infections by an average of 32% (Fewtrell, Kauffmann et al. 2005). The same study showed that an improved water supply had the effect of reducing incidence by only 6% - although this figure would be higher if outbreaks of cholera were to be included. Cholera, however, would not enter the water supply if there were adequate sanitation measures. In 1993, WHO health specialists reviewed the evidence linking interventions with improved health and rated safe excreta disposal above volume of water for

hygiene and with water quality coming in third place (Evans 2005). This finding confirmed the results of the earlier work of Esrey et al (Esrey, Potash et al. 1991) and remains the current understanding of public health (Black and Fawcett 2008). The British Medical Journal held an on-line poll in January 2007, where sanitation was voted as the most important medical advance since 1840 followed by antibiotics, anaesthesia and vaccines (BMJ 2007; Godlee 2007).

The importance of sanitation has been increasingly recognised over the last few decades and has finally made it onto the political agenda. During the World Summit on Sustainable Development 2002 in Johannesburg, sanitation was added as a target to the Millennium Development Goals(MDGs) (U. N. 2002). To halve the number of households currently without acceptable sanitation by 2015, will require a major increase in the number of latrines currently in existence. The 2006 Human Development Report states the following:

> ***"Just reaching the Millennium Development Goal target of halving the global deficit against the 1990 coverage level would require bringing improved sanitation to more than 120 million people every year between now and 2015. And even if that were accomplished, 1.8 billion people would still be without access."***
>
> (UNDP 2006)

Fear and embarrassment place women at a particular disadvantage when it comes to sanitation. Women can be liable to attack or sexual assault when seeking a place for open defecation. In 1996, Kurup et al reported that in Kerala some women will only go out to urinate or defecate under the cover of darkness and even try to adjust their diet accordingly (Kurup 1996). This has the potential to result in all kinds of health problems such as urinary tract infections. Girls will often stop attending school after the onset of menstruation if their schools do not have segregated toilets (Van der Gaag 2007) – and especially if they have no toilet at all. This means that in many cases their education can be limited. Women have primary responsibility for managing their households but often have no voice when it comes to decision making. In an attempt to recognise and address some of these issues, gender balanced water resources and sanitation management activities are being promoted, for example by the IRC (Van Wijk-Sijbesma 1998).

Sanitation has been recognised as being important for health, but over recent years it has also been acknowledged as contributing to improved living environment, human dignity, improved education outcomes and poverty reduction. Indeed, sanitation and hygiene are purported to have an influence on all of the eight Millennium Development Goals (Mehta and Knapp 2004). Despite this understanding, in 2004, 2.6 billion people were still without access to any form of acceptable toilet (WHO/Unicef JMP 2004b) and four years later the same statistic is still considered to be current (Black and Fawcett 2008). Progress towards the MDG sanitation target has been slow and while at current rates of progress it may be possible to reach the MDG water target by 2015, the sanitation target is likely to be missed by some 500,000,000 people (WHO/Unicef JMP 2006). The 2006 HDR suggests that the 2015 target may not actually be

realised in Sub-Saharan Africa until 2076 (UNDP 2006). Having recognised the scale and impact of the sanitation situation, the General Assembly of the UN decided in December 2006 to declare 2008 as the International Year of Sanitation (U. N. 2006) in an attempt to raise the profile and awareness of the importance of sanitation and to attempt to promote action at all levels. To help support efforts towards enabling larger numbers of poor people to achieve sustained sanitation, the Water Supply & Sanitation Collaborative Council (WSSCC) launched the Global Sanitation Fund on the 14th March 2008 (WSSCC 2008).

While the scope of the sanitation situation has been assessed and has made it onto the political agenda, the situation is generally reported on a country-wide basis without reference to localised variations. Thus, while the MDGs and their associated targets have been identified and accepted internationally, there remains no specific strategy to address the problem or to recognise which areas are of greatest need on a more local basis. Latrines are likely to be more prevalent in some villages than others (even within the same district), and the reasons for this variation are also likely to be diverse as different factors will motivate different households (Jenkins 1999; Black and Fawcett 2008). During the 1960s, a study was conducted to assess domestic water use in Kenya, Tanzania and Uganda (White, Bradley et al. 1972). Thirty tears later, this earlier study was repeated in an attempt to note any changes over the period (Thompson, Porras et al. 2001; Mujwahuzi 2002; Tumwine 2002; Katui-Katua 2004). Many lessons have been learned as a result of this exercise and it continues to provide valuable insights in regards water supply. Unfortunately, no such multi-country study has yet been conducted with regard to sanitation and there remain many unknowns and assumptions.

When a sanitation programme is found to be successful in one locality, it does not automatically follow that every aspect of that programme or approach will be replicable in every or any other community with identical results. Communities, cultures and traditions vary even within a region, not to mention internationally, though there may be commonalities of approach which could be considered. The weakest link in current sanitation programmes is an understanding of how to stimulate a significant increase in demand and promote sustained uptake. The need for clean water is easily recognised at community level, but this is not the typical case with toilets. The "etic" motivation of sanitation planners (i.e. external to the respective villages and potential users) to implement sanitation promotion programmes is traditionally health based. However, the "emic" motivation of the rural community or household (i.e. the internal perspective of the actual villages/households/users) to construct and use such facilities is more predicated on personal perception issues, e.g. dignity, safety, and prestige (Jenkins 1999). Sanitation interventions are not likely to see sustained uptake if user preferences and perceptions are ignored.

Traditionally, programmes have been somewhat "top-down" in their approach i.e. devised, guided and applied by external agencies. A variety of such approaches to water supply are

discussed by Therkildsen in his research "Watering white elephants?" (Therkildsen 1988). Many such interventions have provided hardware subsidies to encourage people to build latrines (see chapter 4 of this thesis). More recently, however, subsidies have been increasingly thought to have a negative or limiting effect since such handouts may be likely to increase dependence and reduce dignity for beneficiaries who may not be able to replace their latrine in due course without a further subsidy. Some current sanitation programmes have adopted a more "bottom-up" participatory approach which is perceived to enhance ownership, dignity and longer term sustainability. Two examples of this more recent type of approach are: *Sanitation Marketing (SM)*; and *Community Led Total Sanitation (CLTS)*.

Sanitation Marketing (or the social marketing of sanitation) is promoted as an attempt to accelerate both sustainable demand and supply for sanitation. The marketing principle *recognises the 4 "Ps" of Product; Price; Place; and Promotion with regard to a community:*

1. a sanitation product (latrine) built from locally available materials which households want and have chosen – as opposed to one which someone from outside their community says they should have.
2. at a price they can afford and are willing to pay – as opposed to receiving a subsidy or a handout which may or may not be available when they need to replace it.
3. available in the right place i.e. at people's own homes regardless of where they live in the village/town
4. people have become aware of the opportunity to have such a toilet through the promotion of the product within their area

Significant progress in sanitation uptake has been noted where private suppliers have supplied the needs of individual households (i.e. the market). Thus, sanitation marketing is seen to be the sustainable approach to meeting the need for sanitation through supporting that market. Marketing is reported to have had some significant success in changing the behaviour of people as they recognise the direct personal benefits (Cairncross 2004; Jenkins and Sugden 2006).

Community-led total sanitation (CLTS) is an approach that aims to enable local communities to analyse their own environmental sanitation conditions and initiate collective local actions to build and use latrines, without the need for external subsidies. It was originally pioneered in Bangladesh in 1999 by WaterAid and their partner organisation VERC (Village Education Resource Centre) (VERC 2002; Ahmed 2006), and has since been introduced in at least 19 other countries in Asia, Africa, Latin America and the Middle East (Kar and Chambers 2008) with some degree of success reported. What appears vital to CLTS is the attitude and approach of the facilitator. Using a participatory analysis of the sanitation situation within the community, the facilitator's objective is to stimulate a collective sense of disgust and shame among community members as they face up to the crude facts about mass open defecation.

The intention is to trigger a realisation among the community members that they each need to change their own habits and behaviour(Kar 2003; Kar and Pasteur 2005).

The above approaches may be considered to be "participatory" since they can be seen to engage the local population in the process. However, they may still be initiated by an agent who is external to the community. There are currently very few accounts of consumer perspectives of what they want or can do with regard to sanitation. Greater understanding is urgently needed to bring together the priorities of rural communities with that which sanitation programme implementers can/should provide. The initial success of the CLTS approach recognises the likelihood that some of the key determinants of sanitation uptake may act at village or community level, and this is supported in other research by Jenkins (section 1.2.1) and Bostoen (Jenkins 1999; Bostoen 2004). This study is designed to examine factors which act at that level, explore the issues surrounding rural sanitation uptake, sustainability and to inform and strengthen the weakest link.

1.2 Background

Reporting on sanitation uptake and coverage can be complicated as different organisations may apply different standards to what they will or will not count as an acceptable toilet. Even the WHO/Unicef JMP altered their definition of an "improved" latrine from 2003 to 2004 (U. N. 2003; WHO/Unicef JMP 2004a) (see later in 3.12 and also table 4.3). Care must be taken to understand the criteria behind particular statistics as one cannot automatically chart sanitation progress by comparing coverage statistics from different (or sometimes even the same) sources over time. This also has the effect of making it difficult to obtain baseline statistics for sanitation interventions and maintaining the same criteria for subsequent evaluation (especially if the statistics come from different sources). Thus a tool is needed which can enable sanitation coverage to be assessed in a consistent and coherent way even where baseline data may be missing.

Sustainability in the field of sanitation is usually regarded in the future tense as a goal or target to be aimed at and is typically referred to in this way in programme documentation. Current trends or approaches to promoting sanitation may refer to their strategy to achieve long-term sustainability (e.g. SM (Cairncross 2004) and CLTS (Kar 2003)). This thesis begins by attempting to find where sanitation uptake has already been sustained and asking what has led to that sustainability.

1.2.1 Jenkins' research on household factors

In her 1999 PhD thesis, Mimi Jenkins examined the decision of private households to install a pit latrine in rural Benin (Jenkins 1999). Her results support:

1. Individuals need of adequate motivation in order to decide for latrine adoption.

2. Motivation is strongly influenced by differences in individual lifestyle and village environment.
3. Individual choice is limited/influenced by the weight of constraints acting for/against it.

Motivational factors, such as prestige, dignity and safety, and the lifestyles of individuals, such as occupation, mobility, education and wealth, as well as positive and negative constraints on sanitation choice are set against the backdrop or environment of the village in which each homestead is located. If so, this would mean that similar households in different village settings would potentially respond in a variety of ways to the same level of sanitation promotion.

1.2.2 Personal observations

Prior to beginning this study, the Researcher had the privilege to work in the field of sanitation promotion in nine African nations between 1991 and 2000. As in 1.2.1, a perception/observation from this time was that some villages did appear more ready to adopt the concept of hygiene and sanitation than others. Different villages participating in the same programme with identical training can provide a range of results (table 1.1). The table shows the numbers of new household latrines constructed following a small-scale sanitation intervention in Togo. The researcher, who conducted the evaluation, visited all villages and personally inspected each latrine to confirm the status. Unfortunately, no data were received on the relative sizes of the villages so the comparisons may not be considered as relative nor could they be calculated as percentages of household latrine coverage. In this instance, the tabulated results are only intended to demonstrate a variety in numbers of latrines constructed following the same level of inputs and over the same period of time.

Table 1.1 Household latrines constructed in Togo, West Africa, 1 year post intervention

Village	Number of latrines at each stage of construction				*Village totals*
	99%-100% complete	*approx 85% complete*	*<50% complete*	*Scheduled for future*	
Zogbepime	9				9
Baka Kope	7				7
Yope	5			2	7
Todome	4				4
Badja	3	1			4
Ati Apedokoe	2	2			4
Ando Yoto	2	1	1		4
Tsiviepe	2	1			3
Ando Bedo	1	2			3
Agbessia	1		2		3
Avazikope	0	3			3
Dzegbakonji	2				2
Ati Atovou	1				1
Nyamessiva	0	1			1
Agouja Badja	0		1		1
Atti Touvi	0		1		1
Totals:	39	23	5	2	69

Source: (McCubbin 1998)

The above table displays the variation in response by 16 villages, which participated in the same sanitation intervention. The number of completed latrines ranged from zero to nine with a median value of two per village. The four villages that had failed to complete any latrines had all started well but somehow failed to maintain momentum and given up. Two of these villages had only started to build their first latrine, and had been able to dig and line the pit and construct a concrete floor slab before construction stopped. The remaining two villages took the latrine construction up to almost roof level but also stopped before completion. At the same time, three villages had been able to respond much better to the programme with between five and nine latrines built over the same period. The village with five new latrines reported that two more were also about to be started.

While the above numbers are not large, they demonstrate in a simple way that the idea of having a latrine may be easier for households in some villages than others. On visiting these villages, a number of possible reasons for the differences began to emerge. Some chiefs/

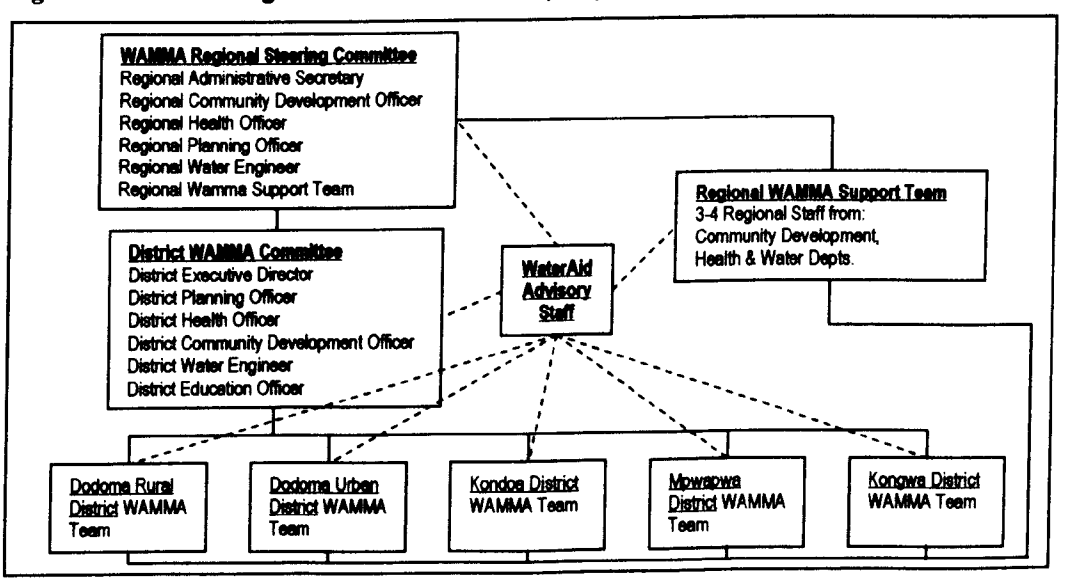
leaders appeared very industrious while others were less interested - and sometimes drunk. None of the villages were particularly wealthy and only one showed any tangible characteristic standing out from the rest, exemplified by the presence of a two-storey mud hut (unique in that area). That village had demonstrated a degree of initiative and responded well to the programme in that it had built and was utilising nine latrines, since the time of the programme.

A discussion of these and other sanitation programme experiences with WaterAid (WA) staff in London – particularly with Vicky Blagborough in 2002 – resulted in some email correspondence with Dave Mather the then WA Country Representative for Tanzania, and a subsequent invitation to visit his office in Dodoma where WA had been operating since 1983. A brief visit in February 2003 led to an invitation to consider basing the fieldwork for this research in the Dodoma region of Tanzania, using the WA Dodoma office as a base.

1.3 *Introduction to WAMMA*

WaterAid's involvement in Tanzania began in 1983 in the Dodoma Region and continued throughout the 1990s in a collaboration known as WAMMA between WaterAid and the Local Government departments of Maji (Water), Maendeleo ya Jamii (Community Development) and Afya (Health). These are the three main government departments with responsibility for water supply, sanitation and hygiene promotion. During the early days of WAMMA WaterAid were more proactive, although their involvement has been scaled back over recent years and has now become more in an advisory capacity (see Fig 1.1). WAMMA teams have been recognised to play an important role in water supply and sanitation development throughout the Dodoma region (Jarman and Johnson 1997; Citinka, Mathew et al. 2005)and the team members have worked alongside villagers to facilitate successful water and sanitation outcomes. It is thus anticipated that any study of village sanitation would benefit from the knowledge and insight of WAMMA members and their relationship with the villages included in the study.

Figure 1.1 Dodoma Region WAMMA Structure (adapted from Jarman and Johnson 1997)



1.4 Research objectives

Objective 1:

Develop and test a classification system for sustained village sanitation uptake

Objective 2:

Identify and confirm which village-level factors influence the sustained uptake of latrines

Objective 1 will be addressed during Phase 1, and Objective 2 will be addressed during Phase 1½ and Phase 2 as laid out below:

1.4.1 Phase 1:

1. Generate village sanitation profiles
    - Working with District Government staff to develop and test a simple tool to record sanitation uptake at village level. This tool should be implemented by existing local village authorities with minimal guidance from District Government and no external agency involvement
2. Define sustained sanitation at village level
    - Using the sanitation profiles generated by the above exercise
3. Classify the above villages according to sustainability of sanitation uptake/demand/ coverage
4. Explore sampling strategies for possible use in future village assessments

1.4.2 Phase $1^1/_2$:

5. Review past sanitation interventions in Tanzania and identify programme differences and results
    - Conduct a desk study of intervention reports
6. Identify potential sanitation uptake factors to be studied in depth during Phase 2
    - Carry out individual and focus group interviews with latrine adopters and non-adopters; meetings with village governments; input from District Government staff; and input from WaterAid Tanzania

1.4.3 Phase 2:

7. Test various factors to confirm if they have influenced village latrine uptake
    - Conduct key informant interviews with ward-level leaders to rate sustained and unsustained sanitation villages according to the factors and indicators selected
    - Analyse the results to confirm which factors correlate to sustained/ unsustained latrine coverage

1.5 Assumptions

To facilitate a comparison of village level factors assumes the following:

1. Household heads can remember the year that their house was built and when they have & have not had their own household latrine,
2. Villages will be able to gather their own historical sanitation data from each household.
3. Sanitation profile graphs can be plotted from the data provided by each participating village.
4. Villages included in the study can be classified with respect to sustained/ unsustained latrine uptake.
5. Sufficient villages with a variety of sanitation uptake levels can be identified and are willing to take part in the study.
6. Influencing factors can be identified and measurable indicators developed for comparison across villages.
7. There is sufficient variability of indicators, and sufficient numbers of villages with measurable factors in each village classification to facilitate meaningful analysis of the above factors.

1.6 Study design

Table 1.2 Study design layout

Study design layout	Phase 1	Phase 1½	Phase 2
Sample of villages (type & size)	Exhaustive, all 128 villages in the district	Purposive sampling, four villages	Purposive sampling, 16 villages
Individuals (how many, how chosen)	All household heads, all Village Executive Officers plus any additional assistance as appointed by village leaders	Village government members and three groups of eight people (mens' group, womens' group and young adults' group); groups include those with and those without a toilet, as invited by VG.	Ward-level personnel: Executive Officer, Education Coordinator, Agricultural Extension Officer (or alternative) 24 people in total - three people for each of eight wards to assess two villages from each ward
Data collected	Retrospective household sanitation coverage 1960-2004, Village information: sub-villages; size; wealth; services; infrastructure	Local perception of latrines and sanitation promotion; identification of sustainability factors to be assessed during Phase 2	Rate each of the factors identified during Phase 1½ for each of the 16 villages in sample
Methodology	Household survey, village government questionnaire	Meetings, group interviews, individual interviews (17 total)	Key-informant interviews (24 total)
Data collectors	Village government (trained by WAMMA members) and other village personnel as required by VG	Researcher, facilitator, two data recorders	Researcher, facilitator, two data recorders

1.7 Chapter layout

Phase 1

Chapter 2: Methodology for household data collection

Chapter 3: Data collection results, definition of sustained/unsustained sanitation villages, sustainability classification of villages

Phase 1½

Chapter 4: Political/historical sanitation perspective and review of past interventions

Chapter 5: Perception of latrines and factors influencing sustained uptake (village-level, District Government, WaterAid Tanzania), development of factors to be tested

Phase 2

Chapter 6: Methodology for village-level data collection

Chapter 7: Data collection results and statistical analysis, recognition of determinants

Chapter 8: Conclusions and recommendations

2 Phase 1 – Data collection

2.1 Methodology

2.1.1 Selection of survey location.

Past personal experience in West Africa and Madagascar failed to find more than a handful of rural examples of high sanitation coverage villages. This study will require larger numbers of villages with high coverage as well as others with low coverage to make the necessary comparison possible. To facilitate the collection of data and minimise other unrelated variables, those villages chosen would ideally be located in the same general area.

Since selecting a random sample of villages across several districts of a region would not automatically guarantee a sufficient number of villages in each category, it was decided to target an entire district and include all villages to try to get a more complete picture for a whole district. Following discussions with WaterAid staff in the UK and the country representative in Tanzania, the Dodoma Rural District was selected. According to the official statistics, this district had 88% latrine coverage in the year 2000 (United Republic of Tanzania 2003).

2.1.2 Classification of sanitation profiles

There is no current definition or classification system for sustained sanitation uptake. Thus, this study needed to develop such a system to be able to identify those villages within each category. The basis for such classification will include sanitation coverage levels at various points in time, but must also take into account whether such coverage is tending towards being maintained, taking village growth into consideration, or whether it is rising or falling over a given period. Chris Smith, in his article in Waterlines, proposed a set of graphs for villages, which he referred to as Latrine Acquisition Curves (Smith 1988). His examples took coverage values every 5 years over a 20-year period. Since there is no knowledge of what has happened over the intervening years, this present study will seek to generate similar curves but using annual data to ensure any changes can be clearly recognised. From such graphs, it is hoped to classify each village on a 9-point scale i.e. a 3x3 table showing the trends over time against the average sanitation coverage for the given period. Coverage ranges could be simplified into low, medium and high, but the values for each range would need to be defined. For example, low coverage could be considered as up to 50%, medium could be between 50 and 75%, and high as anything over 75%. However, if no village had more than 60% toilet coverage, this would not facilitate the later stages of this study since no high coverage villages exist. The same would apply where nearly all villages had more than 50%, therefore, it would be necessary to redefine low coverage relative to the overall sample. The final definitions of low, medium and high coverage for this study would need to be confirmed after the data has been collected, but it must be ensured that a good proportion can be classified as high coverage.

2.1.3 Information relevant to the study

As for Smith (Smith 1988), the principle household information required is the length of existence of the homestead and when there has been a household toilet at that location. It would also be useful to explore the prevalence of latrine sharing among households as this may correlate with lower coverage villages. The assimilation of this information would generate a sanitation profile for each village. Since this study is ultimately concerned with village level factors that influence sanitation uptake, it would be wise to try to gather some village information at the same time. In this regard, the following details were considered worthy of exploration:

Village size	- Population
	- # Sub-villages
Facilities	- Presence of a community centre
	- Presence of an organised market
	- Presence of a police post
Formal healthcare	- Presence of a clinic/dispensary
Informal healthcare	- # Traditional Birth Attendants (TBAs)
	- # Traditional Healers (THs)
Religion	- Presence of a mosque
	- # Churches
Education	- # Primary schools
	- Presence of a secondary school
Wealth level	- # Homes with income from other than agriculture
Interventions	- # & Dates of past sanitation interventions in village

2.1.4 Data capture tools

The initial format of the tools to be used in capturing the data allowed for six different types of tool as follows:

- A village summary page to include questions on each of the above categories – one page per village
- A history page showing the years which various events took place- as an aid to households as they seek to remember the various years requested in the data collection process – one page per person collecting data in each sub-village
- A household data page to capture details of the house longevity, years of having a functioning household toilet, and whether or not others are allowed to share the latrine – one page per 10-cell
- A second household page where the details captured can be represented graphically in "line diagrams" to recognise latrine presence – one page per 10-cell
- A summary page where all the latrine details from the 10-cell line diagrams can be combined for each respective sub-village – one page per sub-village
- A separate page to summarise the years of house construction from each sub-village – one page per sub-village

2.1.5 Strategy for data collection

2.1.5.1 Who will collect data?

While people from outside each village could go in and ask the necessary questions, they may not be readily accepted within the rural communities and neither can they know if the respondents are reporting accurate information. Thus, it was deemed more appropriate to explore how each village might gather their own data. Since all the villages are structured in sub-villages and 10-cells (small groups of typically 10 houses akin to streets), it seemed logical to try to work within these existing structures. Ideally, each 10-cell leader could be responsible to gather and record the household information from the houses within their own 10-cell. That said, not all 10-cell leaders are likely to be literate; so provision should be made for a responsible literate individual to be appointed from within each sub-village to assist them. At village level, each Village Executive Officer (VEO) could assimilate the village data with assistance from other members of the respective village government (VG). The sub-village summary pages could be completed by the sub-village representative, or an alternative responsible person either from the VG or possibly a teacher from the local school.

2.1.5.2 How will it be done?

The following strategy was developed in an attempt to assess the feasibility of using local villagers to gather their own data.

Figure 2.1 Data collection strategy

Person(s) responsible	***Function / Area of responsibility***
Researcher	Prepare data capture tools and provide all necessary training for district government WAMMA personnel, research assistants and data entry technicians
District WAMMA coordinator	Write letters requesting individual ward meetings in each of the 48 wards
Research asst. & WAMMA members	Meet with Ward Executive Officer (WEO) & VEOs for each ward at ward meetings & explain purpose of the exercise. Distribute tools to VEOs, explain strategy, provide training
VEO	Select & train responsible individuals to assist in household data collection within their own sub-village Engage with others in the VG to complete village summary page
Sub-village asst.	Visit each 10-cell leader in turn within their own sub-village; explain the data collection process and tools. With the help of the 10-cell leader, draw a simple map of all households in the 10-cell, allocating each house a number and recording the name of each household head

10-cell leaders	Accompany the sub-village assistant to visit each household head from all homes within the 10-cell. Ask each household head all questions required for the exercise, attempting to confirm the responses from memory/experience as the 10-cell leader
Sub-village asst.	Record all answers on the household data capture tools Ensure all households are included/complete Tally latrine totals for each year Transfer 10-cell totals to sub-village summary page After final 10-cell entered, tally annual latrine totals for sub-village as a whole Return all pages to VEO
VEO	Ensure all sub-villages have completed the exercise properly and returned all data pages Sign & stamp village summary sheet as confirmation that the exercise has been completed for the whole village. Return all data collection pages to the office of the WEO
WEO	Sign & stamp each village summary sheet as confirmation that the exercise has been completed for that respective village Ensure that all villages within the ward have finished and returned their respective data pages and that all are ready for collection by the agreed date
Research asst. & WAMMA members	Return to each ward office and collect data pages from the WEO, checking for completion. Bring all data pages back to WA Dodoma office
Data-entry technicians	Check each 10-cell & sub-village data page for simple arithmetic errors & correct as necessary Enter all data from each village onto a pre-defined Excel spreadsheet template, working in pairs to ensure accuracy Save each village in a separate Excel file and email to the researcher
Researcher	Check data & confirm any necessary clarifications with data-entry technicians Further data cleaning if necessary Plot latrine acquisition curves for each village

2.2 *Testing with District Govt, piloting & refining*

2.2.1 Meeting with WAMMA to discuss tools, strategy and mock exercise

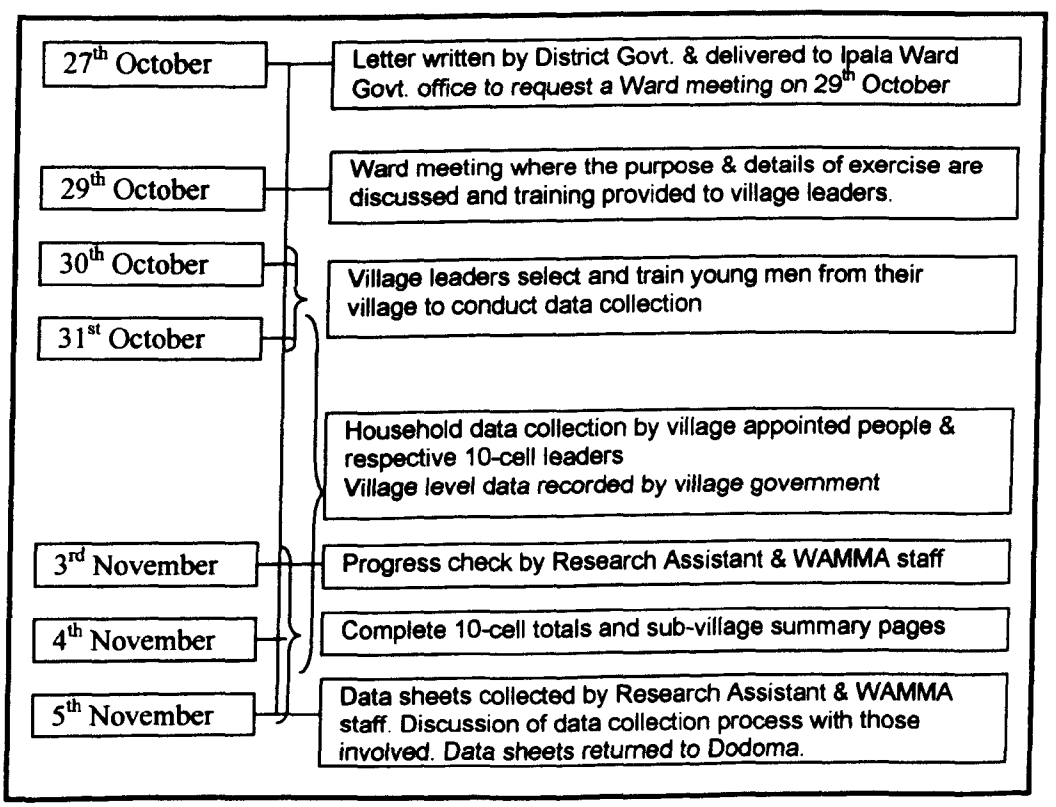
On Tuesday 26th October 2004, a meeting was held in the office of WAMMA for the Dodoma Urban district, which was attended by both rural and urban district WAMMA members along with the researcher and research assistant. During this meeting, the format of all the data capture tools was discussed at length along with the likelihood of the village personnel to be able to conduct the exercise successfully. Following this, each of the attendees participated in a mock data collection exercise to test the tools and their functionality for the exercise.

2.2.2 Refinements to tools and planning of pilot exercise

The outcomes of the above discussions and test exercise were as follows:

- Since the household question page was principally intended to facilitate the construction of the line diagrams on the later page, it was considered somewhat redundant, and it was decided to go straight to the line diagrams and eliminate the earlier page altogether.
- Counting the numbers of latrines for each year might be difficult for some, so it was proposed to suggest village schoolteachers might be asked to assist if necessary.
- Yes/no answers were replaced with a tick or a cross for simplicity.
- The pilot data collection exercise (Fig. 2.2) was planned for the three rural villages of the Ipala ward (Ipala, Chahwa and Mahoma Makulu) within the Dodoma Urban District.

Figure 2.2 Pilot data collection exercise



2.2.3 Pilot data collection exercise

Two of the three villages completed the exercise but no data were received from the ward village, Ipala. This was apparently because the WEO and VEO had failed to attend briefing meetings on the exercise. This highlighted the possibility of some villages potentially failing to engage with the exercise, and resulted in a review of the letter to be sent out by the District Government ahead of the main exercise, strongly urging the participation of all parties. Therefore, the following refers only to the two villages that did participate.

2.2.4 Processing the results

The household data sheets appeared to have been successfully completed by those appointed in the other two villages as follows:

- Although not strictly a "map", all 10-cells provided a list of numbered homesteads and associated household heads on the reverse side of the line diagram page.
- The household numbers were also listed on the front side of the sheet.
- The year of construction was reported for all homes listed.
- The line diagrams were recorded appropriately for each household latrine with the exception of 20/684 houses (2.9%) which recorded having a toilet earlier than the year of house construction. The vast majority of these discrepancies were only out by one year, although four were recorded as having a toilet 10 years before the house was built. These discrepancies were felt to be down to miss-reading/miss-recording error on the form (as opposed to miss reporting) and it was noted to emphasise the need for due care and attention at the training stage in order to prevent/minimise recurrence.
- The accuracy of tallying up the columns for each year was very good with only 30/2880 columns observed to be miscounted. Of these, 29 tallies were out by only one and the remaining column over-reported by two latrines. This represents an overall tallying accuracy of 98.96%.
- The number of latrines for each house was duly recorded in each case.
- The column reporting which homes had replaced their latrines (at least once) had also been completed and tallied, although 11/64 ten-cells had slight errors in the additions. While these were very easy to spot and correct, it could be argued that this column added little since the previous column already included this information.
- The sharing of toilets was clearly recorded in each case with the exception of only three houses for which no answer was recorded. In such a case, it was assumed that there was no sharing of the particular household latrine.

- Summary pages – villages seemed to have no problem in transferring the tallies from the line diagrams over to the summary pages. Subsequent additions/page tallies were also seen to be done correctly, although on two sheets this column had been left blank. For these sub-villages the tallying was completed later back in Dodoma.

- Village data sheets were understood and completed satisfactorily with the exception of the reporting of the population and number of non agricultural households (Fig. 2.3)

Figure 2.3 Pilot exercise results: population and households with "non-agricultural" income

Data ***Village:***	**Chahwa**	**Mahoma Makulu**
Population reported in pilot exercise 2004	2,365	6,500
Population as listed in 2002 census	***2,034***	***1,755***
Estimated number of households with non-agricultural income	63	1,900

Figure 2.3 shows that Chahwa reported 2365 people and 63 households with income from sources other than agriculture. Cross checking with the 2002 census, the population was reported then as 2034, which tends to support the current figure. The numbers reported in both cases from Mahoma Makulu, however, do not appear to relate to the census in any way. Again, a more detailed explanation of the requested data might be required at the initial ward meeting, and the instruction to leave blank if the information is unknown.

Overall, the pilot exercise demonstrated that the household data collection tool was understood and able to be utilised by the two villages that participated. The few errors made in entering the latrine details on the line diagrams, were considered as likely to be down to the person entering the data misreading the years on the page (e.g. mistaking 1986 for 1996 etc.). The other errors were purely arithmetical and can be easily picked up during checking and data entry onto the computer.

2.2.5 The need for data cleaning

As noted above, there were a small number of errors contained in the original data returned from the pilot exercise. To assess the influence of these on the respective latrine acquisition curves, they have been plotted with both the original data and the data after cleaning. Firstly the graphs for Chahwa village (Figures 2.4 and 2.5):

Figure 2.4 Chahwa village: households and toilets

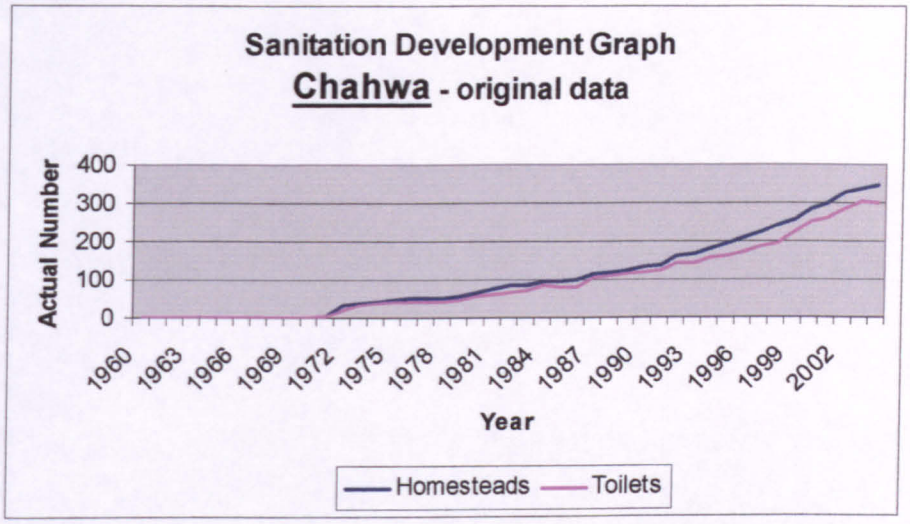
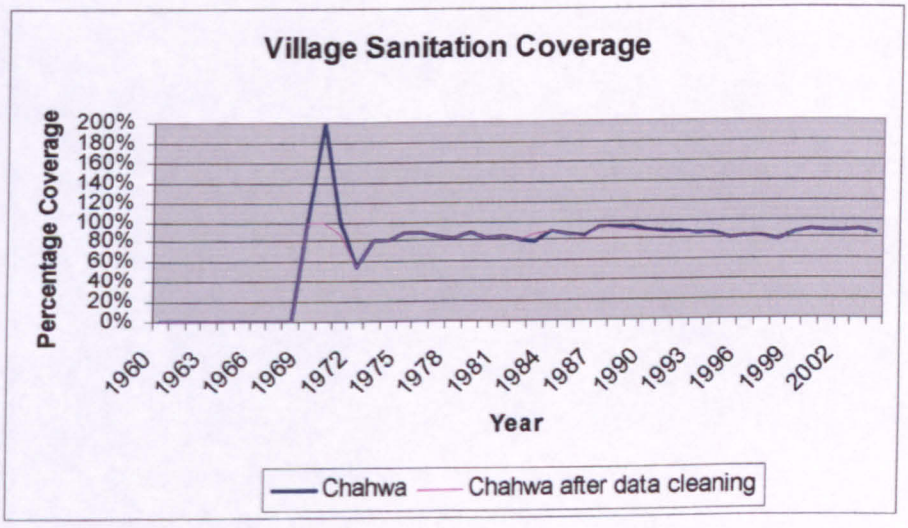


Figure 2.4 shows the actual data reported by the village including the various errors mentioned in the above section. Checking that the year of latrine construction had not been reported as prior to when the house was built effectively removed the main source of error. Figure 2.5 shows the percentage coverage values obtained before and after data cleaning.

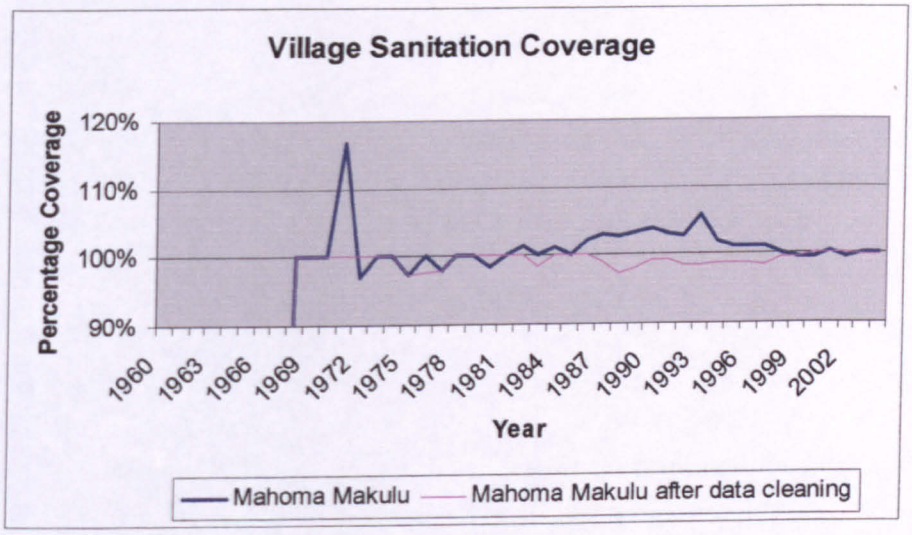
Figure 2.5 Chahwa village: sanitation coverage – before and after data cleaning



In 1970, the original data suggests 200% latrine coverage but this actually reflects one house & two toilets reported for that year. This illustrates the danger of drawing conclusions from small numbers. Apart from the year 1970, the above coverage graphs are very similar.

The graphs for Mahoma Makulu village were also similar in many regards although it would appear that almost all houses had toilets over the years. However, yet again in some years the number of toilets actually exceeds the number of houses, which is not realistic. The original values exceed 100% in1971 and for several years between 1982 and 1997. This again demonstrates the need to check and clean the data. Exaggerating the "y"axis makes the errors of the original data values more obvious as Figure 2.6 demonstrates.

Figure 2.6 Mahoma Makulu village sanitation coverage – before and after data cleaning



The data collection tool fails to prevent such errors as it records both houses and toilets separately. This separation is necessary try to ensure that household heads create the distinction in their minds. Families must live in a homestead but may not always have a toilet. Therefore, only the year of construction is necessary for the house but the presence of a functioning toilet is more likely to vary and require year-by-year consideration. Since the survey was intended to be conducted by local villagers themselves, it will not prevent such errors. One possible way to prevent this might be to consider drawing a second line on the same diagram i.e. to represent the establishment of the household. However, this could appear unnecessarily complex and possibly confusing. Therefore, every effort should be made during training at village level to try to encourage those recording the data to be vigilant. Similarly, those checking for accuracy should scan the data sheets for such errors.

2.2.6 Further refinements

Reviewing the data entry form, it was further decided to:

- Replace the question referring to population with one that asked for the total number of households in the village.
- WAMMA staff suggested that some villages are likely to have more than 10 sub-villages, so the village information page was modified to allow for up to 20.

The finalised data collection tools are presented in Appendix 1.

2.3 *Collecting the data – Phase 1*

2.3.1 Revised strategy for collecting data

If district government staff and a research assistant were to visit each village in turn, this would potentially allow one village to be trained per day. Working six days per week, the dissemination and training process would potentially take 128/6 = more than 21 weeks. This would still not allow for the collection and return of all the data to the WaterAid office in Dodoma for processing and data entry. Hence, the total process would potentially last more than nine months. In preference to this, as mentioned in section 2.1.5, it was proposed that the district government WAMMA coordinator call for ward meetings where the VEOs from each village in their ward come together for training at the same time, thus reducing the number of training sessions to 48 rather than 128. Further to this, if it were possible to employ and train three teams of trainers, the dissemination and training process could potentially be completed within 16 working days. Distribution of the data collection pages was planned for ward meetings in December 2004; and subsequent collection of the completed data sheets during January 2005.

2.3.2 Overview of data collection exercise

Distribution of the data collection tools began on the Monday 6th December 2004 and was completed before the end of the year. Allowing approximately four weeks to complete the exercise, the collection of the completed survey forms began on Monday 3rd January 2005 and followed the same order of ward meetings as before to provide each ward with a similar timeframe to complete the work. Some villages required longer than others, but this was to be expected due to the variation in both number of households and the scale of the geographical area. Consequently, a number of villages had not fully completed the survey by the time of the second ward meeting, however, most of these subsequently delivered their data by hand to the WAMMA office in Dodoma. The cost of this exercise was approximately £50 per village (appendix 2) which included salaries for the research assistant and data entry technicians (though not the researcher), allowances for WAMMA members and village-level data collectors, printing of forms, purchasing of associated stationery and a reserve to allow for additional visits where necessary.

Data were received from 119 out of 128 villages (93% village response rate), and only one of these produced results which indicated that they had failed to grasp how to complete the household data page. In this case, there were no lines drawn on the "line diagrams" although there were many marks indicating either when latrines had been built or when they became no longer functional. Unfortunately, without the lines it was impossible to determine the significance of such marks. For this reason, the village of Makakatika had to be eliminated from the process leaving the remaining 118 villages (92.2% of all villages in the district).

2.3.3 Initial results

Village Details:

Of the 118 villages from which usable data were received, all appeared to provide the relevant information to enable the village sanitation profiles to be generated. However, an initial review of the data revealed that some of the village details had been omitted as follows:

Figure 2.7 Phase 1 results: missing data

Phase 1 survey - initial observations & missing data	***Number***	***% of relevant sample***	***% of all villages***
All villages in Dodoma Rural District	128	100.0%	100.0%
Of all 128 villages:			
No data received	9	7.0%	7.0%
Unusable data	1	0.8%	0.8%
Of 118 villages with usable data:			
Missing village summary page	9	7.6%	7.0%
Of 109 villages having a village summary page:			
Missing total # households	29	26.6%	22.7%
Missing # non-agricultural h/holds	19	17.4%	14.8%
Missing # clinics	3	2.8%	2.3%
Missing # TBAs	17	15.6%	13.3%
Missing # traditional healers	18	16.5%	14.1%
Missing # mosques	6	5.5%	4.7%
Missing # churches	12	11.0%	9.4%
Missing # community centres	4	3.7%	3.1%
Missing # organised markets	4	3.7%	3.1%
Missing # police posts	4	3.7%	3.1%
Missing # primary schools	4	3.7%	3.1%
Missing # secondary schools	4	3.7%	3.1%

Examples of the completed data entry forms are given in Appendix 1. Overall, the villages seem to have responded well despite the above missing aspects. Eighty villages reported an estimate of the number of households in the village, and 90 were able to estimate how many had income from areas other than agriculture. This represents 77.3% and 85.2% respectively of all villages in the district. An estimate of the number of households in each village will be important to this study and, where missing, the methods used to establish such values are given in section 3.1. The table requesting details of specific services and institutions was also received well. Of the 109 villages that returned this data sheet, only two failed to attempt this table. All others completed the first column, which asked if any of these 10 services existed there, although one village did fail to note if any traditional healers were present. The totals of each aspect/service proved to be slightly more difficult for some villages. One village failed to report any totals despite recognising the existence of some services. A further 16 villages were unable to provide one or more totals. Usually, the missing totals referred to TBAs, traditional healers or churches. These three represent the highest numbers of any facilities/profession for the questions asked in this table. The largest number of TBAs reported by any village was 50; traditional healers was

15; and churches was 12. The next closest facilities numerically were mosques, and primary schools, which had a maximum reported number of three for all villages reporting. Beyond the three main omissions mentioned above, two villages did not report a total number of mosques, one left the number of markets blank, and one did not report on how many primary schools were in their village. For the vast majority of other villages, the response for each which reported having such an institution was that there was only one – e.g. it is not likely that any village would have more than one organised market, although one large village (>900 households) did report having three. That said, even the largest villages (>2000 households) only reported having one organised market each. The only other aspect to report in this section relates to facilities reported as present in the first column, but having a total number of zero in the second. Only two villages come into this category. One reported having both TBAs and traditional healers but then listed totals of zero for each, and another village reported having traditional healers but again the total was zero.

With respect to the household data, there were a few villages where one 10-cell or more omitted to record the year of house construction, and several villages had not completed tallying up the sub-village summary. The implications of these will be discussed in the following section.

2.4 Data entry

2.4.1 Procedure and template including error flags

To facilitate the entry of the survey results onto computer, a template was developed using Microsoft Excel. This program was chosen because the village information page could be reproduced on screen with the various cells highlighted to copy straight from the returned data sheet. These cells in turn were linked to other parts of the template where the appropriate information was duly requested. An example of how this worked is shown in Appendix 3.
After the village information sheet had been copied onto the template, an area was provided and automatically labelled for household data from each sub-village to be entered. Prior to entering such information, the data-entry technicians would have checked the tallying of latrines from the line diagram pages and latrine summary page for each sub-village, to ensure arithmetic accuracy of the given data. In addition, a tally was conducted of the years that the homesteads were constructed for each sub-village. This was done using the form ref srs5 (Appendix 1) – however, it should be noted here that the two right-hand columns on this form initially intended to record two separate household sustainability factors had become redundant since the decision was taken to simplify the srs3 form.

After arithmetic checking and household tallying, the data from each sub-village could be entered into the appropriate columns for that sub-village on the village template (appendix 3). A table was prepared as part of the template for each sub-village, and was made up of five columns:

- The central column (3) gave the year and was listed from 1960 to 2004 per the survey;

- Column 1 was provided so that the number of households established during each particular year could be entered – transferred from the household tally form srs5 (appendix 1);
- Column 2 was set to automatically provide cumulative totals i.e. the total number of homesteads existing within that sub-village for each year – it is recognised that this figure will not take into account those who have since moved away or those who have died;
- Column 4 was designed to enter the numbers of latrines present in the sub-village for each year – transferred from the sub-village summary sheet (srs4, appendix 1);
- Column 5 had been pre-set to calculate automatically the latrine coverage within the sub-village for each year by dividing the total number of latrines recorded for each year (column 4) by the total number of households in the year (column 2).
- Above these columns there are two boxes requesting page numbers. The left hand box over the housing columns was to enter the unique page number for the srs5 form specific to that sub-village, and used to enter the data into column 1; the right hand box over the toilet columns was to enter the page number from the srs4 form used to enter data into column 4.
- At the bottom of this table, space was provided to enter the total number of shared latrines and the total number of households (also transferred from srs4).

The above template included a number of crosschecks to highlight possible conflicts or errors as follows:

- if the page numbers listed at the top of each sub-village table did not match the relevant data forms srs4 & srs5 - each specific village and sub-village had a unique number
- if the page numbers were outside the number range given on the village data page, srs1
- if the number of new households in a year was greater than 20 – to confirm accuracy
- if the number of household toilets in any year exceeded the number of homesteads
- if the total number of households reported to be in each sub-village was different from the cumulative number of households built by 2004 at the time of the survey
- If the number of latrines listed as shared was more than the total number reported as existing in 2004.
- If more households have been reported than can actually be represented by one srs4 summary page (200).

The above warnings were set within the template to advise those entering data when inconsistent data were reported, and all were highlighted in a bold red font in order to be obvious and to attempt to identify possible errors at the earliest opportunity.

The template also included a village table similar to the sub-village tables but combining each of them to create one to represent the totals for the village as a whole. This table did not require all of the above warning messages in the sense that they would be expected to have been identified at the time of initial data entry, and already checked/corrected with regard to the specific sub-village in question. Additional boxes at the base of the village table were included to report:

1. The total number of households as estimated by the village government – this cell was linked to the cell where this estimate was recorded from the village summary page srs1.
2. The difference between the village estimate and the households supplying data for the exercise.

Beyond these, only three error flags were placed to check the data. Per the sub-village tables, data checks 1 and 2 related to the household and latrine totals. However, in this case data check 3 was set to highlight where the village estimate was more than 50 households different from the total number of households within the village from which data has been received. The message in this case was simply to highlight any significant difference rather than any error or possible mistake in entering the data. Overall, any error flags would be recognised by the data entry technicians at the time of inputting the data (to highlight the need to check for accuracy) and those flags remaining would also be obvious to the Researcher on receipt of the village data file in due course.

2.4.2 Data entry technicians & training

Two data entry technicians were interviewed and appointed to record the information from the villages as it was delivered. Both technicians had previously done work for the WaterAid Dodoma office and had a proven track record in this type of work. They were provided with desk space and a computer within the WA office, and the Excel spreadsheet template was provided to facilitate data entry. Blank template files were created for each village in the district to provide a unique location for the data from all villages. A day of data entry training was provided using actual data files.

2.4.3 Data checking in Dodoma

The data were checked and processed according to the guidance provided. No alterations were made to the original data other than to correct any simple arithmetic errors. The technicians systematically checked all the data prior to entering onto computer. Each technician was able to work independently at this point as each was checking the various totals previously calculated by the village. There appeared to be several arithmetic errors in many of the village data sets, however, as in the pilot exercise the numbers were typically out by only one or two for any given year and these were not deemed to be systematic. Despite these small discrepancies, it was deemed appropriate to take the time necessary to minimise errors and maximise the accuracy of the results. In addition to checking the various totals, the technicians were required to transfer all the years of house construction onto a separate sub village housing tally sheet, which

included all 10-cells. Thus the totalling of houses and of toilets were essentially separate operations carried out independently of each other and only brought together at the time of data entry. This checking process began on the training day, and continued until the data were ready to be entered onto the computer some four weeks later. This meant that each technician would check and, where necessary, correct the arithmetic from two to three villages on average each day, working six days per week. There was always a chance that the data transfer process could lead to further errors, but this was considered minimal and would have been likely to be flagged by the various error checks built in to the data entry template as discussed in 2.4.1.

2.4.4 Computer entry & email to London

The various village data files were thus entered onto their respective Excel templates, saved and a copy emailed to the Researcher in London. For this process, the two technicians worked together at one desk where one would read out each data value for the second to type it onto the computer and the first could look up at the screen to confirm that each value had been entered accurately. In this way, the values were checked immediately at the point of data entry.

2.4.5 Further data checking & cleaning in London

As each file arrived, the Researcher checked it again and any questions arising were immediately emailed back to Dodoma for comment or further checking by the data entry technicians. This provided the opportunity to check any highlighted data flags previously built into the template. At this stage, it became clear that any remaining errors related to latrines being reported as built prior to the year of house construction. This possibility is highly unlikely in reality as housing is seen as of primary importance with latrines as secondary at best. Thus, the latrine coverage for any "offending" sub villages would appear greater than 100% and trigger the error message. Since the data had been entered by sub-village rather than as a whole village at once, the researcher was able to highlight and bring adjustment to only those specific sub villages that had been flagged. This would automatically bring correction to the overall village totals due to the way the template had been set up.

The process of adjustment for sub villages involved the researcher making a copy of the village file, labelling it as "adjusted" and reducing those latrine numbers such that the total coverage for any year did not exceed 100%. This process was required for 87/118 villages which may initially suggest a problem, however the scale of correction i.e. adjustment to the overall latrine numbers and thus percentage coverage was relatively small. It usually meant reducing the latrine totals by no more than one for any given year and took usually about one or two minutes at most per village. This adjustment resulted in the re-classification of only four of the 87 adjusted villages (see next chapter).

2.4.6 Repeating the data-collection in five villages

While the data technicians were beginning the process of checking the data received, prior to entering onto the computer, return visits were made to a sample of five villages. This was an

attempt to validate the Phase 1 survey results from a small sample of households using external personnel. Five villages were selected from among those villages that had completed the survey and had a range of sizes, as determined by the estimate of households given on the village summary pages.

Figure 2.8 Validation check: proposed sample villages

Village	***Est. households***	***Road travel-time (mins) from Dodoma***	
Chipanga "B"	269	70: unpaved, 20: rough track	West
Babayu	444	10: surfaced, 60: unpaved, 30: rough track	North
Lamaiti	632	10: surfaced, 30: unpaved, 60: rough track	NW
Zajilwa	835	10: surfaced, 80: unpaved, 60: rough track	NE
Manchali	1113	60: surfaced	East

Since each 10-cell had provided a simple map or at least a list of households with the name of each household head, a unique number could be allocated to each home and this allowed for a random sample of households to be selected using a random number generator. Forty homesteads were thus selected as well as a further 30 in reserve for each village to allow for any that proved inaccessible or for those household heads that may be away during the time of the visit. While the size of each village varied, the sample size remained constant at 40. Revised line diagram pages were prepared which listed the name of the selected household head as well as the name of their 10-cell leader in addition to the three data requests: year of house construction, years of functional latrine at homestead, and whether the toilet was shared. Further differences from the original exercise were that in this case those collecting the information would be from outside the village, although accompanied by a villager who could direct them to the location of each house. Two WAMMA members accompanied by the Researcher visited one village for each day between 29th March and 2nd April 2005. Each WAMMA member visited 20 selected homesteads per day and the Researcher accompanied one of them per day alternating between members. Since the original data from each village had yet to be processed, there was no particular level of expectation with regard to results generated at the time of this follow up visit.

This exercise would be used later to assess the possibility to establish a village sanitation profile from only a small sample of households rather than the more time consuming exercise of attempting to include every homestead. At the same time, this follow up exercise provided an opportunity for the researcher to see first hand what the situation was like in each of these villages. Overall, the households in each village responded well to this second attempt to gather the same information as had previously been obtained by village personnel, and many commented on the earlier exercise. Photos taken in each of the five villages are included in the next chapter along with the particulars and results of this follow-up visit – see 3.6.1.

3 Phase 1 – Results

3.1 Missing data – household numbers

As noted in chapter 2, various items of data were missing from the village information received and each one would have been beneficial to the overall exercise. Initially only one of these was considered critical to the study: the number of households in each village. In order to compare village results, the respective size of each village would be required – initially to judge what proportion of each village was represented by the data, and later when the various factors would be compared and contrasted between larger and smaller villages.

Where a Village Government (VG) had estimated the number of households for their village, this value was taken as the best value to use since the VG is directly responsible for the village and more "connected" than any outside agency that may have carried out a housing survey. Such a value was not provided for each of the 38 villages noted in section 2.3.3 (9 villages that did not return a village summary page plus 29 villages that did return this page but omitted this particular detail). For these villages, an approximation could be established from alternative studies carried out during the same year – 2004. Three such studies were found to have been conducted, and the information was made available by the respective offices. The MoH district office in Dodoma generates annual records for each village, and while the records are not combined to produce village-by-village records, the District Health Officer, Mr Mzwanda was able to provide a summary of household and latrine numbers for most villages from 2001 to 2004 from their reports (Mzwanda 2005). MAMADO, a recently established NGO in Dodoma, had conducted a more in-depth study of the Dodoma Rural District in 2004, and the director, Mr Halla, made a draft copy of this report available (MAMADO 2004). WaterAid had also recently completed a survey of the entire region, and had entered their data onto computer ready for analysis. Musa Mpinga from the WA Dodoma office allowed access to the Rural District data, which included housing estimates for each village (WaterAid Tanzania 2004).

When the household values for each village from each of the three sources were tabulated, it was clear that few figures were in exact agreement. Therefore, to reach an accepted value for this study, the following process was adopted:
Step 1. Identify the two closest values and take the mean of these.
Step 2. Establish a range of +/- 25% from the mean value.
Step 3a. If the third value fell within this range, it would be included and the mean of all three values would be calculated and adopted.
Step 3b. If the third value fell outside this range, it would be rejected as an outlying value and the mean of the nearest two values would be adopted.

The only reason to adjust either the village estimate or the calculated estimate, would be if the actual number of households reporting data exceeded this value. Thus, the accepted number of

households from each village was obtained by taking the highest value of: a] the village estimate (where it was given); or b] the calculated estimate (where the village did not report an estimate); and c] the actual number of households reporting data from that village.

3.2 Village graphs

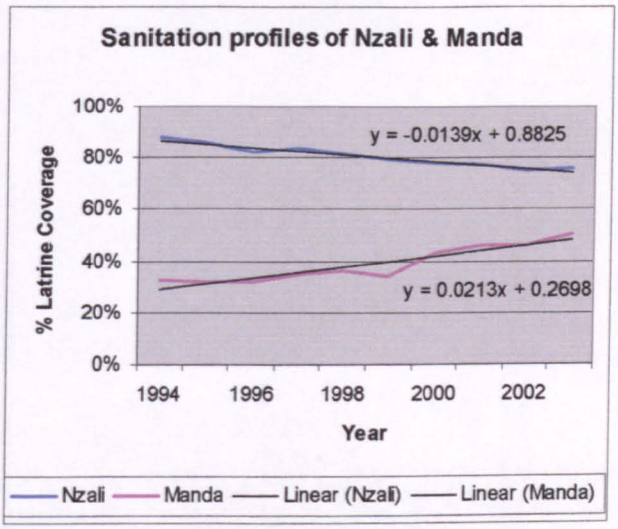
The result of the data collection exercise was that 65,644 households (75.7%) of an estimated 86,745 from 118 villages took part (excluding the 308 households from Makakatika village which did not produce usable data and has therefore been excluded – see 2.3.2). The data were used to generate sanitation profiles for each village in the form of latrine acquisition curves. These graphs show how household and latrine numbers have changed over time as well as the percentage household latrine coverage. Samples of these curves are presented in Appendix 4.

The growth of each village is clearly demonstrated through the graph of household numbers (see appendix 4), despite the fact that some households may have moved away and relocated in a different village or dissolved on the death of members. Similarly, the actual numbers of latrines reported can be seen to have grown in each village, albeit at a different rate from the number of houses. The result of these differences in growth rates between households and latrines can be seen on the latrine coverage graphs (appendix 4). Where the rate of increase of toilets is similar to the increase in households, the coverage graph remains more or less flat; where toilet construction exceeds household establishment, the coverage graph can be seen to rise; and where households outpace latrine construction, the coverage graph is observed to fall. It should be noted here that a falling coverage graph does not automatically mean that the actual number of toilets is reducing, rather that it is failing to keep up with the number of households. In the case of one small village, Magungu (151 households reported from an estimated 209), the actual number of latrines seems to level off between 1993 and 1999, then falls – though by no more than 10 – to the year 2004. Over the years 2000 to 2004, three further villages reported a decrease in the overall number of toilets. In Nkhome latrines decreased over 2002-04 by 10 (293 households reported from an estimated 1229). In Ilolo latrines fell over 2001-04 by 38 (100% of an estimated 740 households reported); and Lukali latrine numbers fell over 2000-04 by 44 (201 households reported of an estimated 1182). A further three villages reported fewer numbers of latrines in the year 2004 only, with reductions ranging from one to 10. That said, falling numbers for one year does not constitute a general trend. Overall, 38 villages were observed to have a reducing sanitation coverage when looking at the latter 10 to 15 years of the graph, but the vast majority of these still had increasing actual numbers of toilets. From this, it can be deduced that the idea of having a household latrine is far from an alien concept for most villages in the district.

It is important to highlight that the gradient of the coverage slope alone does not reflect whether the coverage level is high or low for the period considered (see Fig 3.1). In the two villages shown in the graph, the 10-year average sanitation coverage for Nzali (falling coverage) was

80.6%; while for Manda (rising coverage) it was 38.7%. Linear regression produces the associated trend lines and their equations which confirm the coverage change gradients as +2.13% for Manda and -1.39% for Nzali.

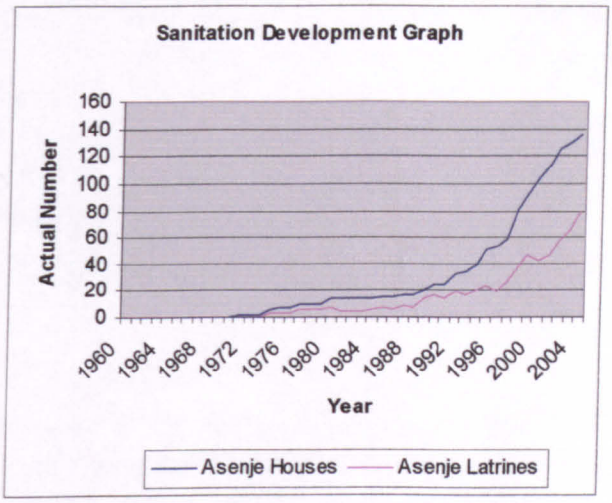
Figure 3.1 **Nzali & Manda villages: sanitation coverage**



To gain a true reflection of the overall picture of sanitation will require some combination of both the rate of change and the coverage level for each village in the study. Over the early years represented by the graphs – 1960s and 70s – the data can only represent those older households that remained at the time of data collection; it is clear that many people will have migrated or passed away since then. In addition, the indicated village coverage may be less than accurate when only a handful of homes are represented over that period. Some villages are much older than others and therefore more established with a better infrastructure. The profiles of newer villages can hardly be compared over the early years when in many cases they did not even exist. Early sanitation history will be useful in assessing the development of those older villages, but to assess the current situation across all 118 villages will necessitate our focusing on the later years.

Reviewing each village data file as it arrived by email suggested that a number of households had reported building their first latrine in 2004. Given that there is a local government bylaw for all homesteads to have a toilet, it was suspected that some homes may have wished to appear to at least have an intention to build and so not be prosecuted. In addition, those few homes, which failed to indicate a year of house construction and did not have any toilet, were taken as being built in 2004. The combination of these two factors had the potential to present a skewed perspective of the data for 2004. Therefore, it was decided to look at the study results up to 2003 only.

Figure 3.2 Asenje village: households and toilets



As noted previously, some of the villages are more recent in their growth and development. Villagisation took place in the 1970s (see (Briggs 1979; Kikula 1997)), and new villages such as Asenje (Fig 3.2) would appear to have developed slowly. To gain the best overall perception of recent sanitation development it was decided to focus particularly on the 10-year period from 1994 to 2003.

3.3 10 year focus

Latrine coverage graphs were generated for each village for the years 1994 to 2003 only (see Appendix 5). To gain a snapshot of the coverage level for each village, the 10-year average (mean) latrine coverage was calculated from the values obtained for each of the villages.

3.3.1 Mean coverage

Figure 3.3 Dodoma Rural District: distribution of village sanitation coverage

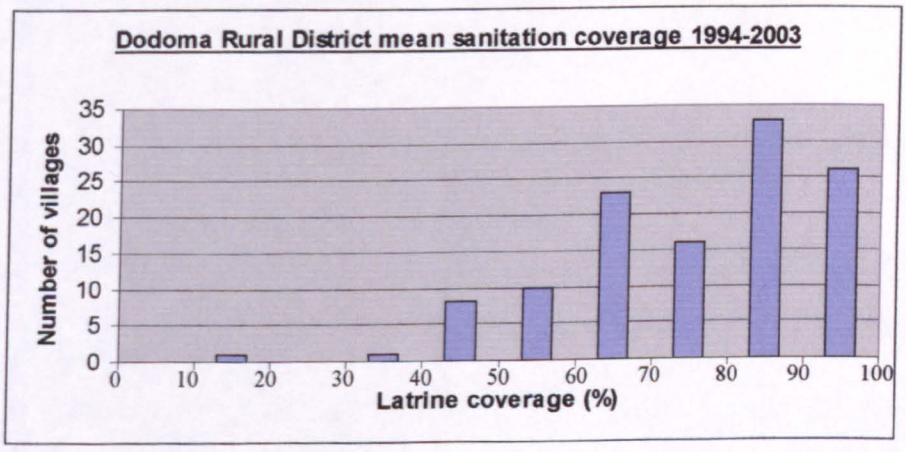


Figure 3.3 shows the range of 10-yr mean village sanitation coverage for the 118 villages for which there is data[1]. From the diagram, it can be seen that for the years 1994 to 2003, most of the villages report reasonably high sanitation coverage. The mean value is 75.8%, and the median is 79.8% with a lower quartile of 64.9% and upper quartile of 89.6%.

[1] X-axis % coverage ranges denote > (lower value) and ≤ (upper value) of each range e.g. >60 and ≤70%

In an attempt to classify the villages into low, medium and high coverage , the value ranges of 0-50%, 50-75% and >75% as suggested in chapter 1 would not provide a reasonable number of villages in the lower range. Only 10 villages (just over 8%) in the district come into that category. Similarly, more than 58% (69) of the villages have more than 75% sanitation coverage. Therefore, the ranges proposed for this study have been adjusted to: 0-60%; 60-80%; and 80-100%. This will allow for 20, 39 and 59 villages in the respective ranges. The upper boundary, at 80%, could actually be set higher to balance the numbers more equitably, however it would seem harsh to judge a village as medium when it has reached more than 80% sanitation coverage.

3.3.2 Trend lines & gradients

On the 10-year sanitation coverage graphs (such as those shown in Fig 3.1) it is possible to add a linear regression trend line to see the overall tendency for each village. In the equation of each trend line, the "x" coefficient represents the gradient of the line. Thirty-eight villages were observed to have a negative gradient, and eighty had a positive slope.

To ascertain which villages may be classified as effectively having such a "flat" gradient, it is necessary to perform a regression analysis of the data to find whether the 95% confidence interval of possible values for the gradient includes zero. The regression analysis confirmed that 23 villages had significantly falling latrine coverage, 40 villages had significantly increasing coverage, and coverage in the remaining 55 was not significantly changing over time. The results of this regression analysis (and the gradient values) are recorded in Appendix 6.

3.4 Classification of villages

3.4.1 3x3 table and definition of sustained sanitation village

It has now been shown that the villages may be classified according to:

a) average latrine coverage for the 10-year period; and

b) the gradient of the trend line. Combining these two factors produced a 3x3 table as follows:

Table 3.1 Village classification according to mean coverage (1994 – 2003) and rate of change in coverage

Dodoma Rural District Average Sanitation Coverage: 1994 – 2003			
Number of Villages with:	Significantly Falling (-ve) Rate of Change	Zero Rate of Change	Significantly Rising (+ve) Rate of Change
High Coverage (>80%)	13	29	17
Medium Coverage (>60%, ≤80%)	8	16	15
Low Coverage (≤60%)	2	10	8

It should be recognised that table 3.1 displays the average coverage levels as opposed to the end point i.e. 2003. Therefore, to reflect more accurately the sanitation situation for 2003 we should consider the data shown in table 3.2. The rates of change for each village have not been changed, only the point at which the coverage level has been measured and hence some villages will have moved up the table while others have moved down.

Table 3.2 Village classification according to 2003 sanitation coverage and mean rate of change in coverage (1994 – 2003)

Dodoma Rural District Average Sanitation Coverage: 2003			
Number of Villages with:	Significantly Falling (-ve) Rate of Change	Zero Rate of Change	Significantly Rising (+ve) Rate of Change
High Coverage (>80%)	6	29	23
Medium Coverage (>60%, ≤80%)	11	16	11
Low Coverage (≤60%)	6	10	6

Villages that fail to maintain their level of sanitation coverage cannot be considered to have sustained sanitation, yet a village with high coverage cannot either be considered to have unsustained sanitation. Conversely, villages that have a rising level of latrine coverage cannot be seen to have unsustained sanitation yet villages with low sanitation cover have not demonstrated sustained sanitation. Using the above table, the following definitions for sustainability of village sanitation are proposed:

*Def. 1: A village with **sustained sanitation** will be seen to maintain high sanitation coverage (not falling) or have medium but rising coverage.*

*Def. 2: A village with **unsustained sanitation** will be seen to maintain low sanitation coverage (not rising) or have medium but falling coverage.*

*Def. 3: Villages with high but falling sanitation coverage; medium sanitation coverage (not rising or falling); or low but rising sanitation coverage will be classified as having **intermediate sanitation*** (See table 3.3).

Table 3.3 Proposed village classification system for sustainability of sanitation

Village Classification:	Significantly Falling (-ve) Rate of Change	Zero Rate of Change	Significantly Rising (+ve) Rate of Change
High Coverage (>80%)	***Intermediate sanitation village***	**Sustained sanitation village**	**Sustained sanitation village**
Medium Coverage (>60%, ≤80%)	**Unsustained sanitation village**	***Intermediate sanitation village***	**Sustained sanitation village**
Low Coverage (≤60%)	**Unsustained sanitation village**	**Unsustained sanitation village**	***Intermediate sanitation village***

3.4.2 Three-point scale of village level sustained sanitation

Applying the above definitions to the villages of the Dodoma Rural District would mean that for 2003:

a total of 29+23+11= **63**/118 (**53%**) villages have sustained sanitation;

a total of 6+16+6= **28**/118 (**24%**) villages have intermediate sanitation;

a total of 11+6+10= **27**/118 (**23%**) villages have unsustained sanitation.

A further application of the above data would be to use the known rates of change of sanitation coverage to project forward and speculate as to the likely situation some years in the future. In this case, since the baseline for our calculation was ten years, it was decided to project forward by 5 years from 2003 i.e. to 2008. Clearly, those villages with constant coverage (trend line gradient = 0) will remain in the same categories, however, some of those which have a rising coverage will move up to a higher category and some of those with falling coverage will move down. Following is what the above table looks like when projected forward to 2008:

Table 3.4 Village sanitation projected classification in 2008

Dodoma Rural District Projected Sanitation Coverage: 2008			
Number of Villages with:	Falling (-ve) Rate of Change	Zero Rate of Change	Rising (+ve) Rate of Change
High Coverage (>80% in 2008)	3	29	27
Medium Coverage (>60%, ≤80% in 2008)	12	16	10
Low Coverage (≤60% in 2008)	8	10	3

Again, applying the sustainability definitions to the villages of the Dodoma Rural District would mean that in 2008:

a total of 29+27+10= 66/118 (56%) villages would have sustained sanitation;

a total of 3+16+3= 22/118 (19%) villages would have intermediate sanitation;

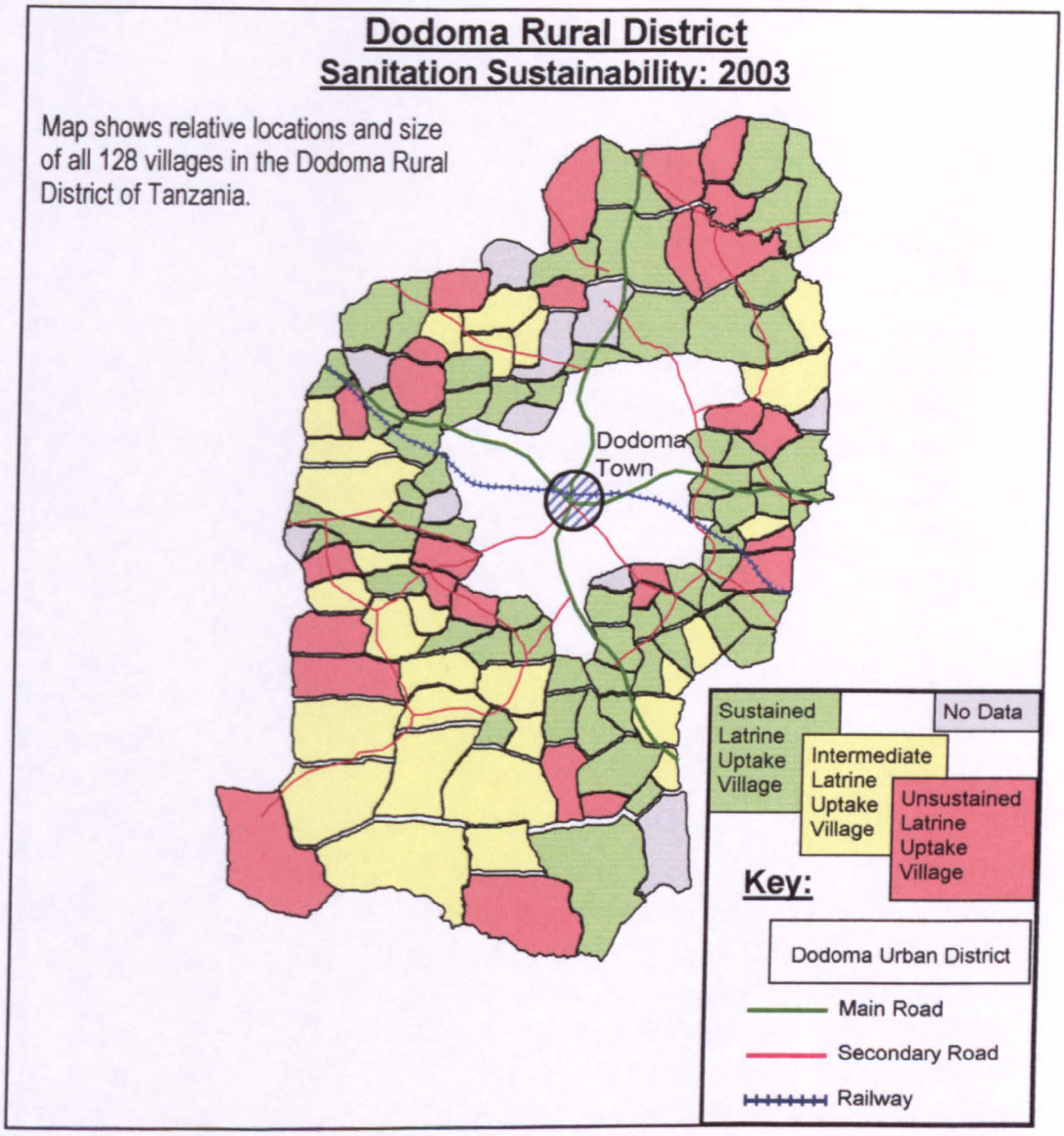
a total of 10+8+12= 30/118 (25%) villages would have unsustained sanitation.

While the above table only identifies the numbers of villages within each classification, each village has itself been categorised in the process. Thus, those villages with unsustained sanitation coverage can be identified as a priority for any available investment in sanitation promotion. Those villages classified as having intermediate sanitation coverage may also be considered for such investment, but as a second priority after those in the unsustained category. Villages where sanitation coverage has already been sustained are unlikely to require significant further investment in sanitation promotion since they have already attained/demonstrated a good level of cover. Thus, this tool has the potential to enable each district to assess progress in light of the sanitation target within the Millennium Development Goals. However, projecting 12 years forward to the year 2015 cannot be done with confidence from the 10-year baseline used in this instance.

3.5 Spatial distribution of sustained sanitation coverage villages

Identifying the sustained/unsustained sanitation villages on a map, displays the relative location of the respective level of sustainability (Fig. 3.4). A ward boundary map of Dodoma Rural District was plotted with Geographical Information Systems (GIS) data provided by GeoData in Dar es Salaam, and the village boundaries were approximated from a MoH annual report. It can be observed that most of those villages along the route of the main roads have more sustained sanitation, but so also do other villages more distant from main routes. Villages along the routes of secondary roads can be recognised to be much more variable with respect to sanitation. The only surfaced road at the time of data collection was the main road leading east from Dodoma towards Dar es Salaam.

Figure 3.4 Dodoma Rural District map: sustainability of sanitation in 2003



Combining the village data would generate a district profile (see section 3.9), and extrapolating the principle from other districts would similarly produce a regional profile, and combining regional data would generate a national profile.

A tool such as this has the potential to identify clearly those villages that are in greatest need of sanitation assistance, and could potentially benefit national and local governments, NGOs and others to highlight where to invest their limited resources. Section 3.9 explores the potential impact on the district profile of addressing each sustainability classification in turn.

3.6 *Validation/sampling exercise 1*

3.6.1 Retesting in 5 villages of varying size

Initial investigations from three separate reports in 2004 indicated that the median village size for the Dodoma Rural District was in the range of 675 to 811 households (Q1: 465 – 575; Q3: 1002 – 1069) (MAMADO 2004; WaterAid Tanzania 2004; Mzwanda 2005). During the time when the data entry technicians were checking data prior to entering onto computer, a revisit was scheduled for a selection of villages in an attempt to check the village data reported. Five villages of varying size were selected with the intention of repeating the exercise in a reduced sample of 40 households from each village. The objective was to see if a random sample of 40 houses would be sufficient to reflect the entire village – or at least the entire data set for each village – and to gain a first hand perspective on villages prior to the actual results being processed. To that end, five village visits were planned where the Researcher would be accompanied by WAMMA staff (see section 2.4.6). The villages were selected according to their own reported size and were:

Manchali,	VG estimated 1113 households;
Zajilwa,	VG estimated 835 households;
Lamaiti,	VG estimated 632 households;
Babayu,	VG estimated 444 households; and
Chipanga "B",	VG estimated 269 households.

The households within each village were numbered according to the data provided by the respective villages. The village data sheets listed the names of all the sub-villages – this was taken as the order for sub-village inclusion. Each sub-village had its own summary page with each 10-cell represented by a column – the order of the 10-cells on the summary page provided the order in which they were numbered. Each 10-cell line diagram page had on the reverse side a map or numbered list of households. Thus, each household for each village was numbered, and could be randomly selected using a random number generator. In this way, 40 households were selected for inclusion in each village sample. In addition to these 40 homes, an additional 30 were selected as possible substitutes where any of the original 40 were not available for any reason. All houses selected from each sub-village were grouped together on the same page to facilitate data collection and a revised version of the srs3 form was created specifically for each sub-village. For each household in the sample, the name of the household head was written on the page, as well as the respective 10-cell leader to ensure that the correct household was clearly identified. At the top of each page, the number of homes to be sampled from that sub-village was recorded, and those homes in the reserve list were clearly identified as such in order to assist data collectors and enable them to identify the first choices. Any unavailable household heads from the primary group within a sub-village could then be substituted by another from the reserve list within the same sub-village. Only where no alternatives remained within the same sub-village would a reserve household from a neighbouring sub-village be selected, and that

only when the households required from that neighbouring sub-village had been completed. Thus, households were randomly selected for inclusion in the repeat data collection exercise.

3.6.1.1 Manchali Village

Manchali was the first of the five villages to be visited. Two WAMMA members, accompanied the Researcher and the 40 homes were divided in two so that the researcher and one member visited 20 (accompanied by a local teacher to help locate each household), and another accompanied the other WAMMA member to visit a further 20 homes. Data collection started at 11:45hrs and was completed at 18:30.

Photo 3.1 Manchali village: stick & sack latrine

Manchali was observed to be large and the housing was quite spread out. It is located on the main asphalt road between Dodoma and Dar es Salaam and therefore had the benefit of good transportation and communication possibilities. It was clear that some homes did not have any toilets though the majority did. Of the 20 households visited by the researcher, one latrine was very simple in construction, with a superstructure made from sticks and sacks to provide a privacy barrier (photo 3.1), and the rest had mud-brick walls. The condition of the walls varied considerably but none of the 20 had any roofs.

Photo 3.2 Manchali village: local pour-flush toilet

Only one latrine had a small concrete slab (photo 3.2) which was connected to an offset latrine pit via a short section of PVC pipe. This was considered a "pour-flush" toilet by the locals although it did not have a water seal. The remaining latrines had logs and mud/soil for a floor with a

simple hole through to the pit beneath.

Photo 3.3 Manchali village: latrine showing rain damage to floor

In a few cases, the rain had caused several holes to develop in the floor as it had washed some of the soil away (photo 3.3). Eleven of the first 40 household heads were not available on the day of the visit so these were substituted from the reserve list. Where possible, the substituted homesteads were within the same sub-village as the intended household, although in one case this was not possible so a homestead from a neighbouring sub-village was selected instead.

3.6.1.2 Lamaiti Village

Photo 3.4 Lamaiti village: grass/reed latrine

Lamaiti was remote by comparison with Manchali, and very spread out. There were a number of simpler toilets observed within the village. Some of these had stick superstructures and some made only from tall grass (photo 3.4). At the same time, a good number were found to be made from mud blocks, and a minority had cement plastered walls and stronger floors (photo 3.5). The latrine in photo 3.5 also had a roof, but again latrine roofs were very few in Lamaiti. Some of the more remote homesteads were found to share a common courtyard area and, in one of those visited, both families reported sharing the same toilet. In this case, the latrine was seen as having equal ownership as opposed to belonging to only one household that allowed the other to use it by permission.

Photo 3.5 Lamaiti village: interior of cement-plastered latrine

Most houses were observed to be of the traditional "tembe" construction using mainly sticks and mud. Some improved roofs had corrugated roofing sheets but simpler homes used banana leaves on top of sticks. All the tembe roofs were covered with a layer of soil – even the ones with metal sheets (photo 3.6).

Photo 3.6 Lamaiti village: traditional tembe housing improved with metal roofing sheets

Eight of the 40 household heads were unavailable at the time of the visit, but in this case, all were able to be substituted from within each respective sub-village.

3.6.1.3 Babayu Village

Photo 3.7 Babayu village: roofed latrine with collapsed wall

Babayu was a smaller village although still quite spread out. Some of the mud built latrines had roofs (photo 3.7) though not many. Despite having a roof, this latrine had been storm damaged and the entrance wall collapsed and replaced (temporarily?) with sticks.

There appeared to be a high groundwater table in places, consequently one household visited had constructed their simple grass built latrine on a slight hill behind their property (photo 3.8) in an attempt to maximise its life and functionality.

Photo 3.8 Babayu village: grass latrine built on small hill

Recent rains had also led to the river level rising and this made it impossible to reach one of the sub-villages from which four households had been selected for inclusion. Since the entire sub-village was unreachable, these four were substituted from the reserves within the other sub-villages. Apart from these, alternatives had to be found for six other households but in each case, this was done within the same sub-village.

3.6.1.4 Chipanga "B" Village

Many of the homesteads visited in Chipanga "B" appeared to be grouped together in small clusters surrounded by their respective land, crops and animals. Previous villages had appeared less planned with housing seeming more individually developed rather than group focused.

Photo 3.9 Chipanga "B" village: flooded latrine

As in Babayu, Chipanga "B" had localised high levels of groundwater, which had clearly filled up some latrine pits (photo 3.9) and rendered them temporarily unusable due to a fear of the stick and soil "slab" collapsing into the pond of sewage beneath.

Photo 3.10 Chipanga "B" village: example 1 of roofed latrine

Another observation from this village was that a higher proportion of the latrines had roofs (photos 3.10, 3.11).

Photo 3.11 Chipanga "B" village: example 2 of roofed latrine

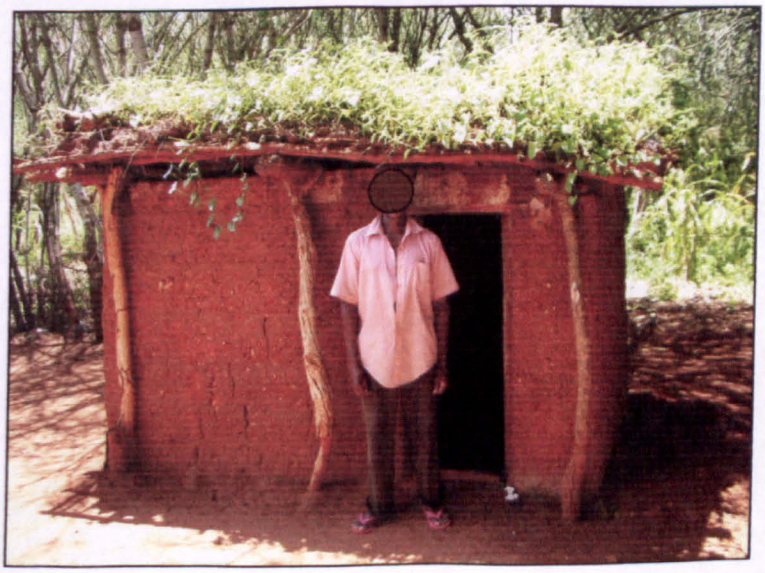
Most of the housing was traditional tembe style and the latrines observed were all of this style of construction although not all were plastered with mud for privacy. It is possible that they had been plastered in this way but the rains may have washed out the plastering in places. Only seven of the planned 40 household heads were unavailable, and all were substituted from the reserve list within their respective sub-villages.

3.6.1.5 Zajilwa Village

Photo 3.12 Zajilwa village: organised market

Zajilwa was the most distant of the five villages from Dodoma town, taking 150 minutes of travelling time. The village was estimated to be spread out over a distance of 25km although the centre of the village had more of a built-up appearance with housing much closer together as well as several shops. On the day of the visit, an organised market was taking place and a good number of traders were selling their wares near the village centre (photo 3.12). While this village was remote from Dodoma, there were some indications of wealth e.g. three tractors were observed (parked, so impossible to confirm their functionality). As expected, family units varied in size and wealth level. One household reported 16 wives with 40 children in a large extended family group of buildings. Possibly because of the market, more household heads/spouses were absent from their respective homes in this village than in any of the others. Fourteen out of the 40 homes had to be substituted for the exercise, but again all were substituted by homesteads within their respective sub-villages.

Photo 3.13 Zajilwa village: example of roofed latrine



Many latrines were of mud-wall construction, and some nearer the centre were noted to be roofed (photo3.13). The results of this exercise are recorded as "validation 1" in table 3.5.

3.7 Validation/sampling exercise 2

In an attempt to further check and confirm the results of the sampling exercise from these villages, each was revisited yet again by WAMMA members between the 17th and 21st October 2005. This represents a gap of 9-10 months from the original full-scale exercise and almost seven months since the above exercise 1 was carried out. The same randomly selected household list was used as before, but this time it was conducted by the WAMMA staff without the Researcher being present. The intention was to revisit the entire 40 household sample and carry out the same exercise for a third time. Because of the nature of the questions asked and the time elapsed since the original exercise, this was an opportunity to confirm whether the same profiles would still be generated without reference to the earlier exercises. The intention was for households to recall and estimate afresh their details rather than try to remember what they had previously reported. This would further check the Phase 1 results and confirm that each village had been capable or gathering their own data.

As before, not all household heads/spouses were available on the day of the visit to each village, and some substitutions were made in most cases – although when the data were returned it was clear that some had been missed altogether, reducing the sample size in the case of three villages. Although the reduced sample size was disappointing, the results have been included in the table below for comparison and completeness – these are reported as "validation 2".

Subsequent to the analysis of the above 5-village validation exercises 1 and 2, the results from each have been set alongside the original full dataset analysis from earlier in this chapter, and the original data for the intended 40-household samples. The results obtained are presented in table 3.5.

Table 3.5 Results of validation exercises 1 & 2

Comparison of validation exercises 1 & 2 with full & sample data set					
Village and estimated size	*Number of homes in dataset*	*10yr Averages (94-03)*		*Village sanitation sustainability rating*	*% of village households in sample*
		Sanitation Coverage	*Rate of change (% per yr)*		
Manchali 1113 households	900	86.7%	0	**sustained**	80.9%
	40 original data	84.7%	0	**sustained**	3.6%
	40 validation 1	79.9%	1.13%	**sustained**	3.6%
	34 validation 2	85.5%	-0.92%	**intermediate**	3.1%
Zajilwa 835 households	772	68.0%	4.82%	**sustained**	92.5%
	40 original data	72.3%	0	**intermediate**	4.8%
	40 validation 1	85.7%	0	**sustained**	4.8%
	40 validation 2	80.4%	1.61%	**sustained**	4.8%
Lamaiti 632 households	632	88.2%	-0.59%	**intermediate**	100%
	40 original data	73.3%	0	**intermediate**	6.3%
	40 validation 1	83.5%	-2.62%	**intermediate**	6.3%
	40 validation 2	77.7%	0	**intermediate**	6.3%
Babayu 446 households	446	88.5%	0	**sustained**	100%
	40 original data	84.2%	0	**sustained**	9.0%
	40 validation 1	66.7%	0	**intermediate**	9.0%
	39 validation 2	76.7%	0	**intermediate**	8.7%
Chipanga "B" 269 households	261	89.5%	0	**sustained**	97.0%
	40 original data	91.9%	0	**sustained**	14.9%
	40 validation 1	93.5%	0	**sustained**	14.9%
	38 validation 2	86.6%	1.39%	**sustained**	14.1%

It can be observed from table 3.5 that despite some variation in the 10-yr average sanitation coverage figures (column 3) and to a lesser degree in the rate of change in coverage (column 4), the sustainability classification of the villages remained largely similar. Using the original data for the random samples of 40 households, only Zajilwa village classification was misclassified as intermediate on the sampling level of 4.8%. Taking the first repeat exercise data, again only one village was misclassified – Babayu on a sampling level of 9%, emerged as

intermediate when the main exercise assessed it as sustained. Thus in each case one village was wrongly classified as intermediate but none were misclassified as unsustained when previously recognised as sustained. For the second repeat exercise and despite smaller sample sizes in some villages, the classification results were all identical to the first repeat exercise – with the notable exception of Manchali where the sample size was reduced to only 34 households (an estimated 3.1% of houses in the village). This result may well have been skewed by the smallness of the sample size.

At the time of selection, the above villages were primarily chosen in order to explore the effect of overall village size rather than sampling error in the apparent level of sustainability of sanitation. Following the analysis of the initial data, it can now be seen that none of those villages selected had unsustained sanitation cover. In order to try to observe the influence of sampling on villages with that sanitation profile, six further villages were selected. Of these six, three had been classified as having sustained coverage, and three had unsustained coverage.

3.8 Effect of varying sample size on sustainability rating of large & medium villages

When all the data from Phase 1 had been processed and analysed, it was possible to assess which villages had been classified in each sustainability category. At the same time, the size of each village had also been confirmed for the purposes of this research. From this information, two large (>1,000 households) unsustained sanitation villages were selected alongside one large sustained sanitation village; and one medium sized (in the range 500 – 700 households) unsustained sanitation village alongside two medium sustained sanitation villages. The intention was not to repeat the exercise in these six villages by revisiting them, rather to take a variety of random sub samples from the original data. In the same way that households had been randomly selected from each village for the above "repeat" exercise and the original data from each of these was reanalysed separately to generate sanitation profiles for each village sample, this approach could be used to assess any further villages to be sampled. Previously the number of households had been limited to 40, but for the next six villages this number could be varied. It was decided to explore the impact of varying the sample size from 40 up to 100 households from each of the six villages to see if there was an obvious minimum sample size that would be required to generate an accurate profile. Smaller villages were not included here since 40 to 100 households represent a much higher sampling percentage of homes for them. The results of this exercise were as shown in table 3.6.

Table 3.6 Results of sample size variation on sustainability rating

Effect of varying sample size on sustainability rating of large and medium size villages.					
Village and estimated size	*Number of homes in sample*	*10yr Averages (94-03)*		*Village sustainability rating*	*% of village households in sample*
		Sanitation coverage	*Rate of change (% per year)*		
Itiso **1734** households	1279	49.7%	0	**unsustained**	73.8%
	40	54.8%	0	**unsustained**	2.3%
	60	47.2%	-2.60	**unsustained**	3.5%
	80	45.8%	-2.42	**unsustained**	4.6%
	100	46.2%	-2.02	**unsustained**	5.8%
Kigwe **1572** households	1115	86.4%	0.53	**sustained**	70.9%
	40	90.7%	0	**sustained**	2.5%
	60	86.3%	0	**sustained**	3.8%
	80	83.1%	1.34	**sustained**	5.1%
	100	85.4%	1.12	**sustained**	6.4%
Mgunga **1117** households	1103	52.3%	0	**unsustained**	98.7%
	40	49.5%	1.42	**intermediate**	3.6%
	60	46.9%	1.69	**intermediate**	5.4%
	80	47.1%	0	**unsustained**	7.2%
	100	46.6%	0	**unsustained**	9.0%
Mnase **658** households	651	97.4%	0.17	**sustained**	98.9%
	40	99.4%	0	**sustained**	6.1%
	60	98.7%	-0.49	**intermediate**	9.1%
	80	96.4%	-0.45	**intermediate**	12.2%
	100	96.4%	0	**sustained**	15.2%
Ndebwe **625** households	622	90.9%	0	**sustained**	99.5%
	40	89.2%	0	**sustained**	6.4%
	60	91.0%	0	**sustained**	9.6%
	80	93.0%	0	**sustained**	12.8%
	100	93.1%	0	**sustained**	16.0%
Ndogowe **588** households	585	49.2%	0	**unsustained**	99.5%
	40	53.4%	3.30	**intermediate**	6.8%
	60	53.9%	1.44	**intermediate**	10.2%
	80	56.3%	1.61	**intermediate**	13.6%
	100	58.8%	0.92	**intermediate**	17.0%

Table 3.6 shows that in no case was a sustained sanitation coverage village mistaken for an unsustained one regardless of the sample size when a small sub sample was used to grade it. Similarly, no unsustained village sample was classified as sustained. Using a sample size of 40 households, two of the six villages (both assessed as having unsustained sanitation) were reclassified as intermediate. Since the same procedure was used previously with the other five villages, we can combine the results to show that three out of eleven villages (27.3%) were incorrectly assessed using a 40 household sample. The sample showed one village reclassified down from sustained to intermediate sanitation, and two villages reclassified upwards from unsustained to intermediate sanitation.

Table 3.7 Sampling agreement summary

Comparison of Sampling Results vs. Full Data Set						
Sample Size	# of villages	Sample = Full Data	Sample < Full Data	Sample > Full Data	Total # Different	% agreement
40	6	4	0	2	2	67%
40	11	8	1	2	3	73%
60	6	3	1	2	3	50%
80	6	4	1	1	2	67%
100	6	5	0	1	1	83%

Recognising the limitations of sampling from only 6 – 11 villages, the above table suggests that a sample size of 80 households may not produce significantly higher agreement than a sample of 40. Only with a minimum of 100 homes did the percentage agreement rise and this would suggest that a minimum sample size of 100 households would be required to increase the confidence level. Further villages would need to be included in the sampling exercise in order to further increase the level of confidence in the above sample sizes.

3.9 Discussion and application of Phase 1

3.9.1 Participatory monitoring by village governments

The sanitation graphs (latrine acquisition curves (Smith 1988))generated during Phase 1 of this research (see examples in Appendix 4) have direct application with respect to participatory monitoring at village level. Some VGs were found to have already engaged in measurement of the progress of their village in other aspects of development and a number of records had been generated e.g. in respect of agricultural produce, school attendance, even wealth ranking in a few cases. Village generated data would lead to a clear graphical indication of how the coverage is changing from year to year, and have the potential to be updated every five to ten years (as opposed to a point measurement taken on an annual basis). This thesis has already shown that villages are capable of collecting their own data in a very cost-effective way. Such monitoring could be facilitated by only minor involvement from District Government and the

graphs generated could be used as part of the participatory assessment for programmes. In particular, these may be of value in more bottom-up approaches such as SM or CLTS.

3.9.2 District Government monitoring

The graphs shown in Figure 3.1 and Appendix 5 would enable DG staff to recognise which villages would benefit from further sanitation promotion. Engaging with VGs to monitor sanitation every 5 to 10 years (as in 3.9.1) would enable the DG to keep up to date with progress and to ensure that resources are targeted specifically towards those villages which need help i.e. the unsustained sanitation villages and to a lesser degree the intermediate sanitation villages (see 3.10). Such monitoring would demonstrate progress towards the MDG sanitation target for each village as well as for the district as a whole (see 3.9.4, 3.9.5). Similarly, if applied across other districts, a regional profile could be generated and potentially a national profile if all districts took part, and thus the progress towards the MDG target could be tracked with a greater degree of confidence. Indeed the monitoring could continue after the 2015 deadline until any remaining villages had sustained sanitation coverage.

3.9.3 Quantifying the impact of sanitation interventions

Attempting to assess the impact of sanitation programmes or interventions, regardless of who has conducted or funded them, has in the past often been hampered by a lack of baseline information on coverage. Even if the numbers of latrines constructed during the programme are recorded, there may not be any record of how many were first-time latrines as opposed to replacement latrines. Therefore there may be no connection between the number of latrines constructed and the level or change in coverage. One example of this would be the HESAWA programme which is discussed in more detail in Chapter 4. Table 4.3 is an example of different sources estimating sanitation coverage for the same region but a disagreement of 22% for the Mara region and 15% for the Kagera region in 1978 means that the baseline is uncertain and therefore the actual impact of the 17-year programme is unclear. This same table also demonstrates the difficulties associated with comparing different data sources for different years i.e. each of four sources are listed, but the criteria may be different for each. A village sanitation profile/latrine acquisition curve for each village in the HESAWA (or any other) programme could provide a coverage level at the beginning of the programme – as well as the 10-year trend line for the preceding 10 years. The profile could be extended throughout the period of the intervention and beyond to give the coverage level at the end of programme activities as well as each other year up to the time of the survey. This could help identify not only when the various latrines were built and how the coverage has changed, but also how the demand for latrines has changed – by comparing the trend line gradient for the years following the programme to that of the 10 years prior to the programme. This would be possible even in the absence of baseline data, and the longitudinal survey would mean that criteria were consistent for the entire period.

3.9.4 Applying MDG targets at village level

Since most villagers will be unaware of the MDG sanitation target, the individual village graphs as exemplified in Appendices 4 and 5 would be appropriate for participatory monitoring of coverage at village level even without reference to the MDGs. However, this study has produced data for each of the 118 villages and it is actually possible to apply the MDG sanitation target formula at village level, calculating an individual goal for each village. This would recognise the reported village sanitation coverage for 1990 (Appendix 6) and allow its progress to be measured against itself rather than (or as well as) a national or international standard. In section 3.4.2, the projected coverage values for the year 2008 were calculated (also recorded in Appendix 6). Therefore, a simple comparison is possible to check on projected progress by 2008. This process may be more appropriate for engaging ward and village governments in sanitation progress than comparison with a more "remote" national situation. Figures 3.5 – 3.7 may be useful for the District Government in order to gain a snapshot of the progress of each village throughout the district as a whole.

Figure 3.5 Comparison of projected sanitation coverage in 2008 against village MDG targets for 2015: Sustained sanitation villages

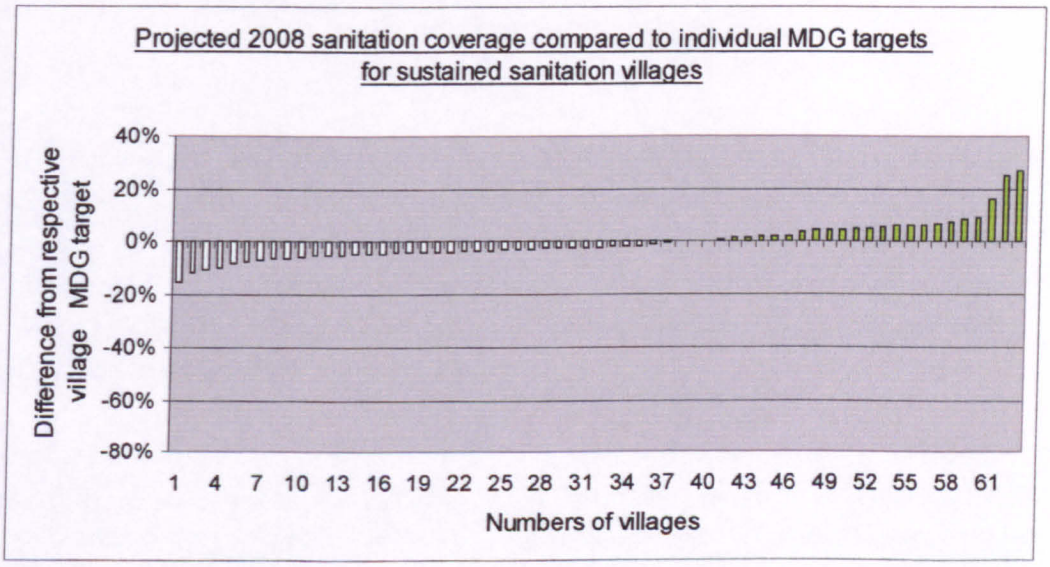
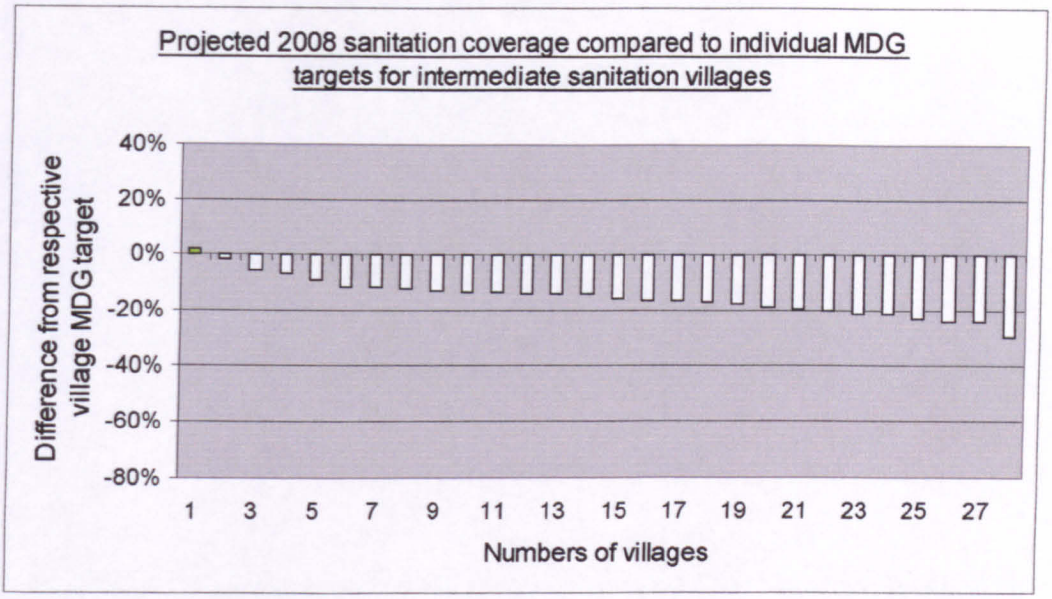


Figure 3.5 represents the difference between each of the 63 sustained sanitation villages projected sanitation coverage in 2008 and their respective MDG target (based on the reported values for 1990). Those villages numbered 38 to 63 (26 in all) are projected to have already met or exceeded their respective MDG targets by 2008. A further 23 villages (numbered 15 to 37) are projected to be within 5% of their target, and of the remaining 14 villages, only four are projected to be more than 10% away from reaching their individual target. Overall this would suggest that by 2008, 49 (77.8%) of sustained sanitation villages are projected to either have reached or be within 5% of reaching their respective MDG targets, and 59 (93.7%) would be within 10%. The mean for the whole group is within 0.5% of reaching their targets by 2008. By

contrast, the intermediate sanitation and unsustained sanitation villages are shown in Figures 3.6 and 3.7 below.

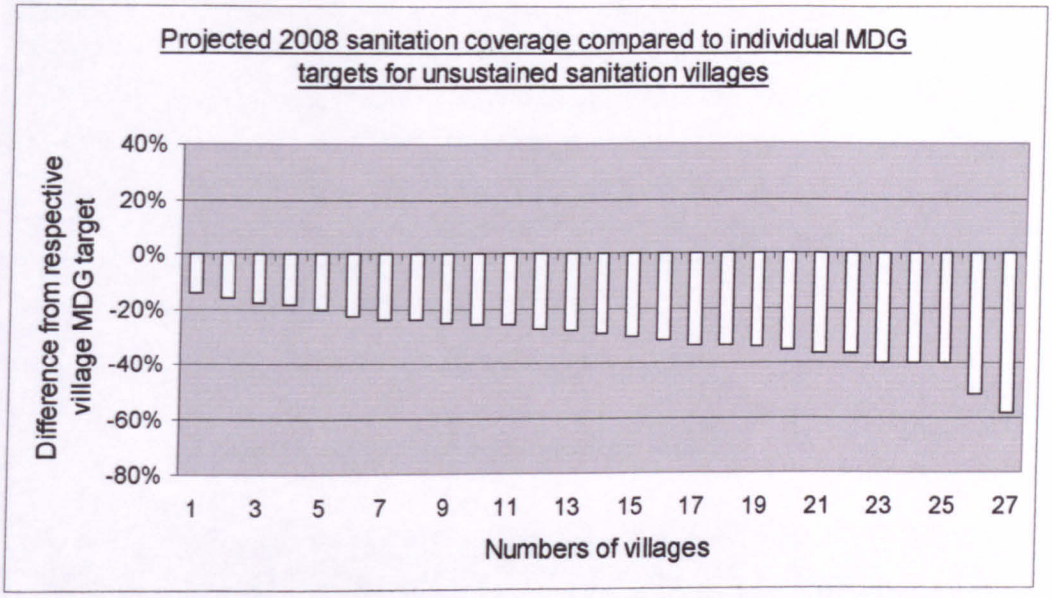
Figure 3.6 Comparison of projected sanitation coverage in 2008 against village MDG targets for 2015: Intermediate sanitation villages



Although classified as intermediate sanitation villages, six of these villages have a rising rate of sanitation coverage, six are falling and 16 are remaining at the same level (see section 3.4.1). Figure 3.6 shows that one of the intermediate sanitation villages is likely to have reached its MDG target by 2008, and another is likely to be within 5%. For the remaining villages, three are projected to be short of their target by 5 to 10%, a further 16 villages between 10 and 20% and the remaining seven villages range up to 30%.

The unsustained sanitation villages are projected to miss their respective targets by amounts ranging from 14.5% to over 58% by 2008 (Fig. 3.7). However, it should be recognised that 17 of the 27 villages have a falling rate of coverage, which means that it is possible that by 2015 their sanitation coverage level could be even lower (and therefore miss their individual MDG targets by even more than shown on the graph). This assumes no positive sanitation influences on the villages in question.

Figure 3.7 Comparison of projected sanitation coverage in 2008 against village MDG targets for 2015: Unsustained sanitation villages



Figures 3.5 to 3.7 combine the concept of sustainable sanitation with individual village MDG targets, projecting forward by five years from 2003 to 2008. Thus, the concept of the MDG target could be applied on a village-by-village basis and would allow a District Government to monitor progress within the context of each individual village – as well as grouping villages according to their measured level of sanitation sustainability. This would also provide a tool for each village to document their own progress. A similar exercise could be carried out in 2011 and projected to 2015 to evaluate where each village would be in relation to their own or even the national MDG sanitation target. Such an exercise would assess where the greatest improvements have occurred and what remains to be done in order to achieve the target.

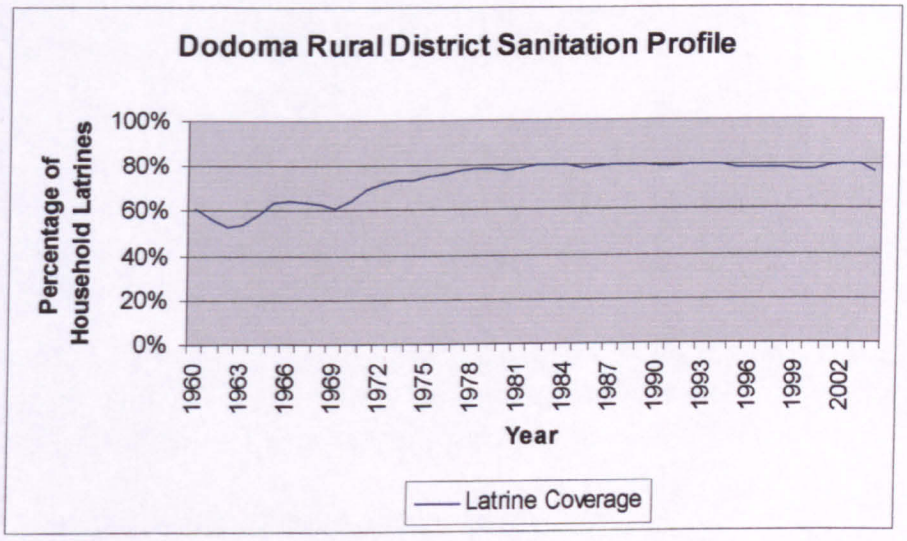
The above approach has the potential to be further developed and applied in respect of monitoring progress towards the other MDG targets. Sanitation coverage is part of Target 10, and the other aspect of that target is access to improved water sources which could also be assessed in this way. Indeed, with slight modifications, aspects of the first seven of the eight MDGs could be monitored using variations of the survey methodology utilised here.

3.9.5 District level sanitation coverage

Sanitation coverage is typically published at national level (e.g. (WHO/Unicef JMP 2000), (WHO/Unicef JMP 2006)) and this can create the impression that the entire country is at the same (or of a very similar) standard. However, a single sanitation statistic such as latrine coverage is liable to hide any number of localised variations as noted in section 3.9.4. The GWSSA report shows a rural sanitation coverage level for Tanzania in 1990 of 86% and again for 2000 it remains at 86% implying no change. The later WHO/Unicef JMP document applies

different criteria to its definition of "improved latrines" and disallows the inclusion of shared latrines (see section 3.12). This results in a revised estimate that the overall national sanitation coverage for Tanzania in 1990 was 47%, and in 2004 this figure is reported as still being 47% - although the claimed rural coverage is purported to have fallen from 45% in 1990 to 43% in 2004. Clearly, there is a major disparity between the two sets of figures and the reality is likely to lie somewhere between them. Both reports agree, however, that rural sanitation coverage in Tanzania (whichever figure you accept) has not improved since 1990. Despite the variety of individual village profiles recognised in section 3.4 of this thesis, combining these data to create the coverage profile for the Dodoma Rural District as a whole would support the unchanging nature of the above statistics for this period (Fig. 3.8).

Figure 3.8 Dodoma Rural District latrine coverage since 1960



The Phase 1 data that produced the above graph, demonstrates that over the 10-year period from 1994 to 2003, 23 villages were seen to have falling sanitation coverage trends (Fig. 3.1). At the same time, 40 villages were recognised to have rising coverage trends. Despite this, the overall picture seems to have remained essentially constant. Regression analysis on the above data between 1994 and 2003 (per the villages in section 3.3.2) confirms that the trend line gradient is not significantly different from zero, and that the mean coverage is 78%.
On this basis, the likely coverage in 2015 would also be in the region of 78%.
In an attempt to improve the situation, the District Government may wish to consider the following options, using the sustainability classification of Phase 1.

3.9.5.1 Concentrating efforts on the sustained sanitation villages...

Villages where sanitation has already been sustained can be thought of as generally having already accepted and implemented latrine construction and therefore may appear to require less effort to reach an even higher standard. Sixty-three villages were classified as having sustained sanitation and any effort to increase coverage for each of them could actually imply a

considerable effort (due to the number of villages) despite the fact that these villages are closer to Dodoma and already have higher coverage. To explore the effect of addressing the sustained villages, we can consider the maximum potential, i.e. if all sustained villages reached 100% coverage and all others continued according to their current trends. The effect of all the 63 sustained sanitation villages reaching 100% coverage in 2015 would be to raise the district profile – but perhaps by less than might be expected. The projected increase in district coverage would be in the order of 4%, taking the revised projection to 82%.

3.9.5.2 Concentrating efforts on the intermediate sanitation villages…

Twenty-eight villages were classified as having intermediate sanitation. Only one of these was anticipated to reach its individual MDG target by 2008 (see section 3.9.4) without further assistance. If progress was such that each of the 28 villages reached their own target (without addressing any villages from other categories), the impact on the 2015 district coverage would be to raise it by approximately 3% to a projected 81%.

3.9.5.3 Concentrating efforts on the unsustained sanitation villages…

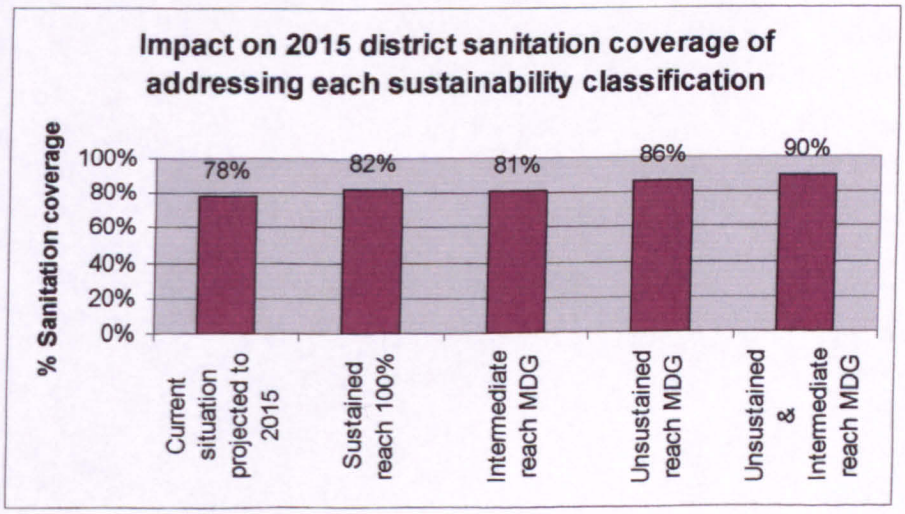
Twenty-seven villages were classified as having unsustained sanitation and none of these was expected to reach their MDG target or even come close to it (see section 3.9.4). However, if each of these 27 villages were to reach their own target by 2015, the district coverage would be projected to increase by 8% to reach 86%.

3.9.5.4 Concentrating efforts on the unsustained and intermediate sanitation villages…

If it were possible to target both the unsustained and the intermediate sanitation villages, the combined effect would take the projected estimate to 90%.

Figure 3.9 represents the above results graphically.

Figure 3.9 Dodoma Rural District projected sanitation coverage in 2015 by influence of sustained sanitation category



Therefore, it is recommended that to improve the overall district sanitation coverage, sanitation promotion efforts should be concentrated primarily on the unsustained sanitation villages, and if time and funding allows, the intermediate villages could be targeted as well. This would have the effect of limiting the additional sanitation promotion to either 27 villages or possibly 55 (if the intermediate villages were included) instead of all 118 from Phase 1. The smaller number would in effect lead to a higher concentration of available resources in fewer villages rather than spreading equally through all.

3.9.6 Latrine replacement

As data from Phase 1 of this study shows, latrines are being constructed and replaced over time. The line diagrams provided by each household suggest that latrine replacement is commonplace although not always immediate. Figure 3.10, below, is a copy of actual household data from one of the "10-cell" groups of houses from the Phase 1 data collection. The left hand column identifies each of 20 households with a number. The second column shows the year of house construction. In the main grid section, the horizontal lines represent the years that each household had a functioning latrine. The right-hand column identifies with a tick which latrines were shared with other families at the time of the survey and the row of numbers at the top of the sheet represents the total numbers of latrines in the 10-cell for each year between 1960 and 2004. The design of the data-collection tool was such that if a latrine were to be replaced during the same calendar year as the old one had filled/collapsed, it would not show any gap in service (the line would appear to be continuous). Even where a latrine had ended in one year and been replaced during the following year, the annual totals would show that the house in question did have a latrine during part of both years. However, gaps of more than one year appeared frequently in the recorded data. This may represent something of a short-term cash-flow problem rather than a decision to not replace the toilet immediately. It was clear from most villages that such "immediate" replacement was not possible for all households (see Figure 3.10).

Figure 3.10 Line diagram for one of the 10-cells from the Wonjeleza sub-village of Chali Isangha

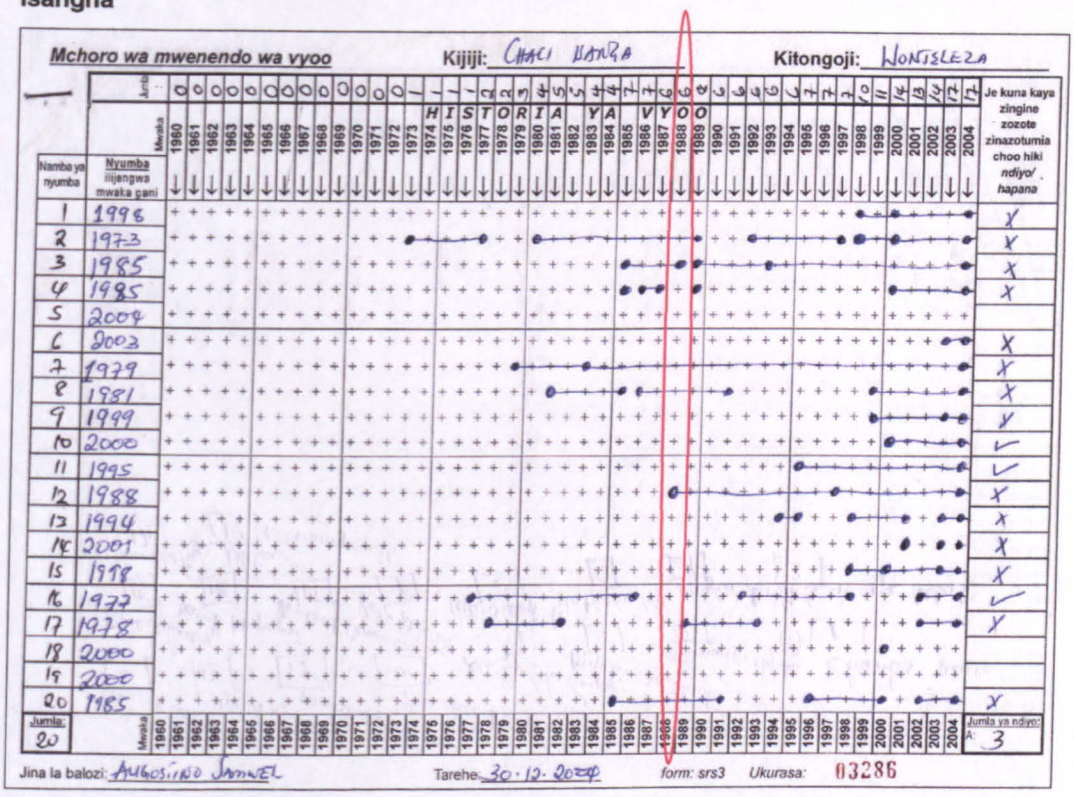


Figure 3.10 demonstrates that households may have a variation in their ability to replace latrines:

- house 11 appears to have had the same latrine from 1995 to 2004
- house 12 had a latrine from 1988 to 1997, replaced it during the same year and this replacement latrine was still functioning in 2004
- by contrast, house 2 had a latrine from 1973 to 1977. This was followed by a gap where the household had no latrine until 1980. The replacement then lasted until 1989 and the next latrine was built some three years later in 1992 and lasted until 1997. This was replaced in 1998 and continued to 2000 when it was replaced again with the latrine that was still functioning in December 2004 – at the time of the survey.

Latrine replacement, though possible, was not always immediate for all households. This implies that latrine coverage, which can be seen to vary from year to year, may not necessarily indicate that those without a latrine at that point in time are among those who still need persuasion to have one. They may simply be between latrines at that particular point. For example, if we again consider Fig. 3.10, the year 1988 (highlighted in red) would reflect a coverage of 67% – only nine of the 20 households existed in 1988 and a total of six latrines. However, each of the three houses without a latrine at that time had previously had one, and all replaced their latrine over the next four years, subsequently replacing again after that. This

would imply that once people have decided to build a toilet, further persuasion may not be necessary. However, an investigation into the constraints, which prevent households from replacing their latrines sooner, may produce some additional insights.

3.9.6.1 Latrine replacement and sustainability of sanitation at household level

Sustainable sanitation may not be easily seen in a cross-sectional survey at household level since the assessment may take place during one of the gaps between household latrines. This could have the potential to create a less than accurate picture of the household's desire or intention to replace their latrine (Jenkins and Scott 2007), though it would reflect their actual ability within the constraints of their household situation.

The scope of this study is specifically focused on villages as a whole, in an attempt to identify and measure the sustainability of sanitation. The criteria for sustainability at household level would mean a different type of assessment. For example, if sustainability were to be measured by the number of times a replacement latrine had been built by a particular household, then there could be a discussion as to what the number of replacements would need to be to qualify as "sustained". If, for example, a total of three latrines were to be used as the measure of sustainability (i.e. two replacements), eight of the 20 households in Fig. 3.10 would qualify, yet some of these had periods of up to 11 years before replacing their latrine. This basis would also disqualify some of the newer households (such as number 1) which had continuous service from their latrine and replaced it only once. Even some of the older houses would not qualify if only one replacement had taken place (e.g. number 12).

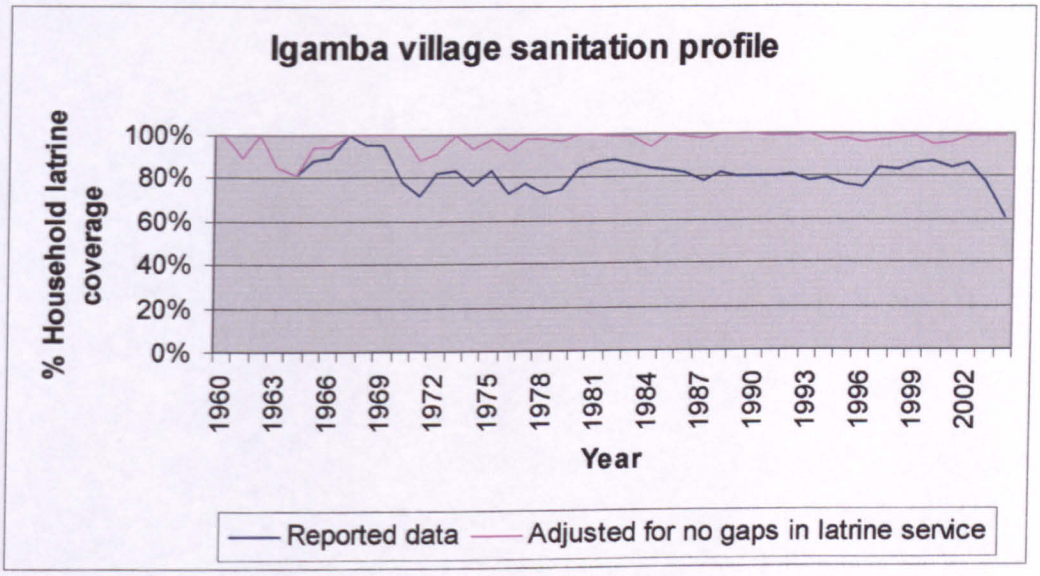
The ability for a household to be able to replace their latrine is vital for sanitation to be sustained, as can be seen from the above example. However, the findings of this thesis would suggest that a more complete picture may be presented when considering the entire village.

3.9.6.2 Latrine replacement in the village of Igamba

Like Chali Isangha, (one 10-cell of which was represented in Fig. 3.10) the village of Igamba was classified as having sustained sanitation during Phase 1, but it produced many examples of households that were able to replace their latrines only after a period of a year or more. Taking Igamba as a whole, the average sanitation coverage from 1994 to 2003 was 82% and this coverage level was being maintained. Despite this sustained sanitation profile, fully 226 of the 365 households (63%) reported having at least one break in sanitation of a year or more. The majority of the others had built their first latrine after the year 2000, and may simply not yet have needed to replace it. Only four houses were seen to never have had a toilet – but again none of these houses was more than five years old (and may therefore still expect to have a latrine in the near future). The median break in households having their own latrine was 2 years, but the range actually spanned from one to 14 years and in one extreme case 19 years was reported before replacement came about.

The cumulative effect of all these breaks in service was explored by taking each household that had constructed a latrine, and assuming no gaps in latrine service. This was the same as recording the year each house was constructed, and simply asking when their first latrine was built – in this way assuming continuous latrine access since the initial construction. The results of this exercise are shown in Fig. 3.11.

Figure 3.11 Village sanitation profile showing reported vs. continuous household latrine presence



The impact of continuous latrine presence was to raise the average sanitation coverage (1994 to 2003) from 82% to 97%. This implies that if households were able to overcome the constraints that prevent them from replacing their latrine immediately, the village sanitation profile could be improved by some 15% in the case of Igamba. The adjusted graph from Fig. 3.11 may be seen to represent the level of acceptance or even potential for latrines within Igamba, although what has actually been possible is represented by the reported data.

The significance of this is that while sanitation promotion has clearly been effective, it may be appropriate to consider what can be done now to reduce the time between latrines for individual households. In Phase 1, we were able to identify the existence of such latrine gaps, but did not attempt to explore any reasons for them. The most likely explanation may be that of individual household cash flow (long or short term). Subsistence farming in rural Tanzania is widespread and essentially weather-dependent – principally with respect to rainfall. This means that when rainfall is below average, the crop yield is less (sometimes significantly less) than what might be realistically anticipated for a normal year. The result is that families that usually cope well with the demands and necessities of life in their village may be reduced to food-insecurity for the next year or more. Indeed, more than one year of limited cash flow is possible, or even probable, since households may be unable to afford all the seed required for planting in the next

year – which may limit the next year's crop yield too (and potentially beyond since it may take several years to fully recover). In such situations, replacing a full latrine may not be the highest item on their priority list. However, this does not mean that they would not wish to do so. In such a situation, latrine promotion may not be as effective as a short-term loan for example. Perhaps agencies should avoid implementing sanitation and hygiene promotion programmes immediately following such seasonal weather extremes, to allow households to recover financially and concentrate on issues of survival until some semblance of normality has been resumed. Clearly, the recovery time necessary would depend on the severity of the drought or flood.

To explore this concept of delayed latrine replacement further, attempts were made during Phase 1½ to confirm sanitation behaviour after a latrine becomes no longer functional (see section 5.7.18). Further study of the reasons behind such delays (and possible strategies to reduce them) would help in the design of more appropriate interventions and increase the coverage and sustainability of sanitation in settings such as the Dodoma Rural District, where the habit of latrine use and (eventual) replacement is already fairly well established.

3.10 Changing definition of improved latrines

The definition of an acceptable "improved" household latrine has changed over recent years. In 2003, the UN published its document "Indicators for Monitoring the Millennium Development Goals", and section 31, page 66, defined the proportion of population with access to improved sanitation in the following way:

> **"... the percentage of the population with access to facilities that hygienically separate human excreta from human, animal and insect contact. Facilities such as sewers or septic tanks, pour-flush latrines and simple pit or ventilated improved pit latrines are assumed to be adequate, provided they are not public, ... To be effective, facilities must be correctly constructed and properly maintained." (U. N. 2003)**

The following year, the WHO/Unicef Joint Monitoring Programme for Water Supply and Sanitation published this special rule for estimating access to improved latrine facilities in the Annex of their 2004 Policies and Procedures document:

> **"Although simple pit latrines are classified as improved, many surveys use categories such as simple pit, pit, pit latrine, traditional latrine or latrine interchangeably. Such categories are known to include facilities that are neither sanitary, nor provide privacy. They are not considered improved in their entirety and therefore count only 50% in coverage estimates..." (WHO/Unicef JMP 2004a)**

Also:

> **"Public or shared sanitation facilities are not considered improved because such facilities are usually unhygienic and lack privacy..." (WHO/Unicef JMP 2004a)**

The above definitions suggest that only 50% of household pit latrines may be included as "improved latrines" in coverage estimates; and those facilities which are shared by more than one household, do not qualify at all. The application of these definitions may help to explain the difference in reported coverage levels for Tanzania between the GWSSA 2000 assessment (WHO/Unicef JMP 2000), and subsequent documentation (WHO/Unicef JMP 2004b;

WHO/Unicef JMP 2006). Where latrines are shared, the above wording implies that they are expected to be unhygienic and lacking in privacy – though these issues may relate more to the numbers of users rather than the physical condition of the structure. Where a latrine is used by a variety of families living in the area, it could be seen as essentially a public facility; however, this may not be the situation if a latrine is only shared by two households (see 3.11.1).

The foregoing definitions must be applied in a consistent fashion if progress is to be clearly recognised. There is potential for confusion if governments and monitoring bodies apply differing definitions within the same document. An example of this possibility was noted in the Tanzania section of the ***Getting Africa on Track to Meet the MDGs on Water and Sanitation*** report in 2006 (AMCOW, WSP-Africa et al. 2006). The 1990 rural sanitation coverage was listed as 45% (in line with the ***Mid-Term Assessment*** (WHO/Unicef JMP 2004b) as opposed to the 86% listed in the ***GWSSA 2000 report*** (WHO/Unicef JMP 2000)). In the same table, the 2002 rural figure was given as 90% (which reflects the earlier definition of the ***GWSSA 2000 report*** (86%) rather than the revised definition and evaluation of the 2004 ***Mid-Term Assessment,*** which places the rural coverage in 2002 at 41%). While the 90% 2002 coverage was reported to be according to the 2002 national census, it was recognised in a subsequent paragraph that a "strict MDG definition may place coverage closer to 50%" (AMCOW, WSP-Africa et al. 2006). Thus, the implied change in coverage over the 12-year period is presented as doubling from 45% to 90% as opposed to a much smaller change from 45% to "closer to 50%". Whichever definition is used, consistency must be applied in order to recognise actual change.

3.11 Shared latrines

According to the above definitions, shared latrines cannot be included in the analysis of progress towards the MDG sanitation target (WHO/Unicef JMP 2004b), and that only half of the private household latrines are actually recognised in the data, regardless of condition or whether the latrine in question is "protected" within a family compound. Apart from potentially disallowing high quality household latrines from inclusion in the statistics, if this concept were to be understood and applied at district or village level, it would potentially discourage neighbours from being friendly towards people in need who may even be part of their own extended family. Not every household is likely to be willing to share their facilities – especially on a long-term basis. However, in a culture where helping each other through times of hardship is seen as a positive thing, this option to help would effectively be removed if the above criteria were applied locally. If a family wished to be generous in this way, they themselves would no longer be seen to have an acceptable toilet (even if it is made of concrete and is the best in the area) simply because they wanted to help by sharing. On the face of it, this would seem manifestly unfair. However, where a "shared" latrine is seen as available for use by anyone in the vicinity, this would be more akin to a "public" latrine and such public facilities are unlikely to be of an acceptable hygienic standard and may lack privacy – though this is not always the case either. Multi-cubicle public toilets are often associated with a market, clinic, school or a place of

worship, and have no private family ownership as such. Clearly, these do not qualify as household toilets and therefore should not be included in the coverage statistics.

3.11.1 The case for including shared latrines

Where a family has been in the habit of having and using their own latrine for an extended period of time, in due course they may find that the pit has become full (or is no longer functional for another reason such as collapse). The family may wish to continue to retain their sanitation standards, despite not being able to access the cash flow required to replace their latrine immediately (see section 3.9.6). Such a situation could result in a discussion with a near neighbour who is happy to allow them access to their family latrine in the short term as found in 5.7.18. The result of this could be that, for a season, both households share the same facility until the first family are able to replace their own. Even though such a situation is considered temporary, the family demonstrating compassion and generosity towards their neighbour – who may even be a relative – has the impact of disqualifying their own latrine from inclusion in the coverage statistics if the above classification is taken literally. Thus, not just one household but two would be considered to have lost access to an improved latrine. This would mean that the recognised coverage for a village would be less than the reality – since neither household would have adopted open/indiscriminate defecation practices in the bush. The impact of latrine sharing is discussed further in sections 5.7.18 and 7.3.11, but more research is required to confirm the extent to which sharing is taking place along with the duration periods and limitations.

3.12 Summary of Phase 1 findings

This research began by assessing the sanitation history of 118 villages of the Dodoma Rural District of Tanzania. The key findings of Phase 1 were:

a) ***It is possible to train and equip villagers to organise themselves to gather historical data on sanitation coverage at household level.*** (section 2.3)

b) ***The data can be used to produce village sanitation profiles*** (section 3.2), ***to classify villages: by sanitation coverage level*** (section 3.3.1); ***and according to their rate of change in sanitation coverage*** (section 3.3.2).

c) ***A high sanitation coverage value does not guarantee or imply a positive rate of change in coverage*** (section 3.4.1), ***so that both coverage level and rate of change are required to assess sustainability*** (table 3.3).

d) ***If villages are classified as having sustained, intermediate or unsustained sanitation*** (section 3.4.1), ***repeating the exercise in a random sub-sample of 40 households from each village produced identical classification results in four out of five villages.*** (section 3.6 – 3.7)

e) ***Random sampling of data from a further six villages using sample sizes from 40 to 100 households produced identical classification results for three to five villages depending on sample size and support a minimum sample size of 100 households per village.*** (section 3.8)

f) ***The greatest increase in District sanitation coverage would come from focusing efforts towards the unsustained sanitation villages first and then into the intermediate sanitation villages if resources permit.*** (section 3.9.5)

g) ***Replacing full/collapsed latrines is happening across the Dodoma Rural District but many households are unable to replace their old latrine straight away.*** (section 3.9.6) ***Further research may help confirm if the delayed replacement is related to cash flow problems stemming from seasonality (either too much or too little rain).*** (section 3.9.6.2)

h) ***The sharing of latrines between households is common throughout the district.*** (section 3.11)

4 Review of past sanitation and hygiene promotion initiatives in Tanzania

4.1 Overview

This chapter begins by providing an historical overview of the United Republic of Tanzania, detailing the structures of governance and the inclusion of sanitation within government policies. The main body of chapter four is a review of four interventions, which included a sanitation and hygiene component and took place in various regions of Tanzania between 1985 and 2002. This is the result of a desk study, carried out between August and November 2005, involving the review of 30 relevant project reports, which were sourced by WaterAid Tanzania for this purpose (though none of the programmes had any WaterAid involvement).

As a basis for contrast and comparison, the above programmes were assessed in line with the WaterAid Research Tool number 2 (Jenkins undated) with respect to the following headings:

- Technology choice (section 4.4)
- Information, education and communication (section 4.5)
- Demand stimulation (section 4.6)
- Product provision (section 4.7)
- The enabling environment (section 4.8)

4.2 The Tanzanian context

4.2.1 Historical summary

Formerly known as Tanganyika, mainland Tanzania obtained its independence from British Colonial rule in 1961. The island of Zanzibar similarly gained its independence in 1964 and in the same year both came together to form the new United Republic of Tanzania. In 1967, President Nyerere published his socialist vision for the nation, known as The Arusha Declaration (Nyerere 1967). One of the points raised in this document was a recognition that development was about people rather than finances, and a second was that villages and the rural areas would play a key role if such development were to become a reality. A result of this was the "Operation Vijiji" or Villagisation programme (1972-1976) where the GoT (Government of Tanzania) sought to transform the model of rural settlements by grouping together the rural population in nucleated villages rather than in dispersed family smallholdings. These villages were intended to be of a size that would be considered bureaucratically efficient for the delivery of services. Part of the overall plan seems to have been the idea that these new "Ujamaa" or "familyhood" villages could become the basis for a socialist system of production. The socio-political, economic and environmental results of Villagisation have been further explored by Briggs and Kikula in their respective documents (Briggs 1979; Kikula 1997).

4.2.2 Governance structure – regional to village level

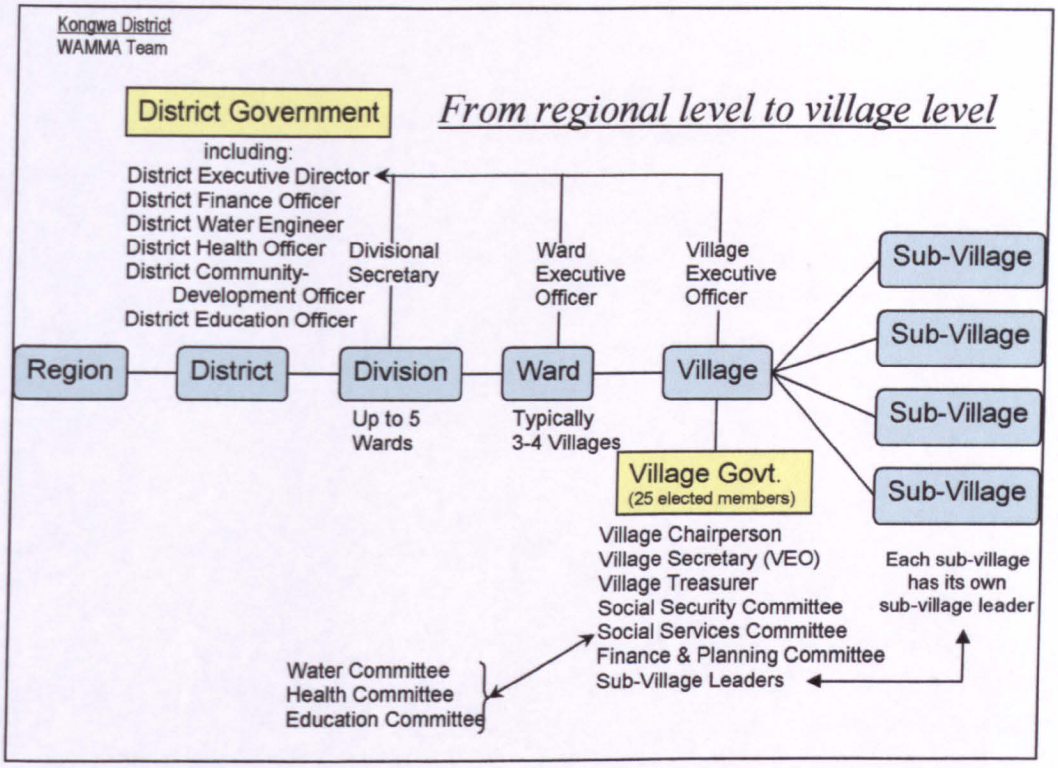
Mainland Tanzania has 21 Regions (Figure 4.1) including *Dodoma Region*. Dodoma Region is in turn divided into 5 Districts: Dodoma Urban; *Dodoma Rural*; Kondoa; Mpwapwa and Kongwa. Dodoma Rural District has *8 Divisions*, which are sub-divided into *48 Wards* and then further to *128 villages* at the time of this research.

Figure 4.1 Regional administrative map of the United Republic of Tanzania

Map courtesy of 2002 Population and Housing Census (The United Republic of Tanzania 2004).

Responsibility for village-level administration lies with the Village Government, which typically comprises 25 people. Such village governments will include a Village Chairperson (VC), Village Secretary/Village Executive Officer (VEO), Village Treasurer, members from the Social Security Committee, members from the Social Services Committee, members from the Finance and Planning Committee, and all sub-village leaders. All appointments are elected from within each respective village except the VEO who, along with Ward Executive Officers (WEOs) and Divisional Secretaries are appointed by the District Government and receive a salary. Village governments report to ward government and through the Divisional Secretary to the District Executive Director and the District Government (Figure 4.2).

Figure 4.2 Tanzania governance structure



4.2.3 Governance structure – village to household level

Within Tanzania, each village is seen as an area of land containing the houses and farms constructed on it, rather than a collection of homes set in countryside that is not considered as part of the village. This system, set up during the time of President Nyerere, ensures that every house in the entire country is recognised as being part of a particular group of other homes within the same, sometimes large, geographical area. Houses (or "cells") are grouped together in streets or "10-cells". Originally, these were groups of 10 houses as the name suggests although with growth over time, the actual number of houses has been found to vary from as low as six up to around 20. Each 10-cell has its own appointed and recognised 10-cell leader. 10-cells are grouped, in turn, into sub-villages, which again have their own sub-village leader.

Thus, villages are divided into sub-villages; sub-villages into 10-cells; and 10-cells comprise groups of homesteads within a particular locality. Every home is part of a 10-cell, every 10-cell is part of a sub-village, and every sub-village is part of a village.

4.2.4 Sanitation in government policies

Issues surrounding the lack of sanitation have been recognised at government level since the early days of Independence. The National Health Policy (United Republic of Tanzania 1990) refers to the earlier 5-year development plans stating that emphasis was being placed on improving hygiene, environmental sanitation and good nutrition between 1964 and 1981. That

said there is little detail as to how such an emphasis would be worked out in practice. Each village was expected to have a minimum of two Village Health Workers (VHWs), one of whom would focus on maternal and child health and the other on environmental sanitation. The construction of latrines was to be promoted for all households, health facilities and educational facilities, and a clean environment to be encouraged around houses and village institutions. The VHWs were staff for a Village Health Post (VHP), and each village without a more formal health facility such as a clinic/dispensary was expected to have a VHP. VHWs were to be selected and paid by the Village Government (VG) and were to be given a short training prior to providing their services. In 2002, the subsequent National Health Policy (United Republic of Tanzania 2002) had a stated policy objective to facilitate the promotion of environmental health and sanitation. Indeed, at various points throughout the document sanitation is recognised as a significant factor though no specific details were provided of how this objective would be met.

As discussed, the primary responsibility for rural sanitation has been through the MoH although two other government departments are also officially involved – namely Water and Community Development. According to paragraph 57 (p35) of the National Water Policy (United Republic of Tanzania 1991), integrated rural water supply and environmental sanitation projects were started during the 1980s, although there is no mention of the scale of these nor any details or locations specified. However, the intention appears to have been that both water and sanitation projects should take place alongside each other and villagers were to be motivated to take responsibility for the cleanliness of their own environs. For an assessment of some such projects, see later in this chapter, and also Therkildsen's comparison of water supply programme approaches (Therkildsen 1988). The subsequent National Water Policy (United Republic of Tanzania 2002) contained only a minimal mention of sanitation although section 4.1 of that document did highlight the need to involve the local communities in the development of their water and sanitation solutions. In addition, paragraph 4.7 discussed the relationship of water, sanitation and hygiene education as they relate to poverty. The Position Paper on Water Supply and Sanitation Services in Tanzania (United Republic of Tanzania 1992) also provides a summary of the historical situation with respect to water supply and sanitation. It concurs that the responsibility for rural sanitation, health education and community mobilisation is shared between the three ministries mentioned above (Health, Water and Community Development) along with the Prime Minister's office (Local Government and Regional Administration). Additionally, sanitation receives specific though limited mentions in the National Environmental Policy (United Republic of Tanzania 1997) and the National Science and Technology Policy (United Republic of Tanzania 1996). Documents that did not mention a need to address the sanitation situation include The Tanzania Development Vision 2025 (United Republic of Tanzania 1995) and The Poverty Reduction Strategy Paper (United Republic of Tanzania 2000) which, although having a section on page 30 entitled Water and Sanitation, made no mention of sanitation whatsoever.

Overall, sanitation appears to be recognised by the Government of Tanzania (GoT) as a vital area of public health, which should not be ignored - either nationally or on a local basis. However, none of the above documents is particularly clear as to the scale of the problem or a specific strategy with which to address the issue. Sanitation is not the explicit responsibility of any single government department and so there is no ultimate home for it. That said, the GoT could be recognised as having a positive stance and promotional messages come through many different departments. Documents that are more recent recognise that while the public health of a community is impacted by the lack of sanitation, the choice of what system to adopt at household level is also the preference of individual households set within the environment of their 10-cell, sub-village and village. Within all policy documents relating to water supply and sanitation, the vast majority of each of these publications pertains to water supply. Very little is written regarding sanitation other than to recognise that it is an issue. The implication of this is that there is little understanding as to what could or should be done to encourage households without toilets to build them, nor as to what are the key influencing factors for sustained sanitation uptake at household or village level.

Despite this apparent lack of understanding, Tanzania reported national rural sanitation coverage in 2002 of over 88% (United Republic of Tanzania 2004), which compares favourably with the WHO/Unicef JMP value of 86% (WHO/Unicef JMP 2000). Indeed, the Dodoma region sanitation coverage was reported to range by district from 80 to 88% with the Dodoma Rural District reported to have 88% of households with a toilet in 2000 according to the Socio-economic Profile of Dodoma Region (United Republic of Tanzania 2003). If accurate, this reflects a very significant level of latrine coverage – especially when compared with other parts of Africa.

4.3 Programmes under review

Over the years from the mid 1980s to 2002, a number of sanitation and hygiene promotion interventions were carried out across various regions of the United Republic of Tanzania. This chapter sets out to review and contrast a selection of such programmes with the intention of recognising their strengths and weaknesses from the available reports. Programmes were considered with respect to the level of uptake of household latrines and evidence was sought to indicate if latrine uptake and use was sustained rather than transient. Locating the necessary reports was no simple exercise in itself, but a total of 30 relevant reports were found and studied as part of this review. Those of particular relevance are included in the References section at the end of the thesis. The programmes incorporated in this review were not restricted to those specifically addressing sanitation alone, but all included a sanitation focus and most also involved a hygiene awareness or promotion component.

4.3.1 Programme 1: Domestic Water Supply Programme, Shinyanga Region

DWSP

DHV Consultants BV, Amersfoort, The Netherlands

The DWSP in Shinyanga region started in 1993 under the bilateral development cooperation arrangements between the Governments of Tanzania and the Netherlands, and was the third in a series of water programmes in the region. Originally intended to end in February 1998, it was subsequently extended to June 2001. The stated overall objective was "... To improve the living conditions and the health situation of the rural people in Shinyanga region by providing access to adequate (i.e. sufficient in quantity and safe in quality) water supply and sanitary facilities within reasonable distance from the homesteads in a sustainable and environmentally viable way" (DHV Consultants BV 1998). The sanitation aspect of the programme really only got properly started in 1997 with the development of a package targeting primary schools (DHV Consultants BV 1997b). The timing of the school sanitation and hygiene focus coming less than a year before the overall programme was originally scheduled to be completed leads to the conclusion that this was something of an "add-on" rather than a central concern.

4.3.2 Programme 2: Demonstration Project on Low-cost Sanitation in Tanzania

DPLST

Deutsche Geselschaft fur Technische Zusammenarbeit (GTZ) &
World Bank Technology Advisory Group (TAG)
established under the Interregional Project INT/81/047
of the United Nations Development Programme.

The project began in May 1985 and was planned for a duration of 2 years. It was funded under the General Accord on Economic Cooperation between the United Republic of Tanzania and the Federal Republic of Germany signed on January 25, 1975, and under the Project Agreement between the two Governments signed on January 25 and February 2, 1985. The project goal was to promote the extension of low-cost sanitation technologies and services to the low-income populations in the urban fringe areas of Dar es Salaam, Tanga, Arusha, and Tabora. This was to be accomplished by setting up a construction plant for the manufacture of VIP (ventilated improved pit) latrine components (the Buguruni Plant), and the production of draft strategies for the introduction of low-cost sanitation throughout Tanzania and technical plans to be refined and documented (Bauer and Wright 1987).

4.3.3 Programme 3: Dissemination of Low-cost Sanitation Technologies

DLST

Deutsche Gesselschaft fur Technische Zusammenarbeit (GTZ)

Part of the Tanzanian natural low cost sanitation programme

This programme followed on from the above GTZ / TAG project although it did not begin until October 1989 and was scheduled to end in May 1991. The overall goal was recorded as "betterment of sanitary conditions" and the purpose "achievement of adequate sanitation in urban areas" (GTZ 1991) of Tanga, Arusha, Moshi and Morogoro. This programme focused specifically on sanitation and exclusively promoted the VIP latrine.

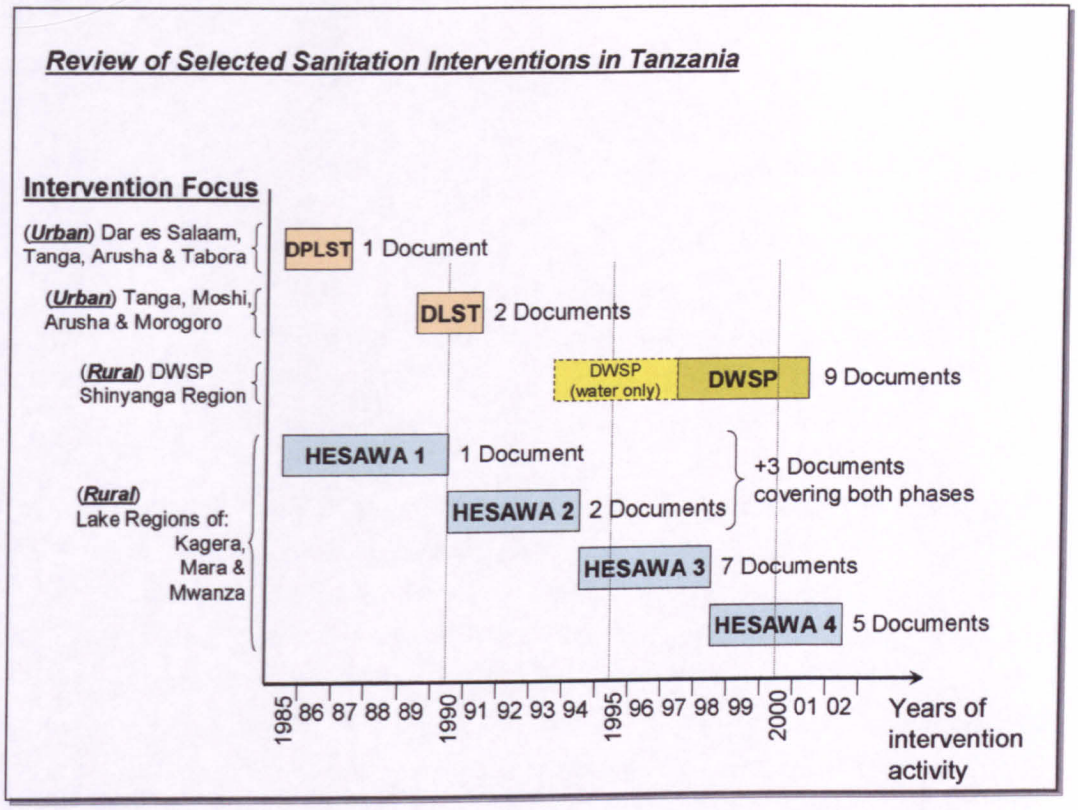
4.3.4 Programme 4: Health through Sanitation and Water

HESAWA

Swedish International Development Authority (SIDA)

The programme began in 1985 based on a Specific Agreement between the United Republic of Tanzania and Sweden on cooperation concerning rural water supply, environmental sanitation and health education. The programme was in four distinct phases and continued until 2002. The area covered was the Lake Zone, which comprises the three regions that border Lake Victoria i.e. Kagera, Mara & Mwanza. The stated objective of the programme was "to improve the welfare of the rural population through improved health education, environmental sanitation, drinking water supply, community participation and capability and capacity building at village and district levels" (Evans, Smet et al. 1992). This was a multi-faceted programme of which sanitation and health education were considered an integral part.

Figure 4.3 Timeline of the four sanitation interventions under review



4.4 *Technology choice*

4.4.1 Range of options supported

All the programmes in this study promoted the Ventilated Improved Pit (VIP) latrine style with concrete floor slabs. During Phase II of the HESAWA programme, a cheaper local alternative (no concrete components) known as the Bwina latrine was reported (Evans, Smet et al. 1992), and although not part of the programme (and confined to the Kagera Region), the HESAWA programme did subsequently expand their supported range to other less expensive versions. The VIP latrine concept seems to have been presented by each of the programmes as the international trend at the time, and was in turn duly accepted and approved by the Government of Tanzania in each case. Thus, this was the option that was presented to the implementing partners and participating villages. There is no sense that end users were initially involved in the selection of this technology, although as has been mentioned above, the implementation of more affordable latrines during later HESAWA phases might suggest that the programme responded to local pressure since the level of uptake of the earlier model was limited (overall the coverage statistics were high but the numbers of VIP latrines built through the HESAWA programme was reported to be 6% (HESAWA 2002)). It is worth noting that the concept of sanitation, and latrines in general, was not new to Tanzania at the time of these programmes. The ***Global Water Supply and Sanitation Assessment 2000 Report*** records Tanzania's urban sanitation national coverage in 1990 as 97%, and rural coverage as 86% (WHO/Unicef JMP 2000), so while VIP

latrines may have been a new idea, most Tanzanian households were at least familiar with the concept of sanitation and latrines.

4.4.2 Rationale for options supported

The justification given for using the VIP technology was different according to the external agency involved. The DWSP in Shinyanga cited the pre-existence of 27 "permanent" latrines with cover slabs in the same region, both DPLST and DLST programmes were recorded as part of the on-going "low-cost sanitation programme" which was initiated in 1979 and the HESAWA programme claimed that efforts had been made to find locally appropriate solutions, but also admitted that the decision had been made following the current national and international trends. Certainly the international trend at that time was the VIP (Dondo and Scott 2006) and it would appear that as such, it was favoured and duly promoted in each case. Retrospectively, however, the relative cost to users and level of demand/uptake might indicate that this choice was not necessarily considered as affordable or appropriate by the local population whom the respective programmes were intended to benefit. It could be noted here that there is a difference between perceived and actual affordability. A household of limited means will have their own priorities for the little income they have, and building a more expensive toilet is not likely to come high in their list – if it is even on their list. That said, if a household head recognises a new toilet is a priority, the first constraint or barrier has already been overcome and affordability becomes a secondary issue. The product options could have been explored further through a contingent valuation which would explore peoples willingness to pay for particular options or designs by expressing their stated preference (Alberini and Kahn 2006). This system, however, was not yet widespread at the time when these programmes were being developed.

4.4.3 Product targeting

The DPLST and DLST programmes appear to be targeted towards the population at large i.e. household latrines, and both the DWSP and HESAWA programmes specifically targeted schools. DWSP and DLST included a number of demonstration household latrines to promote the concept in participating villages. Not all design details were included in the available reports, but there was no indication that any of the toilet designs varied significantly from any others. In other words, none of the facilities appears to have been designed specifically for young children despite the fact that they were built for primary schools. That said primary schools in Africa often have adolescent pupils too.

4.5 Information, education and communication

4.5.1 Product awareness and education

Each programme adopted a different approach to informing potential users. All, however, utilised existing local organisational structures such as ward and village committees, TBAs, VHWs, schools etc. In addition to the existing structures, the HESAWA programme also introduced and facilitated the formation of School Health Clubs, and local HESAWA committees. Those

programmes, which included schools as part of their awareness and education strategy, intended and expected the primary school children to take the various messages back home to their families – though there was no tangible way to assess the impact of this. The DWSP seemed to focus principally on this method of spreading sanitation information, and the HESAWA reports indicate that this strategy became increasingly important throughout the duration of their four phases. It was included from Phase I, but appears to have been a more central strategy during Phases III & IV. The available documentation for the DPLST programme indicates very little in the area of public education – in fact this point was specifically mentioned in the recommendations section of the report (Bauer and Wright 1987), which provided input for the later DLST programme. Following this recommendation, the DLST programme followed a "social marketing" strategy through the local political administrative structures in order to attempt to stimulate latrine uptake.

Throughout all programmes, the process of latrine uptake and choice of latrine design is effectively left to individual households as opposed to being a wider community level decision. That said it is unclear to what extent each household felt free to make that decision. The longer the 17-year HESAWA programme continued, the greater the number of latrines that were constructed. However, it is not clear whether this was the result of a growing sense of being able to make such a decision at household level or whether it was influenced by a growing social or other pressure which was felt at village or sub-village level. These factors may also have been in effect following the conclusion of other shorter programmes too, but no documents were available to confirm this.

4.5.2 Promotion and education

The programme reports (Evans, Smet et al. 1992; DHV Consultants BV 1998a) indicate that the DWSP and HESAWA programmes included substantial emphasis and input towards hygiene promotion and/or health education. It was a stated strategy of both programmes and the numbers of people trained in this area provide evidence of its pursuance (see paragraph 4.8.1.2). In 1998, the PHAST system (DHV Consultants BV 1998b) was adopted into the DWSP approach for the later years of the programme. These programmes demonstrate a commitment to include a promotion and education campaign at all levels down to village level as an integral part of their strategy. The documentation on the DPLST and DLST programmes (Bauer and Wright 1987; GTZ 1991), however, is less detailed. The second programme mentions the preparation and implementation of hygiene education campaigns as a main activity but this was not emphasised in the main body of the report (GTZ 1991). It was noted, however, that a number of District public health staff had been involved at community level. Across the programmes, the direct value to those receiving training, and its ultimate impact in communities, are difficult to isolate and assess independently of the many other relevant factors and the numbers of latrines built can only indicate part of the effect. Sustained behaviour change, which embraces the above messages, can only really be properly assessed a few years after the programmes were completed, to establish whether health and hygiene messages have really been accepted and implemented

beyond the limits of any programme. Where such appraisal has not yet been carried out, it is recommended that this be carried out soon to establish the lasting impact.

4.5.3 Education methods

Apart from DPLST, where detail is scarce, workshops and training programmes were provided for the various actors involved. The DWSP concentrated at village level with the training of head teachers and Hygiene & Sanitation Education Coordinators, working through school health clubs and local community outreach programmes. The DLST programme enabled and equipped district and municipal level public health engineers and their assistants to do the training within their constituencies. HESAWA focused their efforts on village level institutions but also included those at ward level. Little information was found on how such training was passed down to households, or on how they received (or rejected) it. However, DWSP reported that their tools included latrine flyers, the "snakes and ladder" hygiene & sanitation game, and the PHAST video (van Miert 2001). Eventual numbers of latrines may be the only direct way to assess the effectiveness of each programme's training efforts.

4.5.4 Indicators

The scope of the programme reports does not extend beyond the end of the various programmes and therefore fails to capture their longer-term impact. However, the short-term impact may be estimated by various indicators according to the programme. Ultimately, the level of sanitation uptake or increased numbers of functioning latrines built, or improved, will indicate the overall effectiveness of sanitation promotion messages. Additionally, however, where homes and villages are reported as cleaner and where people have improved their personal hygiene practices, this would also indicate successful communication of a sanitation & hygiene education programme. Unfortunately, only the number of latrines built was reported for all programmes except DPLST. Even in this, the DWSP results are less detailed as village results are not reported for all villages. Aspects such as the number of health club or committee members may well be related to the effectiveness of the messages, but if this in turn does not translate into improved facilities and behaviour, such numbers cannot be considered as indicators of a successful programme.

4.5.5 Promotion messages & methods

All the programmes had been set up to promote their messages from a health perspective, though the specifics of the actual messages to the population are not clear from the available reports. Schools were a common focus for information dissemination. Both DWSP and HESAWA (Phases III & IV) introduced clubs for the children to focus on hygiene and sanitation. They also emphasised the need for participating village schools to have adequate toilet facilities for both pupils and teachers. From this base, the DWSP also instigated community outreach programmes. HESAWA from the beginning included an emphasis on training village health workers (VHWs) and traditional birth attendants (TBAs) to promote improved health and hygiene practices. Promotion became a particular focus during the second half of Phase II. DLST on the

other hand involved schools, dispensaries and ward offices as part of their distribution strategy for posters, booklets and leaflets to promote VIP latrines alongside radio and newspaper advertisements.

4.6 Demand stimulation

4.6.1 Affordability and financing

The actual cash cost to the user of a household latrine was only recorded for the DLST programme; however, it was not clear whether this pricing structure was introduced part way through the programme, or being recommended for a later phase. The price paid depended, logically, on the materials used for the construction and was reported as in table 4.1 below.

Table 4.1 Cost comparison of the DLST latrine alternatives

Alternative I: ***Concrete VIP***	Tsh	%age of total cost
Users contribution:	13,800	58.0%
Project Contribution:	7,000	29.4%
Self Help (labour value):	3,000	12.6%
Total:	23,800	100%
Alternative II: ***Mud-block superstructure***		
Users contribution:	10,350	54.2%
Project Contribution:	5,700	30.0%
Self Help (labour value):	3,000	15.8%
Total:	19,000	100%
Alternative III: ***Self build superstructure***		
Users contribution:	7,950	54.1%
Project Contribution:	3,750	25.5%
Self Help (labour value):	3,000	20.4%
Total:	14,700	100%

Source: (GTZ 1991).

The above figures demonstrate a project subsidy ranging from 25.5% to 30% of the latrine cost depending on the technology level selected. Disappointingly, those unable to pay for anything more than the cheapest alternative benefited least, both by percentage and financial amount. This means that the above options actually conspire against the poorest people in the communities rather than support and meet their needs as a priority.

In the HESAWA programme, latrine construction costs were initially all borne by the households (Phases I & II) although no actual costs were noted. Later, during Phases III & IV the cost of the concrete slabs was subsidised and the total cost of Tsh 6,000 was subsidised by 75% making

the cost of the slab to each household Tsh 1,500, however the household still had to pay all other costs (Smet, Shordt et al. 1996). The various reports repeatedly comment that the cost of a slab was felt to be prohibitive and this subsidy was seen as a response to this perception (Evans, Smet et al. 1992; HESAWA 1998).

Institutional latrines for schools were more heavily subsidised by the DWSP and HESAWA programmes, though the subsidy approach was slightly different for each programme. In the DWSP villages, the pit excavation and final superstructure were to be funded from school fundraising, and the sub-structure and floor slab were funded by the programme. In the HESAWA villages, all construction materials were provided by the programme and all labour or labour costs were provided by the respective communities. Again, no detailed costs were provided in the available reports.

4.6.2 Use of credit

None of the programmes reported the provision of any credit scheme for household or school latrines. DPLST had initiated a trial scheme in 1987 but no results were available at the time of the initial report (Bauer and Wright 1987) and there was no record of it having been adopted for the later DLST phase (GTZ 1991). HESAWA initially provided a revolving loan facility for *fundis* (masons) to enable them to begin work on components for up to 25 household latrines per participating village (HESAWA 1989), though there was little mention of this mechanism within the later phase documents where subsidised slabs were adopted.

4.6.3 Use of subsidies

As recorded above, the HESAWA Phases III & IV reports record a 75% subsidy on household latrine slabs. This level of subsidy seems to have been determined as a result of the findings and recommendations arising from Phases I & II as well as possibly the lack of significant growth in latrine uptake. Institutional latrines had a 100% materials subsidy from HESAWA with all the labour or labour costs being provided from within the village. This level of subsidy was intended to represent an overall grant of 50% of the total costs (HESAWA 1989). DWSP subsidised the sub-structure and slab of school latrines, and was responsible for the construction of demonstration VIP latrines. It is assumed that all costs associated with the demonstration household latrines were borne by the programme, as no details were available in the documents. The subsidies offered by DLST for household latrines are not explained within the available reports. The amounts are specified and are recorded as ranging from 25.5% for the cheapest option (see table 4.1 above), to approximately 30% for each of the more expensive versions (GTZ 1991). As previously mentioned, this option did not benefit the poorest and most needy community members, as they would, at best, be able to obtain only the cheapest option, and therefore have to pay 74.5% of the costs whereas a wealthier household might pay only 70% of the price of a more expensive alternative. This varying subsidy is in contrast with the later phases of HESAWA where all beneficiaries benefited from the same subsidised slab and built their superstructure of choice.

4.6.4 Withdrawal of subsidies

In general, the withdrawal of subsidies was not discussed in detail within the documentation. It was clear, however, that SIDA funding for the HESAWA programme was planned to cease at the end of Phase IV (HESAWA 1997; Ministry of Community Development Women's Affairs and Children 2000). Funding for the sanitation aspect of the DWSP had been significantly reduced by the year 2000 (van Miert 1999) compared to earlier years (DHV Consultants 1997; DHV Consultants BV 1998), and the 2001 budget allowed only for the assessment of completed work(van Miert 2000). Hence, sanitation subsidies were planned to cease several months before the completion of the overall programme. No details of any withdrawal of subsidies for DLST were noted from the documents and the subsidies are assumed to have continued until the completion of the project.

4.6.5 Targeting subsidies

There is no indication that any of the above subsidies were initially designed to specifically benefit the poorest levels of society. The DWSP collaborated with schools as opposed to individuals and therefore this concept was not so relevant. While the DLST provided for a range of possible subsidies, it was recognised that simple cost reduction strategies such as those in the programme were not realistic for poorer households (GTZ 1991), and the least well off stood to benefit least rather than most. There is little detail with regard to how the HESAWA latrine subsidy was set up, but given that it was a standard level for all households, there was no clear focus on helping the poorest families. That said, the issue of not to "disfavour the least well off" did merit a mention in the plan of action for HESAWA Phase III (HESAWA 1993), if not in the end of phase progress report (HESAWA 1998). Overall, the subsidies appear to have been established by the respective programmes as an attempt to facilitate an increase in sanitation coverage, but without specifically addressing the needs/ability/situation or mechanisms of the lowest income groups in potentially the greatest need and having the least ability to improve matters.

4.6.6 Cultural issues

While the issue of gender has cultural implications (Kurup 1996; Van Wijk-Sijbesma 1998), no mention was observed in any of the programme documents regarding cultural habits and taboos related to sanitation. The absence of such information suggests that these areas may not have been fully appreciated, investigated or considered prior to designing the programmes. While each programme was set up alongside various national and local governing bodies who would already have certain insights, a community participation strategy addressing this area could have provided some further understanding here and demonstrated a less top-down approach. The evaluation reports on HESAWA and DWSP do, however, mention gender issues though mainly in relation to water supplies (Rautanen, Seppälä et al. 2006; IOB 2007).

4.6.7 Attitudes & preferences

The documents indicate that the level of latrine coverage in the programme areas ranged from 45% to 75% across the Lake Zone (Evans, Smet et al. 1992) in 1984 prior to the HESAWA programme, and nationally in 1983 the urban coverage was listed as 62.3% and rural as 40% (GTZ 1991) prior to the DPLST and DLST. For the DWSP, only two of the districts were reported and their total latrine coverage was listed as 45.3% and 85% respectively.

During the HESAWA Phase III mid-term assessment the external assessors recorded failing to find a single household which practised open air defecation (Smet, Shordt et al. 1996). These figures would suggest that the concept of latrines was not alien to a good proportion of the population, although the VIP system was less well known. Even after the HESAWA programme completion, only some 6% of latrines built were reported as "permanent VIP" per the original design, though the overall number constructed was recorded as 33,825 over the 17 years of that programme. The above may be taken to indicate that disposing of faeces in a latrine is becoming increasingly the norm for many households in Tanzania. That said, community or household preferences do not appear to have played a major role in planning the VIP latrine programmes. Rather, these were reported as resulting from current national and international trends at the time (Evans, Smet et al. 1992). Throughout the HESAWA programme Phases I & II, the lack of motivation of communities to focus on sanitation issues was mentioned, indicating that improved sanitation may not have been a strongly felt need at the time (HESAWA 2002). This led to the development of more intensive promotion through the schools, and to a significantly higher latrine uptake during Phases III & IV. The DLST programme report did reference a national level "social survey" which was said to include aspects on: behaviour, attitudes, and design preferences (among other things), although the results of this were not reported (GTZ 1991). The planning matrix for this programme indicates that the target groups were not involved at the planning stage. Overall, the need to build VIP latrines does not seem to have been a high priority for most people, and this seems to have been a common problem across all the programmes studied. People's preference or level of satisfaction with more simple, lower cost latrines does not appear to have been easily overcome – even after the longest programme which was HESAWA lasting for 17 years.

4.6.8 Demand

While not all programmes recorded baseline sanitation coverage, the figures reported suggest a degree of variability between neighbouring districts or regions. As previously mentioned, the figures range from 40% to 85% (see above), and those statistics include both temporary (simple, traditional) and permanent (with roof & concrete slab) latrine structures. Clearly, the national reported coverage figures include or even disguise a broad range of village and district differences. That said, none of the programmes appears to have been set up to assist local governments to achieve a particular level of coverage as a defined goal. The DWSP target was to have a school latrine plus demonstration household latrine at each participating primary school with a view to stimulating uptake by households. The number of villages to be targeted was

planned annually (DHV Consultants 1997; DHV Consultants BV 1998). The progress reports noted that during 1997 a total of 82 school latrines had been started though only six had been completed. During the same year, 5 demonstration latrines had been started and 4 households had begun to build their own (DHV Consultants BV 1998). The only other figures provided were from the first half of 1999 by which time 34 out of a cumulative total of 58 school latrines had been completed and 49 out of 103 household latrines completed (van Miert 1999).

Disappointingly, the available documents do not confirm details of the overall programme results for sanitation, although data on the numbers of wells rehabilitated and newly constructed were included (van Miert 2000).

The DLST set the target of building 50 – 70 latrines for each of four project towns, with 20 of these being demonstration units in each urban centre. Therefore, the goal was set at 80 demos + 120 to 200 household VIP latrines. The totals recorded as built were 75 demos + 60 purchased household latrines. Hence 94% of the demo target was achieved and 50% of the household target (GTZ 1991).

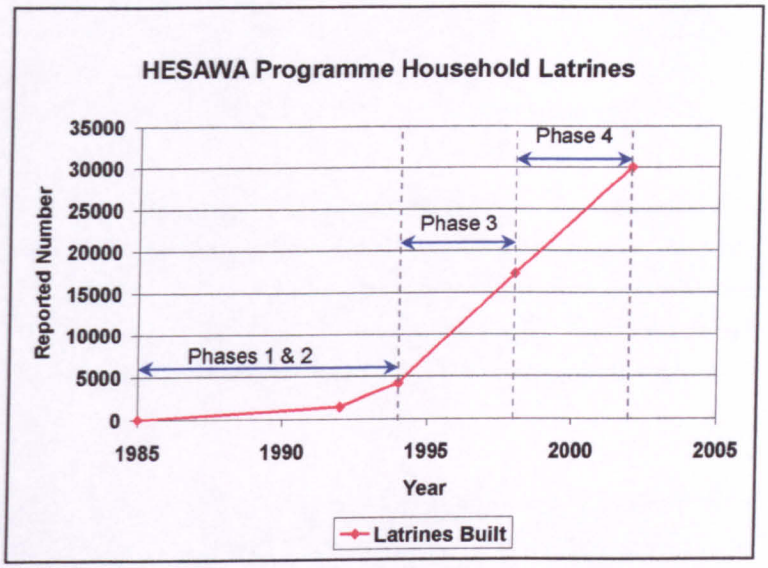
The various phases of the HESAWA programme each had their own targets. The Phase I target was missing from the available documentation, but the other details were as shown in table 4.2.

Table 4.2 HESAWA programme targets and achievements

HESAWA Phase	Targets		Achievements	
	Household	Institutional	Household	Institutional
II	5,675	266		
(HESAWA 1989)				
Phase I + part of II (1985/86 – 91/92 only)			1,456	161
(Evans, Smet et al. 1992)				
I & II combined total			4,168	200
Interpolated from (Smet, Shordt et al. 1996)				
III	19,971	664	13,093 (66%)	403 (61%)
(HESAWA 1998)				
IV	14,157	(built): 349 (rehab): 395	12,757 (90%)	323 (93%) 369 (93%)
(HESAWA 2002)				
Cumulative total latrines built (adding above totals):			30,018	926
Overall programme totals claimed (HESAWA 2002):			33,825	839

While the overall HESAWA totals reported do not tally exactly with those accumulated from the various progress reports, they do provide a reasonable understanding of the programme scale and are within approximately 10% of each other. The above data displayed in graph form (Figure 4.4) suggest that something significant changed during Phase 2.

Figure 4.4 Latrines built following the HESAWA programme



The documentation records that over the last two phases, the intensity of health and environmental sanitation promotion were increased, subsidies were introduced for concrete slabs, and the decision was taken to facilitate less costly alternatives. The combination of these decisions appears to have been highly significant for latrine demand.

The numbers of household latrines built as a result of these programmes provides the best indication of user demand for such sanitation facilities. However, this will not reflect those households who really wanted to build a latrine (improved or otherwise) but who were financially unable to cover the expense at that time. This limitation has already been discussed in the Targeting Subsidies section above. While the numbers of people trained by the various programmes might initially be perceived as an indication of the level of interest in the relevant technology, ultimately, the true test can really be seen only in those who take action in response.

In 2005, a follow-up evaluation of the HESAWA programme was conducted on behalf of SIDA in a sample of 36 villages from six districts (Rautanen, Seppälä et al. 2006). Section 3.1.3 of that report lists how the sanitation coverage is estimated to have changed over the years although the various figures recorded all come from different sources and therefore may not be entirely consistent. The implication is that sanitation coverage has improved in all three regions where the HESAWA programme was conducted and the Kagera region coverage would appear to still be increasing while the Mwanza region increased during the programme and has maintained this increased level since then while the Mara region had improved and has now fallen back (see Table 4.3).

Table 4.3 Latrine coverage as reported in HESAWA ex-post evaluation

Region	Percentage Latrine Coverage			
	1978 (census)	1978 (health Authorities)	2000/01 (HBS Census)	2005 (HESAWA evaluation)
Kagera	75%	60%	95%	97%
Mwanza	75%	75%	92%	92%
Mara	68%	45%	86%	71%

(Rautanen, Seppälä et al. 2006)

In 2007, the follow-up evaluation report for the DWSP was published (IOB 2007). One of the key outcome evaluation questions listed in Chapter 1 was point 1.5: ***"what has been the change in the percentage of the population with access to an improved sanitation facility since 1990?"*** Unfortunately, this question was not addressed in a quantifiable way and while the Chapter 2 summary reports that the sanitation work concentrated on the training of community trainers, no access or coverage figures were listed.

From a sustainability perspective, what happens following the completion of an intervention is as important as the intervention itself, as it will provide evidence of what has or has not been sustained as a result. In this regard, a survey such as that conducted in the Dodoma Rural district in 2004/05 (Phase 1 of this thesis) could provide an understanding of how individual households and villages have observed changes in sanitation coverage over the past 10 to 20 years (see chapters 2 and 3). Until such a survey is done, it is not possible to fully assess the degree of sustained uptake and the current level of demand and coverage.

4.7 Product provision

4.7.1 Supply capacity

All programmes included training of local *fundis* to produce latrine components and thus meet the level of demand within their areas. In addition, the DWSP sought to increase and maintain demand levels through schools programmes for which training was also provided. The DLST programme focussed its efforts on the further development of existing district-level health services by providing training for public health engineers and their assistants. HESAWA concentrated on building capacity at ward and especially village level. Ward level activities included Health Assistants, Public Health staff at health centres, and Community Development Assistants. For villages, the programme involved village governments and committees, VHWs, TBAs, Village Animators, schools and social groups. In this way, the HESAWA programme could be seen as investing a higher proportion of resources in the target population as a whole. Admittedly not all of the above were included in the plan for Phase I, but with the various lessons learned throughout the 17-year programme's duration, all were included and involved by the end.

4.7.2 Local materials

There was no mention of importing construction materials for any of the programmes considered, although the production plant established during the DPLST was seen as potentially becoming a national base camp for developing or demonstrating low-cost sanitation technologies (Bauer and Wright 1987). However, this was located in the Dar es Salaam area and not necessarily "local" to other regions. Apart from this point, all materials appear to have been available locally both for initial construction and subsequent maintenance. Despite such availability, the relatively high cost of concrete latrine slabs was noted in documentation from all programmes. Only 6% of the high number of latrines reported within the HESAWA programme were recognised as permanent VIPs, but the implication from the final progress report is that even the many "temporary" latrines reported had concrete slabs (HESAWA 2002). This could be attributed partly to the subsidised purchase price for the slabs, and partly to the less expensive alternatives being supported, which may have lowered the psychological barrier in people's minds. The only limitation noted on materials availability, related to a period of power rationing in 1994/95, which was unrelated to the programmes.

4.7.3 Supply chain

Following on from the above point, the supply chain appears to have been in place for the various programme activities. Raw materials were available in-country, and specifically manufactured components such as those resulting from the DPLST were intended to be fully available prior to the start of the subsequent DLST programme. Other programmes report training *fundis*/VHWs to manufacture components, such as the slabs, within the programme village areas. Specific sources of materials were not listed within the documentation, but there was nothing to indicate that any of the programmes planned for or experienced any problems relating to supply. For this reason, no mention was made of the need to facilitate any special access to materials that were already considered generally available locally though the actual transportation or distribution of such was not addressed. Such supply availability is a necessary condition for sustainability, although it is not in itself sufficient to guarantee sustainability. The availability of construction materials was a feature that appears to have worked well throughout the programmes considered. However, there is no longer term perspective by which to judge due to the lack of documented post-completion evidence.

4.7.4 Provision system

Construction activities were generally reported to be under government management as all the programmes were set up under agreement with the Government of Tanzania. In practice, this meant management by the District Administration. In real terms, the local *fundis* (who received training as part of the respective programmes) undertook most of the physical construction activities and were assisted by those who had employed them to do the work i.e. the benefiting/purchasing households. In addition, for the DWSP, a key role was played by the school head teachers and hygiene education coordinators though this was aimed more at motivation towards construction. During its development and through the DPLST programme, the

production of VIP latrine components was managed by the German company Gauff Engineers. However, this contract was due to end by March 1987 (Bauer and Wright 1987), and the government Sewerage and Drainage Department was reported as ready to take over the running of the production plant as a function of its Low-Cost Sanitation Unit.

Overall, the donor organisations were recognised as providing the vast majority of the funding and senior management; operations were overseen by regional/district government staff; supply of raw materials and construction activities were mostly reported as being within the private sector.

4.8 Enabling environment

4.8.1 Collaborators, players and actors in sanitation

Each programme collaborated in some way with various levels of Government. At national level, the DPLST, DLST, and HESAWA recorded liaising with the:

- Prime Minister's Office
- Ministry of Water, Energy and Minerals (Maji), responsible for national water supply and sanitation policies, planning and training.
- Ministry of Health and Social Welfare (Afya), responsible for rural sanitation policies, health education and training of Health Officers.
- Ministry of Community Development, Culture, Youth and Sports, which later became the Ministry of Community Development, Women's Affairs and Children (Maendeleo). These assisted rural communities with the organisation of activities and mobilisation to participate in water supply and sanitation.
- Ministry of Local Government, which was the parent ministry for all the local authorities.

At village level, HESAWA was also recorded as working alongside:

- Village Government
- Village Committees
- Village Health Workers
- Traditional Birth Attendants
- *Fundis* and Artisans

The DWSP programme reports recorded the total number of actors involved in their School Health and Sanitation Package activities from 1997 until 1999 (van Miert 1999) as follows:

Table 4.4 Training and partnership in the DWSP school health and sanitation package

Actor / District	Bariadi	Shinyanga Rural	Shinyanga Town Council	Total
Health Officers	2	2	1	5
Education Officers	2	1	1	4
Health Assistants	3	6	0	9
Village Executive Officers	18	26	14	58
Village Chairmen	18	26	10	54
Village Health Workers	36	28	10	74
Community Development Technicians	1	2	1	4
Community Development Promoters	1	1	1	3
PHC Committees	18	14	5	37
Schools Committees	18	26	14	58
Schools Hygiene & Sanitation Clubs	18	20	5	43
Head Teachers	18	20	12	50
Hygiene & Sanitation Education Coordinators	18	20	12	50
Traditional Birth Attendants	2	0	0	2
Community Development Officers	1	1	1	3
Rural Medical Aides/Medical Assistants	1	4	0	5
District Executive Director / Town Director	1	1	1	3
District / Town Programme Manager	1	1	1	3
Total Actors	**177**	**199**	**89**	**465**

The above shaded areas in table 4.4 highlight village-level actors and total 426 out of the 465 who received training. Thus, the DWSP can be seen to have prioritised the villages directly, although the relative proportion of financial investment is not clear.

Each programme had a broad range of collaborating activities. It is impossible to assess the specific impact of each individual relationship, as to how effective it proved to be, so it is necessary to look at each programme as a whole.

All programmes were seen to collaborate with existing organisational structures for the most part. This means that partner staff would have continued to receive their normal salary payments rather than being employed by the various programmes. Where appropriate, allowances appear to have been paid to cover additional workload costs in alignment with standard policy, and the costs of training workshops and supplies were also included.

The scale of project finances for the DPLST was not given in detail but they were recorded as follows:

Sanitation Advisor (1) employed by the project

- Project Vehicle (1)
- Workshop Materials
- Health Education
- Contracting of additional Local Consultants } DM 205,110
- Travelling Expenses
- Office Supplies
- Revolving Loan Fund DM 481,638 *(Bauer and Wright 1987)*

In some regards, HESAWA programme expenditures were more detailed and the IRC/AMREF report broke down the 1990/91 distribution of donated funds as follows:

- Vehicles 21%
- Consultants 23%
- Human Resource Development 10%
- Water Activities 24%
- **Sanitation Activities 1.3%**
- Remaining funds (including Equipment and Planning reserve) 20.7%

Table 4.5 Training of local personnel by HESAWA programme up to 1992

HESAWA programme training up to 1992	
VHWs	655
TBAs	231
Water Point Caretakers	1914
Village *fundis*	893
Shopkeepers	91
Total:	3,784

(Evans, Smet et al. 1992)

It should be noted that the funding of Human Resource Development (above) includes support for both water and sanitation activities and up to 1992 included the training of almost 3,800 individuals (table 4.5). That said, even if half the HRD investment was in sanitation, that still means only 6.3% (5% + 1.3%) of project expenditure was on sanitation. The categories in the above breakdown are somewhat confusing as some relate to the type of cost (e.g. vehicles, consultants...) while others refer to specific outputs or objectives (e.g. water activities, sanitation activities). From the above breakdown (Evans, Smet et al. 1992), it is clear that specific investment in sanitation activities constituted a very small proportion of the overall costs for that particular year. The HESAWA programme was entitled as HEalth through SAnitation and WAter and in name, at least, placed sanitation ahead of water supply. However, the cost of implementing water supply hardware is significantly more expensive than sanitation (latrines) in the rural settings (with the exception of where sewerage and a waste treatment plant are established). That said, at the local level there would appear to be very little dependence on

external financing to facilitate the sanitation component of this particular project. The above costs relating to sanitation appear to be limited mainly to the construction of institutional latrines.

As previously mentioned, all the programmes in this study are reported as working with or through the various levels of Tanzanian Government. In addition to this, the DWSP reports networking with local, national and international organisations with a view to provide opportunities to learn from each other's experiences. (DHV Consultants BV 1998; van Miert 1999; van Miert 2000; van Miert 2001) This networking comprised of meetings and study visits and covered a broad range of aspects in both water supply and sanitation, though no direct impacts or benefits were recorded with respect to the then current or subsequent interventions.

4.8.2 Training

With the exception of the DPLST, all programmes recorded a degree of training for local artisans or *fundis* who were to be involved in the fabrication of latrine constituent parts or their assembly in subsequent construction. Since the DPLST was set up to establish a centre for the fabrication of such parts, it may be assumed that a number of technicians were trained in the process; however, no detail was recorded. Financial training was noted though not in detail. The later DLST programme documented the training of 41 technicians as well as holding an implementation management workshop, although it was noted that not all key collaborators were in attendance (GTZ 1991). The DWSP provided training for Head Teachers and Hygiene & Sanitation Education Coordinators, which centred on primary schools in the participating villages. From these, schoolchildren and village groups such as women/youth groups received training and were expected to pass on information to their families and others in the respective villages. The direct impact of this training alone was difficult to assess, as the level of such communication was not sufficiently reported. The largest scale training effort among the given programmes was that of HESAWA. Table 4.6 provides numbers of village *fundis*, TBAs and VHWs who received training as recorded over the duration of the programme:

Table 4.6 Fundis, VHWs and TBAs trained over four phases of the HESAWA programme

Some Key Village-level Personnel Trained during the HESAWA Programme				
	1985-92	Phase III	Phase IV	Total
Fundis	**893**	**518**	**454**	**1,865**
VHWs	**655**	**531**	**319**	**1,505**
TBAs	**231** (Evans, Smet et al. 1992)	**265** (HESAWA 1998)	**302** (HESAWA 2002)	**798**

During the early phases of the programme, Regional Trainers were reported to have received a six-week training course to enable them to provide training in turn for the District level trainers, who in turn were responsible to train Rural Health Centre Teams and VHWs. It was also

recorded that during Phase 3, district level staff (15 District Coordinators, 45 Department Heads) were trained in project management and financial management. In addition, three of the above 15 District Coordinators also received training in monitoring for effectiveness and community management in water and sanitation projects. Others trained during Phase 3 of the HESAWA programme include accountants, technicians and storekeepers totalling 69 who were trained in their respective areas; this was reported to be 88% of the programme target (HESAWA 1998).

4.8.3 Monitoring and evaluation

Monitoring and Evaluation activities were noted in the reports to be part of each of the programmes. Internal assessments were planned with a frequency reported to be monthly and/or quarterly (DPLST, HESAWA) to six monthly (DWSP). In each case, annual reviews were planned, which were to facilitate strategy and implementation adjustments, and, in the case of the DWSP, annual work plan or plan of action and budget documents were drafted. In addition to such internal reviews, special reports (DPLST) and external mid-term evaluations (HESAWA) were also planned. This review draws upon several such external reports as well as a number of internal ones. The main monitoring and evaluation indicators were essentially programme-specific according to the goals for the respective period. Thus, the specifics for each project phase would vary slightly. However, some of the more general indicators listed by the DLST include an increased number of requests for VIP latrines and an increased number of latrines built. Specific target numbers of latrines for given years or periods were not always clear from the available reports, but there was written recognition of the need to monitor progress.

4.8.4 Scale and scope

Table 4.7 Comparison of the scope of each programme

Programme scope				
Programme	**DWSP** (mainly a water supply project)	**DPLST** (sanitation project)	**DLST** (sanitation project)	**HESAWA** (water supply & sanitation)
Location and estimated target population	**Shinyanga Region**: Bariadi district Shinyanga Rural dist. Shinyanga Urban dist Estimated population: 1,092,348	Urban Fringes of: Arusha Tabora Tanga Dar es Salaam No population listed	Municipalities of: Morogoro Tanga Moshi Arusha No population listed	**Kagera Region** **Mara Region** **Mwanza Region** Approximate population: 5.3 million
Scope of programme	School Latrines (Planned: 58) Completed: **34** In process: 24 Demonstration Latrines Completed: **16** Household Latrines (Planned: 56) Completed: **61** In Process: 13 Over the 4 yr duration of the programme = 27.75/yr	No target number of latrines listed in available reports. No completed latrine numbers recorded...	Report initially plans for 2,000 latrines for this phase; however, document also specifies a target of 50 – 70 latrines for each of the 4 towns including 20 demo units per town. Thus planned = 200 – 280. Total built = **135** Over the 2 yr duration of the programme = 67.5/yr	Over 4 phases and 17 years, a total of **839** school latrines were recorded, and **33,825** household latrines were reported as being built. (NB. According to the same report, only 6% of these were VIPs per original design.) Over the 17 yr duration of the programme = 2039/yr

External financial contribution	Donor Budget from 1997 1997 Tsh 191,500,000 1998 Tsh 389,063,500 1999 Tsh 282,063,500 2000 Tsh 240,338,000 2001 Tsh 155,354,000 total **Tsh 1,258,319,000** 2.25% specifically towards sanitation & hygiene (based on 1998 budget figures) including training: Investment per latrine built Tsh 255,065		External Contribution: DM 1.5 million or approx **Tsh 90,000,000** exchange rate 1988/89 calculated from (GTZ 1991) annex 1 p9 100% sanitation focus Investment per latrine built Tsh 666,667	External Contribution: SEK 800 million or approx **Tsh 80,000,000,000** (HESAWA 2002) Using breakdown from section 4.8.1: 1.3% specifically towards sanitation & hygiene, plus up to 10% from HRD to include training, gives a range of investment per latrine of Tsh 30,002 to Tsh 260,789

Table 4.7 breaks down the various programme investments with respect to the actual numbers of latrines recorded as built. DWSP budgets were recorded for each year and the amount specifically designated for sanitation was based on the 1998 budget. Later budgets were less specific about the amounts spent on sanitation, though they did report on work accomplished. Therefore, the figure of 2.25% has been applied to all years. However, this percentage does not allow for any administration or programme management costs. The HESAWA programme made by far the largest financial investment, but ultimately the cost per latrine was potentially the least - this, despite the fact that again no project management or administration costs were included in this calculation. The specific level of HRD investment allocated to sanitation was not clear from the documentation, so the range of costs per latrine represent from 1.3% to 11.3% of total sanitation investment (see section 4.6.1). The scale of the HESAWA project meant that the cost of preparing and conducting the sanitation aspect of the programme could be spread out much more than under the DLST project, which is why the DLST figure is the highest. The DLST was specifically a sanitation project, which meant that all the costs including administration, project management etc were included in the above rather than a proportion of the total figure.

Of all the programmes under consideration, only HESAWA reported latrines built on a scale greater than 10,000. Their reported total of 33,825 household latrines seems to reflect a significantly higher level of uptake than the other programmes, though if only 6% were concrete VIP latrines (HESAWA 2002), the number of VIPs would actually be around 2,080, or an average of 122 latrines per year over the 17-year duration. The most significant factor in the larger scale of the HESAWA programme appears to be that the technical design of the latrines being promoted was modified part way through Phase II, to allow for the local perception that the VIP design was too expensive. This "lowering of the bar", alongside a 75% slab subsidy and increased promotion activities, seems to have had the effect of enabling a much higher proportion of the population to build a latrine considered "acceptable" by the programme. This increased uptake would benefit from further research. It would have been interesting to know how many of the families had built their first ever latrine as part of the programme, and how many had improved on what they previously had; regrettably, however, there was no record of these details. Such a coverage profile could be generated by utilising the tools developed during Phase 1 of this thesis. The gradient and scale of the coverage trend line noted for the 10 years prior to the programme and compared to the most recent 10-year period. This would provide an measure of the change in demand for latrines (change in gradient) as well as the current coverage level.

4.8.5 Policy issues

While each of the programmes in this review was reported as being initiated through agreements with the Government of Tanzania, specific objectives relating to policies and policy development were not always listed, and therefore not always targeted, as desired programme outputs. The DPLST report documented two specific programme outputs which related to national policy (Bauer and Wright 1987):

1. Draft strategies would be drawn up for the introduction of low-cost sanitation throughout Tanzania;
2. Technical plans for low-cost sanitation would be refined and completely documented.

The report also concluded, however, that these objectives had not been fully achieved. During the later DLST phase, government personnel and the Low-Cost Sanitation Unit were an integral part of the programme, but very little was reported about influence on government policy. The HESAWA programme spanned three regions and one of the achievements noted was that there had been progress in transferring implementation responsibility from the regions to the districts. This has been, in effect, a degree of decentralisation; the use of interdepartmental promotion teams working at village level was seen as partly responsible for this (HESAWA 2002). Earlier reports highlight the need to strengthen operational and policy coordination at national level (Evans, Smet et al. 1992), but there is little mention of how and if this was worked out in subsequent reports. The national policy framework was recognised in the planning for the various phases of HESAWA (HESAWA 1989; HESAWA 1993; Ministry of Community Development Gender and Children 1999), and the programme was reported as being in alignment with the policies relating to health, water and community development. However, little is said as to the influence of the programme on any subsequent policy revisions.

Each stage or phase of the various programmes was reported as leading into the next and therefore influenced to some extent the later stages within each relative intervention. In the case of the DWSP, these stages were yearly sections of the programme, whereas with the other interventions each phase ranged from approximately 2 years up to 5 years. It is not possible to tell from the given reports whether any programme had an impact on how other later programmes were designed or implemented – either in the same area or further afield.

4.9 Overall

4.9.1 Reported achievements and limitations

The **DWSP** hygiene and sanitation achievements were taken from the various progress reports as no final report was available. The main achievements were considered to be:

- Construction of 34 institutional VIP latrines
- Construction of 16 demonstration household latrines
- 61 other household latrines built by families
- Study visits to share experiences from various districts
- Networking with other NGOs
- Introduction of PHAST approach

(DHV Consultants BV 1998; van Miert 1999; van Miert 2000; van Miert 2001)

Limiting factors reported during the programme (which are not specific to sanitation) include:

- Rural communities inadequately involved in decision making and planning processes

- Households face economic, social and political forces while having to resource their own recognised priorities and needs – without including programme priorities
- Villagers lack confidence and competence in all aspects of planning
- Agricultural income dependent on weather and therefore unreliable
- Communities not given required feedback on their priorities to enable them to be more active in intervention activities
- Some poor communities were documented in programme reports as being willing to pay but were actually unable to do so

(van Miert 2001)

The **DPLST** project reported the following achievements:

- Established Buguruni Plant in Dar es Salaam area, producing VIP latrine components
- Buguruni Plant also able to function as national base for developing/demonstrating other low-cost sanitation technologies, and for training of operatives from other regions
- The Sewerage and Drainage Department (SDD) of the Ministry of Lands, Housing and Urban Development ARDHI (now known as the Ministry of Lands and Human Settlements Development) ready to take over the running of the plant as a function of the Low-cost Sanitation Unit.
- Project activities were started in Tanga
- Loan scheme started for sale of VIP latrines

The limiting factors that were noted are as follows:

- Project experienced problems with the timely flow of local operational funds
- Some gaps were noted within the programme coordination and communication
- A decline in the performance of the national economy meant that project latrine design options were no longer affordable by the original target population

(Bauer and Wright 1987)

The later **DLST** programme stated the following achievements:

- Contributed to the acceptance of low-cost sanitation technology at national level
- Tanga Municipal Council introduced a local law related to low cost sanitation
- Contributed to improve the construction of low-cost sanitation facilities (using Buguruni Plant), to reach five project towns.
- At national and municipal levels, the various partners (project promoter, administration, governmental and non-governmental technical services, and target population – especially women) have started to collaborate in training and implementation.
- Foundation laid for multi-sectored multi-disciplinary approach to solving sanitation and health problems.

Limitations were recorded at various levels of the project as follows:

- National level: problems with integration of the Low Cost Sanitation Unit (LCSU) in the administrative system; problems relating to missing equipment; and problems with the strategy for programme implementation
- Urban level: problems regarding the capacity and willingness of the population and administration to cooperate together, part of the blame for this was attributed to the lack of an initial feasibility study
- Technical level: It was felt that the design was of poor quality, too expensive, socially & culturally not adapted to the needs of the users (used for washing and defecation), and as a result the criteria set for good excreta disposal facilities could not be fully reached.
- Integration level: as mentioned at the national level, the integration of the project into the administrative system was observed to be not clearly stipulated by contracts and conventions

(GTZ 1991)

The **HESAWA** programme reported achievements in three groups namely: 1) promotion; 2) human resource development; and 3) sanitation. It is recognised that some areas included below may also refer to the water supply aspect of the programme, but are included here in relation to sanitation and health.

Promotion:

- Community sensitised on HESAWA programme concept, objective and approach using both personal communication and radio broadcasting. (While this was reported as an achievement, it is actually a limited objective and only really says that people were aware of the project.)
- Gender awareness and participation in planning, decision-making and assessing programme activities.

Human Resource Development:

- *Fundis* were reported to be able to construct good institutional and household latrines (numbers below)
- Improved household latrines were constructed with slabs cast by village health workers (VHWs)
- Appreciable change in household environmental sanitation as a result of VHWs
- Women's participation in programme implementation has appreciably increased over the duration of the programme

Sanitation:

- 493,000 pupils from a total of 845 primary schools were screened to identify sanitation-related health problems e.g. worms, diarrhoea.
- Parents' meetings were held to discuss the screening results and develop a response strategy, which helped parents to recognise both problems and solutions e.g. construction of school & household latrines, dish racks, rubbish pits and the wearing of shoes.

- Institutional latrines were built at 839 primary schools, which represents approximately 79% of the 1062 schools in the intervention area.
- 33,825 Household latrines were reported as constructed to serve an estimated 271,000 people

The major constraints noted, with regard to the HESAWA programme, related to the human resource development aspect of the programme and were listed as follows:

- Unreported HRD activities resulted in the lack of follow-up to some of the personnel trained, and therefore also led to the lack of quality control on their subsequent performance in their respective activities
- Schedules for courses and workshops were subject to change without adequate notice and communication, again leading to inadequate quality control as those who missed the training could not then be monitored
- Lack of support to trainees outside of formal training led to trainees being left to themselves without follow up
- Transfer, retrenchment or defaulting of some trainees limited the potential benefit to villages and the overall impact of the programme
- Poor initial selection of participants for some courses also inhibited impact. (It was reported that some individuals were accepted to undergo the TBA training but were later not active in this function. It was not clear, however, how those persons were initially selected – whether by the villages, project staff, or the District Administration)
- Some facilitators lacked ability in participatory adult methods resulting in ineffective teaching and hence trainees who may not fully understand the necessary issues
- Lack of commitment by some course organisers/facilitators who sometimes reduced the length of training or were seen as more interested in the money than in the task of capacity building
- During the earlier phases of the programme, many village HESAWA committees were considered weak due to the lack of adequate training – this situation was noted as addressed during Phase III & IV
- VHWs performance after training was seen as limited and constrained by lack of motivation and incentive from their villages – little or no payment (cash or in kind)
- MoH training curricula were blamed for a tendency of TBA and VHW training to focus on curative/clinical rather than on preventative messages and objectives of the programme
- Sometimes messages would fail to reach the village population as those entrusted to attend meetings or workshops and subsequently pass on the given information, could fail to do so.

(HESAWA 2002)

4.9.2 Discussion

A main goal of each programme was to improve the environmental sanitation in its respective target area but the strategies implemented to achieve or attempt to achieve this goal varied significantly. The variables, as detailed throughout this chapter, are many. Indeed they are too many to be able to simply state that one programme approach was specifically better than another. Clearly, the number of latrines reportedly built as a result of the HESAWA programme far exceeds that reported from the others. However, none of the other programmes lasted for 17 years nor were they noted to have cost in excess of Tsh 80,000,000,000 (approx US $152 million or GB £98 million – mid-term (1994) exchange rates) of donated funds. Each programme can be seen to have both advantages and disadvantages, which relate to individual aspects of the approach taken and need to be set within the context of the overall programme and the people and areas targeted.

Following are a number of general issues identified from the various programmes and reports:

i. One of the significant themes observed from the reported limitations, in section 4.9.1 above, was the lack of adequate involvement of the target communities themselves. This was particularly noted with respect to the DWSP and the DLST programmes. Greater emphasis in this area, perhaps by expanding the initial feasibility study or by utilising a more participatory approach to maximise stakeholder engagement, has the potential to enable communities to get involved with the programme design from the beginning, and thus develop a sense of ownership, rather than having particular choices made for them by outsiders. Potential resentment towards a programme or towards "solutions" presented by a programme can be minimised if such decisions and designs were to be made with greater consultation and listening to where the population considers it is starting from. In this way, a strategy can be created to enable poor communities to take steps to address their sanitation (and potentially other development issues) in a way, which is more acceptable to them, rather than one that to them feels unattainable and imposed on them by strangers who do not live under the same daily constraints as they do. Such collaboration has the potential to lead to technical designs, which are considered socially and culturally acceptable and affordable yet meeting a quality of product pleasing to both donors and beneficiaries. Further research into the specific areas and limits of such involvement would be helpful for the better planning of future interventions.

ii. All of the programmes were intended to enable beneficiaries to reach a higher standard than has previously been possible for them. The findings of this exercise indicate that the initially designed technology standard (concrete VIP latrine) presented by all programmes was generally considered to be too expensive and unattainable by the respective target populations. The HESAWA programme appears to have taken steps to remedy the situation such that the results of the second half of the programme demonstrate a significantly higher level of acceptance and demand by the villagers for a less expensive and lower technology version. The DLST programme documentation also records less expensive design options but these appear to have been promoted later in the project with potentially insufficient time

remaining for this to make an impact on the overall outcome. In each case, a stronger feasibility study or greater stakeholder participation at the beginning, leading to the revised designs, could have enabled the programmes to allow for the more affordable options from the beginning. This in turn could have led to stronger relationships with the population, an increased demand for the product and ultimately a higher degree of sanitation coverage from the same level of financial investment.

iii. A positive aspect of the programmes reviewed was the level of investment in people through a commitment to training at various levels from the village level up. This promotes a level of dignity and respect for each group receiving the tuition, and involves and honours all groups involved – though it does depend on them utilising the training. This points to the importance of people in the process. Sanitation is as much about people as it is about a product or range of products since the product can only be validated through those who choose to make use of it.

iv. The issue of credit was not specifically addressed in the available reports, with the exception of the DPLST (Bauer and Wright 1987) and even the outcomes of that attempt were not recorded. By contrast, the issue of subsidy was addressed by each of the programmes that reported their results i.e. all except the DPLST. The subsidies provided by the DWSP enabled schools to build latrines, whereas those provided later by DLST and HESAWA were aimed at households. The topic of subsidies raises issues of sustainability, since if a particular product is initially only affordable because of the level of subsidy offered during a programme, there is no guarantee that a household will be able to pay the full cost to replace it in due course since the programme and subsidy will be over by that time. Subsidies can also be interpreted as potentially manipulating programme results, implying a false level of demand, which could not be sustained without the subsidy. Perhaps credit mechanisms could ultimately be more appropriate as they enable the household to pay the full cost but over a period of time more suited to the family.

v. Both rural programmes were completed within the last 6 years, i.e. since 2001, and subsequent assessments had been carried out within the various regions (Rautanen, Seppälä et al. 2006; IOB 2007). According to the results discussed throughout this chapter, latrines have been built because of the various interventions but it is not clear whether the respective households had thus built their first latrine, or simply replaced an earlier one. In other words, it is impossible to confirm the impact on increasing the overall sanitation coverage. In light of the current Millennium Development Goal targeting sanitation, it would be invaluable to know how the actual coverage has changed in each location both during and after the respective interventions. Thus, a retrospective survey such as that conducted during Phase 1 of this thesis (looking back over the past 30 years) could present some important findings and demonstrate to what extent each programme has actually affected its target population. An evaluation such as this would also provide evidence of the sustainability or otherwise of programme results from the perspective of the households and communities as a whole.

5 Village perceptions of sanitation

5.1 Overview

This chapter will focus on local perceptions of household sanitation within the villages of the Dodoma Rural district of Tanzania. The areas of qualitative research considered relevant to this study were developed to help define those factors to be explored further during Phase 2. The four main aspects were:

- Reasons/benefits of having/not having a toilet
- Perceptions of good/bad toilets
- Difficulties in obtaining a toilet
- Effective latrine promotion

Information was sought through meetings with various village governments (VGs) and focus group interviews (FGIs) and occasionally individual interviews with men and women from within those same villages - both those with and those without latrines. In addition to data from villages, the perspective of District Government (DG) staff was requested through a meeting of WAMMA in Dodoma, and the perceptions of WaterAid (WA) Tanzania staff – again from a meeting of WA staff in Dar es Salaam. These data were collected in order to help to identify some of the possible factors relating to sustained sanitation uptake at village level. These factors were then explored during the next phase and are discussed in later chapters of this thesis.

5.2 Method

WAMMA and WA were each asked to discuss and write down those factors they considered relevant to sustained latrine uptake. This was a broad brief and was intended to allow those participating to include any aspect that they thought might be relevant.

Village meetings/interviews were more specific and questions were developed to enable those involved to focus on the four areas mentioned above (see section 5.4). A moderator was appointed to conduct the various meetings in Swahili. Semu Nassari worked for the non-government organisation (NGO) "MAMADO" in Dodoma and had extensive experience in leading FGDs and interviews in rural areas. The moderator worked closely with the researcher to ensure that participants felt at ease and that all the questions were clear and well understood.

Two data recorders were appointed to capture the points raised at each of the village meetings. One was a statistics student at the University of Dar es Salaam and the other, a graduate of the Institute of Rural Development Planning in Dodoma. To provide further backup, each of the meetings was audio-recorded onto digital media, which was later downloaded onto a computer in the WA office in Dodoma so that the voice files were available to assist, when necessary, during the translation stage into English.

An accompanying WAMMA member would provide the official introduction of the research team to each group or individual. This was to follow the accepted standard procedure and ensure the respective VGs and villagers would duly receive the research team. Following this introduction, the WAMMA member would leave so as not to influence any of the responses. Thus, the research team consisted of five people including the researcher plus the driver who stayed with the vehicle and played no part in the meetings (see photo 5.1).

Photo 5.1 Research team for qualitative data collection, July 2006

5.3 Background

In order to understand the emic perspective (i.e. the internal perspective of the actual villages/households/users) on latrines within the Dodoma Rural district, it was necessary to arrange meetings within the villages of the district. This was done with the intention to recognise factors relating to latrine uptake and help develop hypotheses for testing in Phase 2. Initially it was thought that two men's groups (one for those with a latrine and one for those without) and two women's groups (again with/without a latrine) in each village would be the best way to set up the meetings/discussions, however following a discussion with Tanzanian staff in WaterAid, this strategy was revised. While immediate neighbours would already know those who were without latrines, to have a meeting with a group of only latrine non-adopters would be to identify and potentially humiliate them before their entire village. Therefore, it was felt that it was very likely that no one would turn up for those meetings. Instead, each of the groups would have a combination of those with and those without household latrines. The revised plan was to meet with the VG first, then to have three further FGIs – a men's group, a women's group and a

young adults' group – which was added to explore if perceptions were changing with the next generation. To this end, letters would be sent in advance informing the VEO of the meetings, inviting the VG members to attend, and inviting them to call some of those with and some without latrines to come for the respective FGI. The VG meeting would be likely to have up to 25 people (according to the size of the village/VG) but each FGI was planned for six to ten people so the participants would be able to speak freely. A total of 12 to 16 meetings were envisaged to ensure that a general perspective was obtained rather than the select views of only a few people. Thus, three or four villages would be selected.

5.4 Discussion guide questions

A few questions were prepared about the profile of the village, intended only for the VG although in two villages the men's FGI was also asked about economic activities as a cross check. These questions were as follows:

- ***What economic activities are carried out within the village?***
- ***What criteria do you use to classify wealth ranking among the people in this village?***
- ***What tribes are here?***
- ***What religions are here?***

These questions were essentially intended to explore aspects of wealth and diversity. As noted above, these were intended only for a few of the meetings (six in total), the main questions for all groups were as follows:

- ***What kinds of people have toilets and why?***
- ***What kinds of people do not have toilets and why not?***
- ***Who makes the decision for a household to have/not have a toilet?***
- ***Are there times when using a latrine is not safe or convenient?***
- ***In this village, at what age do children start to use the latrine?***
- ***What are the advantages/benefits of having a latrine?***
- ***What are the disadvantages/problems with having a latrine?***
- ***What are the advantages/benefits of <u>not</u> having a latrine?***
- ***What is a "good" latrine?***
- ***What is a "bad" latrine?***
- ***How can a household go about getting a latrine?***
- ***What makes it difficult to get a latrine?***
- ***What can make it easy to get a latrine?***
- ***Have there been any activities in this village to try to persuade people to build toilets?***
- ***What are the advantages of local people promoting toilets in their own village?***
- ***What are the advantages of outside people coming in to promote toilets?***
- ***What happens when a latrine is no longer usable?***

- ***What are the main differences between your village and a neighbouring village with respect to toilets?***

The above questions were translated into Swahili prior to a meeting with WAMMA and the research team to review the goals and procedure for this part of the data collection. Additionally, an introductory paragraph was written and translated for the moderator to read out at the start of all meetings. This included the following points:

- The purpose was to find what people think and was not part of any intervention
- The meeting would be recorded but no information would be passed on to others
- People should feel free to express themselves without judgement from others
- Introduction of research team
- Verbal consent from all in group should be obtained
- Invite introductions from all participants

5.5 Village selection

During the discussions with the district government WAMMA members, it was decided to revisit four of the villages which had been part of the validation exercise (section 3.6.1) since they already knew us. It was hoped that the earlier visit might have established a basis for this continuation rather than starting again with other villages. In addition, these villages were all located in different parts of the district and would therefore be likely to have independent perspectives. The goal was first to meet with the respective VG or as many of them as were available. In this way, the research group would be able to introduce this phase of the study as a follow-on exercise and gain formal permission to carry out the FGIs with others in the village, as well as asking the questions to the VG themselves. Thus, the villages of Manchali, Zajilwa, Lamaiti and Babayu were selected with the expectation of 16 separate meetings.

5.5.1 Manchali – Tuesday 11th July 2006

VG meeting	10:45 – 11:45	22 people present. All participated freely from the start
Womens FGI	12:20 – 13:13	eight women present. Slightly reserved and needed encouragement
Mens FGI	13:20 – 14:45	eight men present. Very free from start, all taking part within first 15 mins.
Young Adults FGI	14:53 – 15:52	three females & four males 17-22 years old. Generally open to discussion with all participating when asked

Manchali was the first village to be visited and was seen as something of a pilot for this exercise. That said, all questions were addressed and the data has been included in the overall results. The women's group started with some initial shyness and reservation on their part. This may have been because most were young and two women even had their babies with them. However, after rearranging the group into a circle and encouraging them to be free, they quickly

settled down and began to speak more freely. The main surprise with this village was that it was reported (by the VG, women and young adult group) to have come first in the district (and third in the region) in a competition focusing on latrines in 2005. This appears to have meant that several people from the village attended a seminar and have since been active in promoting latrines. There was no comment on the type of latrine or quality of construction that was being promoted, but all of those taking part reported having a latrine at their house. It was noted that for the remaining villages it should be particularly emphasised that the FGIs should comprise those who do not have latrines as well as those who do.

Further observations include:

- During the rainy season many latrines collapse and there is a general fear of using a latrine during those months in case of injury.
- Open defecation is common at the fields when people are working with crops or animals – even by those who have a toilet at home.

5.5.2 Zajilwa – Thursday 13th July 2006

VG meeting	10:33 – 11:55	14 people present. Very lively and open discussion
Combined FGI	12:16 – 13:31	6 men and 4 women. 1 man & 3 women w/o toilet Preferred to meet together & openly took part
Interview (Man)	14:36 – 15:29	Did not have a latrine as his old one was full. Planning to replace latrine after harvest
Interview (Woman)	16:00 – 16:30	Has never had a latrine. Parents did not have one. Divorced mother with 5 girls (4 – 14 yrs)

Zajilwa village office had a wealth ranking profile on the wall and this was seen as evidence that the VG had already spent some time addressing developmental issues. The meeting with the VG was very enthusiastic with many contributing. Some confusion on timing meant that both men and women arrived at the same time. Neither group were willing to return later due to other responsibilities so they all decided to meet together as one group. Despite the mixed group and that three of the women reported not having a toilet, all the women took part freely and the moderator ensured that their voices were heard and included.

5.5.3 Lamaiti – Friday 14th July 2006

VG meeting	10:00 – 11:47	15 people present. Initially quite formal After rearranging into a circle people relaxed.
Womens FGI	12:18 – 13:10	6 women. 3 with a toilet 3 w/o All participated freely.
Mens FGI	13:15 – 14:15	6 men. 3 with a toilet and 3 without. Equal communication from those with & w/o.
Young Adults FGI	14:21 – 15:18	2 females & 1 male 16-29 years old. All took part

Lamaiti had not yet done any wealth ranking as such and did not have any detailed data. An attempt to assess criteria for ranking was started but had to be abandoned as it proved too difficult for the VG.

5.5.4 Babayu – Saturday 15th July 2006

VG meeting	09:57 – 11:38	14 people present. Open and interactive with men & women talking freely
Womens FGI	11:43 – 12:44	8 women. 4 with a latrine and 4 without Group relaxed after seeing photo of Researcher's family. Willing group but found some concepts hard to relate to
Mens FGI	12:46 – 14:00	9 men. 4 with a latrine and 5 without Very comfortable group which shared freely.
Young Adults FGI	14:07 – 14:55	3 females & 3 males 16-17 years old. All still living with parents. Took a few minutes to settle down but then shared openly. 2 males did not have a latrine at parents' house
Masai Interview	16:18 – 16:45	Older Masai man living on the outer part of village Claimed to have had a latrine years ago but not since.

Babayu was located on the district boundary between Dodoma Rural and Kondoa district. There were buildings on both sides of the invisible boundary but they were parts of different villages – Babayu - Kondoa and Babayu - Dodoma Rural. Babayu - Kondoa has its own VG (reporting to the Kondoa DG) and is therefore governed separately from Babayu-Dodoma Rural, although in appearance the two look like one large continuous village.

5.6 Results – general village data

The village-level data collected during the VG meetings in each of the villages was as follows:

5.6.1 What economic activities are carried out within the village?

All villages reported a similar profile of agriculture, livestock-keeping and small businesses such as selling meat and vegetables. Beyond these, Manchali reported pottery and salt making, and Babayu was engaged in bee keeping. It was not clear if the bee keeping had been a recent introduction to the village, nor if it had started as the result of an external intervention. However, there was little to judge between the villages based on economic activities alone.

5.6.2 What criteria do you use to classify wealth ranking among the people in this village?

This question provided a greater diversity of results. Each VG recognised that their village was made up of rich, middle income and poor people although Zajilwa also reported a "very poor" or

"poorest" category. On that basis, one might expect it to be a less wealthy village. People with larger shops – as opposed to small kiosks – were universally seen as rich as well as pastoralists although the number of cows required to be classified as rich was different for all villages. In Manchali, a livestock keeper would be classified as rich if he had more than 20 cows, but in Babayu the standard was reported as a minimum of 200 cows. Manchali was unable to quantify the number of households that they classified as rich but, as with all the villages, it was reported as the smallest proportion. Universally, the greatest proportion of households for all villages was the middle-income category, followed by the poor (including the very poor in Zajilwa) with the rich category being the smallest. Both Zajilwa and Babayu reported a combined rich and middle-income total of 70% of their households, however, only 5% of homes in Zajilwa were seen as rich whereas in Babayu the estimate was 20%. Overall, the figures provided by Babayu would appear to suggest that it was more affluent than the other villages given the higher standard for classification of being rich (200 cows) and the higher proportion of the population within that category (20%). However, this question alone would be insufficient to provide conclusive results, especially since each village set a different standard and not all VGs were able to estimate proportions.

5.6.3 What tribes are here?

Manchali reported having three tribes within the village. Both Lamaiti and Zajilwa reported seven, although Lamaiti estimated that it was 90% Wagogo. Babayu appears to be the most tribally diverse with nine tribes making up its ranks although no proportions were listed for any. Lamaiti, which reported being 90% Wagogo, may really be less diverse than its reported seven tribes could indicate since on average each of the remaining tribes would account for just over 1.5% each. Clearly, to be able to properly assess the impact of tribal diversity there would need to be some measure of quantity or proportion attached to each and this may be difficult for some village leaders to estimate.

5.6.4 What religions are here?

Another aspect of village diversity may be assessed through considering religion. Throughout the district there are three main categories of religion i.e. Christianity, Islam, and traditional beliefs which was sometimes referred to as Paganism by the villagers.

Table 5.1 Religious diversity

Religion:	***Manchali***	***Lamaiti***	***Zajilwa***	***Babayu***
Christian	98%	70%	45%	most
Moslem	very few	10%	35%	second
Traditional beliefs	2%	20%	20%	least

Each of the VGs reported that the largest group were the Christians although the proportions varied significantly from village to village. Babayu was not able to provide an estimate other than that the order was Christians then Moslems with traditional religion being the least number in their village. This was the same order for Zajilwa although they were able to agree on

estimates of 45% Christian, 35% Moslem and 20% tradional beliefs. Both Lamaiti and Manchali reported fewer Moslems than Pagans although Lamaiti reported 10% whereas Manchali had almost none. Despite the majority Christian population, there was a significant difference between Manchali with 98% and Zajilwa with 45%. Manchali would appear to be effectively all-Christian whereas Zajilwa appears to be much more diverse. As with tribal diversity, religious diversity can only be realistically assessed if approximate proportions can be provided.

5.7 Results – sanitation data

Altogether, sanitation data were collected from 139 people from all four villages in a total of 17 meetings. In an attempt to identify variations between different categories of participant, the data recorders numbered all group members (with the exception of the larger VG meetings) and noted this number beside the respective comments. Thus the total number of comments could be recorded and it could be recognised when a particular perspective was reported by an individual without a latrine (see table 5.2 and following). The overall results were as follows:

5.7.1 What kinds of people have toilets?

All four villages reported that all wealth levels from rich to poor within their village have toilets. Babayu village was more specific concerning those potentially more well off in that they reported that all employees, businesspersons and about half the farmers would have a toilet. Universally for households with a latrine, all family members except the really young children were said to use it. A total of only eight responses to this question may indicate that it was hard for people to grasp conceptually.

5.7.2 What kinds of people do not have toilets?

Again all levels of society were reported as including those without a toilet – from rich to poor. Zajilwa village reported that some people (rich and poor) just did not want to build one and did not recognise it as a priority. Other rich people such as pastoralists are moving around all the time and do not see the point of toilets for them. The poorest levels of society such as those who are disabled, old or sick are unlikely to be able to build a latrine for themselves. Those without latrines were reported to either use a neighbour's toilet or go to the bushes. A total of 11 responses were noted. The implication from the above two questions is that, with the possible exception of those classified as "vulnerable", local people did not appear to see any direct link between wealth level and whether or not a household had a latrine.

5.7.3 Who makes the decision for a household to have/not have a toilet?

The decision was usually made by the household head (whether male or female). Where there is a husband, the wife could often have a significant influence to motivate the decision especially since she was the one who spent most time at home. A total of 30 responses to this question.

5.7.4 Are there times when using a latrine is not safe or convenient?

Those who have a good latrine were reported to be able to use it all year round. However, every village reported that during the rainy season, many people were away from their homes working on the land and during that time, they used the bush. Those with "temporary" latrines (i.e. those without a roof) often feared their latrine may collapse during the rains and would often go to the bushes instead during that season. A total of 29 responses were noted.

5.7.5 In this village, at what age do children start to use the latrine?

The vast majority of people said that children begin to use the latrine around the age of four or five. The youngest age reported was two and a half (Babayu VG meeting) and the oldest was seven years (two Babayu women). A total of 30 responses.

5.7.6 What are the advantages/benefits of having a latrine?

Two main questions were asked and the variety of answers and number of mentions for each were as reported in table 5.2:

Table 5.2 Reported reasons why people have a toilet

Reasons:	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Prevention from disease/outbreaks	16	4	5	6	2	3	3
Protect/keep clean the environment	14	4	3	5	4	2	2
Know about/see as important to have a latrine	3	3	1	2			
Lack of bush	3	3	1	1		1	
Privacy	3	2	1		1	1	
Protect water sources	2	2	1		1		
Visitors can use it	2	1		1		1	
Avoid embarrassment	1	1		1			1
Brings respect	1	1		1			1
Force from village leaders	1	1	1				
Improved lifestyle	1	1	1				
Protection from snakes/animals	1	1	1				
Totals:	48		15	17	8	8	7

Table 5.2 summarises the responses on the subject of motivation or reasons why people install a latrine at their home. Universally, the top two factors related to disease/outbreak prevention (cholera, diarrhoea) and keeping their surrounding environment (homes, yards etc.) clean. The women taking part in the FGIs rated cleanliness higher than disease prevention but all others rated disease prevention first – even some of those who did not have a toilet. Issues of privacy

and a lack of bush cover within the village are related since people hide behind bushes to defecate when there is no toilet; however, both points were listed separately within the discussions. These, along with the issue of priority – understanding and rated importance – of having a latrine were next in the overall reported number of comments, but with only three comments compared to the next up rating of 14 comments would suggest a much lesser degree of motivation.

5.7.7 What is good about having a latrine or bad about not having one?

This question attempted to address the issue of the perceived benefits of having a latrine and was presented in two formats, though combined together in the table 5.3 below

Table 5.3 Reported benefits of having a latrine/disadvantages of not having one

Benefits of having/ disadvantages of not having a latrine	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Prevention of disease	21	4	3	7	8	3	9
Protect/keep clean the environment/avoid dirtiness	11	4	3	3	2	3	3
Privacy	4	3		2	2		3
Avoid embarrassment	4	2	2	1	1		2
Brings respect	4	2	1	3			1
Comfort/close proximity to home	1	1		1			1
Lack of bush	1	1			1		1
Prevents flies	1	1			1		
Protect water sources	1	1	1				
Visitors can use it	1	1			1		1
Totals:	50		11	17	15	6	20

This table is in many ways similar to the previous one. This time the questions focused on peoples attitude toward latrines and were presented in such a way as to bring out positive aspects of having a latrine – the negative aspects will be presented in the next section. Again, the top two responses focused on preventing disease and maintaining a clean living area. Both the men and women mentioned disease prevention much more frequently than keeping their surroundings clean but both were high considerations according to the numbers of comments made. The men also highlighted the perception that a latrine brings respect to a family and agreed with the women that privacy was also a valuable aspect to having a latrine. Those who did not have a latrine also appreciated that disease prevention was a key benefit of having a toilet, as was keeping the area clean and privacy along with avoiding embarrassment though to a lesser degree.

5.7.8 What are the disadvantages/problems with having a latrine?

Table 5.4 Reported reasons why people do not have a toilet

Main reasons given to not have a toilet	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Poverty/cost	9	3	1	3	5		8
Low priority/do not recognise importance	5	3	4			1	
No-one to help	5	3			4	1	5
Old one collapsed/full and have yet to get new one	5	3		2	1	2	5
Local traditions (not be seen by children or in-laws)	2	2	1	1			
Old/disabled/sick are not able to build one	2	2	1		1		1
Soft ground	2	2	1	1			1
Laziness	2	1	1			1	
Do not want to build one (pastoralists?)	1	1	1				
Fear of snakes in latrine	1	1		1			1
High water table makes it difficult	1	1		1			
Pastoralists move around every few months	1	1	1				
People are used to going to the bush	1	1		1			1
Still uses parents latrine	1	1			1		1
Totals:	38		11	10	12	5	23

Table 5.4 begins to summarise the perceived negatives relating to latrines. The question asked for reasons why people did not build latrines and the intention was to hear from both those who had a toilet and those who did not. As can be seen from the table, both groups of people did respond and both with somewhat differing perceptions. They key reasons reported by those without latrines related to cost, timing and the lack of help – particularly by women. Men, women and young adults all reported having had their latrines collapse and had been unable to replace them up to that time. Conversely, those who had toilets felt that those without had not recognised it as a high enough priority and were lazy or being influenced by local traditions. One such example related to an embarrassment of being observed as walking towards a latrine (particularly of being seen by children or in-laws) as everyone knows why people go to a latrine – as opposed to walking out to the bush area where their purpose may be less clear as they may only be going to chop wood for example.

5.7.9 What is bad about having a latrine or good about not having one?

This question was asked to balance the positive perceptions requested previously, and the results are listed in table 5.5.

Table 5.5 Disadvantages of having/benefits of not having a latrine

Disadvantages of having a latrine or benefits of not having one	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Nothing bad	13	4	4	4		5	3
Bad smell	8	3	1	3	3	1	1
Dirtiness/Flies/can cause disease	3	3			3		
Strangers/neighbours leave your latrine dirty	3	2	1		1	1	
Fear of collapse during rainy season	1	1		1			1
Waste of potential housing plot	1	1		1			
Totals:	29		6	9	7	7	5

Most people (though notably not women) reported there was nothing bad about having a latrine – even three people who did not have one reported this. The most important aspects for women were bad smells and poorly maintained latrines, which had been left in a dirty state attracting flies which were recognised to have the potential to cause disease. The men also agreed about the potential for latrines to smell.

5.7.10 What is a "good" latrine?

Again, the following responses were given and the numbers of instances are shown in table 5.6:

Table 5.6 Reported features of a good latrine

Features of a GOOD latrine	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Has a roof	14	4	3	6	3	2	5
Strong/high walls	13	4	3	5	2	3	4
Strong floor	8	3	3	2	1	2	2
Has a large/deep pit	6	3	2	1	2	1	1
Pour-flush type *(local version w/o water trap)*	5	2	2	2	1		1
Has a door	2	2	1			1	
No bad smell	2	2	1	1			
One which is clean	2	2	1		1		
Has a cover for the squat hole	1	1	1				
Has a window for ventilation	1	1	1				
Has foot rests	1	1		1			1
Insect resistant	1	1		1			1
Totals:	56		18	19	10	9	15

All of the concepts relating to a good latrine refer primarily to the particular design of the latrine or how well it had been maintained. From the above table, the top five answers were design features and were recognised by all groups – even those without a toilet. The young adults did not mention the pour-flush design, but the others did cite this option and these were visible in some of the villages. People prefer the idea of a "permanent" toilet, which will not be affected by the heavy rains, hence the reference to high walls and a roof. That said, in the majority of cases observed, roofs were few. The local version of a pour-flush toilet was generally seen as a desirable option though possibly beyond the means of many in this district as the actual numbers of this type were low. The large proportion of temporary latrines in the villages may imply that while people were aware of what was understood to be a "good" latrine, this knowledge alone was not sufficient to persuade or enable them to build one.

5.7.11 What is a "bad" latrine?

Table 5.7 Reported features of a bad latrine

Features of a BAD latrine	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Walls made from grass/reeds/sacks	9	4	3	2	2	2	
No roof	6	4	1	1	2	2	1
Many holes in the floor (rain damage)	4	3	2	1	1		
No door	3	3	2			1	
One which has collapsed/started to fall down	3	3	1	1	1		1
Walls made from sticks	3	1		1	1	1	1
Has a bad smell	2	2	1	1			1
Has short walls	2	2	2				
Many flies	2	2		1	1		1
Not strong timber	2	1		1		1	
Shallow pit	2	1			1	1	
No footrests	1	1		1			1
One which is dirty	1	1			1		
Poorly built	1	1				1	
Totals:	41		12	10	10	9	6

As in the factors relating to good latrines, factors for bad latrines also related specifically to the design of latrines and the problems arising from the lack of adequate maintenance. Table 5.7 shows that all types of group reported that temporary walls made from grass, reeds or sacks were a particularly poor design and this was followed by the recognition that many poor latrines were without a roof. Reviewing these factors tends to suggest that many are related:

- A latrine with grass/reeds/sack walls will typically mean the walls are lower in height, poorly built and unlikely to be able to support a roof
- A latrine without a roof is open to the elements and significantly more likely to incur rain damage to both the walls and floor – particularly if not constructed with strong timber – which can ultimately result in the collapse of either or both
- Walls made from grass, reeds, sacks or sticks and latrines without a door do not provide a high level of privacy which may imply embarrassment for users
- Latrines which are dirty and have not benefited from regular cleaning and maintenance are more likely to smell bad which in turn will attract flies again making users feel less comfortable

5.7.12 How can a household go about getting a latrine?

People from each of the four villages seemed familiar with the process of constructing a latrine – even some of those who did not have one at the time of the meeting. Two men and a woman from Babayu reported on their experience of constructing a latrine during the 1990s, and at that time, their reported construction costs ranged from Tsh 5,000 to Tsh 7,000. However, it should be noted that in each case there was no roof provided for the latrine. Conversely, in three villages current estimates were provided for roofed latrines with costs ranging from Tsh40,000 to Tsh72,500. In each case, all the work was expected to be done by other people so the reported cost could potentially be reduced if done by family members. The breakdown given for the only two detailed estimates was as follows and should be set against the national statistics of a mean rural household monthly income of Tsh14,134 and a median rural household monthly income of Tsh7,513 (National Bureau of Statistics Tanzania 2002):

Table 5.8 Reported cost to build a "permanent" latrine

Example 1		***Example 2***
Cost in Tsh	Details of work to be done	Cost in Tsh
12,000	Excavate pit 10 -12 feet	5,000
6,000	Cut & fetch wooden logs	7,000
8,000	Buy 400 mud bricks	6,000
	Build walls	10,000
15,000	Buy roofing timber and nails	8,500
22,000	Buy metal roofing sheets	24,000
3,000	Pay mason	3,000
	Pay surveyor	2,000
	Buy a door	7,000
66,000 or approx £29.50 (at July 2006 exchange rate)		72,500 or approx £32.40

The work was anticipated to take approximately a month to complete.

A total of 13 responses were noted for this question.

5.7.13 What makes it difficult to get a latrine?

Table 5.9 Reported difficulties in obtaining a latrine

Difficulties in obtaining/ constructing a latrine	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Long distance to hard wood logs	9	4	2	3	1	3	
Hard/rocky ground	8	4	1	1	4	2	
Long distance to water source	5	4	1		1	3	
Lack of money	5	3	2	1	2		2
Hard for a woman to dig pit/produce mud blocks	3	3	2		1		
Lack of skills to prevent latrine collapsing	3	2	1	1	1		1
Sees no difficulty	3	2	3				
High groundwater table	2	2	1			1	
Laziness	2	2		2			1
No help available	2	2			2		2
Soft ground	2	2		2			1
Competing priorities for time/money	2	1		1		1	2
People don't want job of digging latrine pits	1	1		1			1
Totals:	47		13	12	12	10	10

Most reported difficulties (table 5.9) related to the physical limitations such as the distance to hard wood or water source (14 mentions) and the ground conditions e.g. hard or soft ground, or high groundwater table (a combined total of 12 mentions). Issues relating to a lack of money received seven mentions. Those without a latrine highlighted financial difficulties and a lack of available help to assist with construction.

5.7.14 What can make it easy to get a latrine?

Table 5.10 Reported factors which help to facilitate latrine construction

Helpful factors for latrine construction	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Availability of tools	7	2	1	1		5	3
Money	6	2	2		4		1
Water source is nearby	3	2		1		2	1
Good soil	2	2	1	1			
Dividing up the work	2	1	1			1	
Availability of hardwood	1	1	1				
Bicycle to transport water	1	1				1	
Help available	1	1			1		1
Ox cart to transport wood & water	1	1				1	
The desire to have a toilet	1	1	1				
Totals:	25		7	3	5	10	6

Table 5.10 shows that the physical limitations of water and hard wood (or the means to obtain them) received a high number of mentions (combined total of six), though this was exceeded by the related matter of the availability of construction tools (seven). Having enough money to pay for materials/labour also received six mentions. These three areas received most of the comments with respect to the ease or difficulty of the process of obtaining a latrine.

5.7.15 Have there been any activities in this village to try to persuade people to build toilets?

Table 5.11 Reported latrine promotion activities

Latrine promotion by:	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Village/ward leaders	21	4	2	7	11	1	7
Dispensary staff/health officers	7	4	2	2	2	1	3
WAMMA/District Govt staff	5	3	2	2	1		1
National campaign/organisation	5	2	2	1	1	1	1
Street/10-cell leaders	3	2	1	1	1		2
Church	2	1				2	
International organisation	1	1	1				
Totals:	44		10	13	16	5	14

Sanitation promotion was reported to have taken place in all the four villages visited and by each group of people taking part. Table 5.11 would indicate that local leaders were seen as being particularly responsible for this with 21 mentions and local health personnel next with seven. National campaigns and DG staff were also recognised as playing a significant role and each was mentioned a total of five times. Those without toilets recognised that significant attempts had been made to promote toilets by local leaders and health staff as well as the 10-cell leaders within their village. The implications of this are that few external NGOs and international organisations have been recognised as having impacted the sanitation level except where they worked through the DG.

5.7.16 What are the advantages or disadvantages of local people promoting toilets in their own village?

Table 5.12 Reported advantages of local people promoting sanitation

Advantages of local promotion of latrines	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Better/easier follow-up available	9	4	3	4	1	1	3
Better local knowledge	3	3	1	1		1	1
No language problems - mutual understanding	2	2		2			1
Totals:	14		4	7	1	2	5

Table 5.13 Reported disadvantages of local people promoting sanitation

Disadvantages of local promotion of latrines	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
People can feel bullied/forced/harassed	2	2	1		1		

It was clear that those who took part in the meetings saw significant advantages to sanitation promotion being done by those who were local (table 5.12). The opportunity for on-going follow-up activities was particularly recognised as a benefit along with better local knowledge and a common language was felt to bring easier two-way communication. The only difficulty reported was that some people can feel bullied or harassed by those doing the promotion (table 5.13). It was interesting to note that this was reported by both village government personnel – who may well have been responsible for such tactics – and also one of the women's FGIs representing those potentially on the receiving end of such promotional activities.

5.7.17 What are the advantages or disadvantages of outside people coming in to promote toilets?

Table 5.14 Reported advantages of external people promoting sanitation

Advantages of external latrine promotion	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Outsiders might bring new skills/ideas	5	4	3		1	1	1
People listen to outsiders	3	2		1	2		1
Incentives	1	1	1				
Outsiders might bring money to help them	1	1			1		
Sometimes they bring new products	1	1			1		
Totals:	11		4	1	5	1	2

Table 5.15 Reported disadvantages of external people promoting sanitation

Disadvantages of external promotion of latrines	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Embarrassed to be told by outsider to have toilet	2	2		1		1	

With regard to external people coming in to a village to promote toilets, two main advantages were listed (table 5.14). People reported that they can be more attentive when an outsider talks to them and they seemed to appreciate the opportunity to learn about new ideas or gain new skills. Money/ incentives and new cleaning products were also mentioned though less frequently. The downside of non-local people coming in was reported in two villages where they

felt embarrassed to be told by outsiders to have toilets (table 5.15). Perhaps the ideal solution to latrine promotion by external agencies and NGOs would be to work through and support the existing DG channels down to village level, maximising the local advantages and minimising the potential for embarrassment, or to consider a CLTS approach.

5.7.18 What happens when a latrine is no longer usable?

Table 5.16 Reported action when latrine becomes non functional

Latrine is no longer usable	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
Dig a new one before the old one is full	6	3	2		3	1	
Dig a new one	5	3		3	2		2
Use neighbour's toilet	5	2	1	2	2		
Go to the bushes	4	3	1	3			
Build temporary toilet until rainy season passes	1	1				1	
Renovate old latrine	1	1				1	
Totals:	22		4	8	7	3	2

Table 5.16 would suggest that there was a general expectation to replace full latrines but the issue may be one of timing and it would not be practical during the rainy season. An alternative short-term solution may need to be implemented and this could either mean using a neighbour's toilet, if they would allow it, or going to the bushes. Many of those with a latrine (though notably not in the men's group) were aware of the need to construct a replacement before the first became full. The findings from this question appear to corroborate the latrine replacement findings of section 3.11 in that not everyone would expect to be able to replace their latrine immediately. Of those unable to replace straight away, most expected to use a neighbour's latrine though perhaps a smaller proportion may resort to open defecation for a time. This confirms that even when a household toilet is not functional, the family may not automatically go to the bush – especially where a neighbour is willing to share for the period. Thus, a break in household latrine service for a family would not guarantee their lack of access to a toilet.

One group was asked if they would allow their neighbour to share their latrine. There were three responses to this:

- Not if he knows his neighbour is just lazy
- Yes, because she will also go to them when her latrine is full
- She would advise them to build their own toilet

There seemed to be a mixed response to sharing, but it appeared to be perceived as acceptable for a proportion (less than half) of those interviewed. This concept is worthy of further exploration in relation to:

- Actual numbers of households sharing each latrine
- Acceptable duration of sharing (from the perspective of the latrine owner)
- Have any households shared their latrine previously but would not do so again, why?

Further discussion on latrine sharing is provided in section 7.3.11.

5.7.19 What are the main differences between your village and a neighbouring village with respect to toilets?

Table 5.17 Perceived difference between villages in same ward

Difference between villages within the same ward	number of comments						
	Total	# villages	VG	Men	Women	Youth	No toilet
Don't know	4	2		3	1		3
Both villages in same ward so no difference	1	1	1				

Table 5.17 would suggest that some people, especially those without a toilet, found the concept of this question difficult and either were unable to grasp it at all, or, as in the case of one VG member, they felt that all villages within the same ward would be similar.

Table 5.18 Perception of higher coverage villages

Perception of higher coverage villages	number of comments						
	Total	# villages	VG	Men	Women	Youth	No toilet
Leaders here are active in educating villagers	1	1	1				
People here understand importance of latrines	1	1	1				
There is good road access for health facilitators	1	1				1	
This is a ward village	1	1	1				
Totals:	4		3	0	0	1	0

In all meetings where differences were recognised, the village where the participants came from was always seen as a higher coverage village and without exception was compared with one of lower sanitation coverage. There were only a few reasons suggested for higher coverage villages and those have all been reflected in the above table 5.18.

Table 5.19 Perception of lower coverage villages

Perception of lower coverage villages	number of comments						
	Total	# villages	VG	Men	Women	Youth	Without a latrine
More bushes	7	3	3	1		3	1
Many livestock keepers/pastoralists	4	3	3	1			
Health officers visit less frequently	3	2		1	1	1	1
Small village/fewer households	3	2		2		1	1
Laziness/no desire	2	1				2	
High groundwater table	1	1	1				
More remote	1	1				1	
People prefer to stay with old traditions	1	1	1				
Totals:	22		8	5	1	8	3

It was easier for people to comment on the other "lower coverage" villages. A greater amount of bush cover suggests that these villages may be more sparsely populated. Throughout this exercise, pastoralists had been identified as typifying those of a more nomadic lifestyle who move around every few months in order to find pastureland for their cattle. This was seen as their culture or tradition and very few of these were perceived as having a toilet. From the above table 5.19, there were five direct references to this although the young adults may have perceived this as laziness (taking the total to seven). The size of the village – with respect to the number of inhabitants or houses – was seen as significant. This may relate to the age of the village or how well established it had become, similarly, it could indicate something of the level of remoteness or the level of amenities available within the village. Linking the frequency of visits from health officers to the level of road access as in the previous table would suggest that those villages with better access were perceived to have higher sanitation cover. Finally, the hydro-geologic conditions were again cited as limiting the number of latrines in low coverage villages.

5.8 Summary of village level perception

The above issues represent the village level perceptions of differences in latrine coverage. Table 5.20 presents a summary of the major sanitation uptake factors as raised by the villagers during this exercise, though these are not necessarily listed in order of perceived priority. The factors have been separated according to whether they concern individual household/family situations and choices or if they may be seen as relating to the village.

Table 5.20 Summary of reported factors relating to latrine uptake

Personal Situation/Choice Factors	Village Level Factors
Prevent Disease	Wealth/poverty level
Cleanliness of area	Access to hardwood
Motivation/priority/laziness	Level of bush cover
Availability of help	Access to water source
Availability of tools	Hard/rocky ground
Individual poverty	# or % of pastoralists
Privacy	Soft/unstable ground
Timing wrt rain/harvest	High ground water table
Avoid embarrassment	Accessibility of village
Bring respect	Size of village
Traditions	# or % of Vulnerables
Prevent flies	Administration level
Visitors	Active VG
Improve lifestyle	Remoteness
Protect from snakes/animals	Housing density
Convenience	

5.9 Sustainability factors (From discussion with WAMMA)

Prior to the various factors acknowledged during the village meetings, the Dodoma Rural WAMMA staff had been invited to meet and identify those factors that they deemed relevant for sustained sanitation uptake. The list in table 5.21 was generated during their discussion.

Table 5.21 Sanitation uptake factors reported by WAMMA members (WAMMA 2005)

Sustainability factors identified by Dodoma Rural district WAMMA members
1. Good leadership at village level
2. Economic growth of Community (purchasing power)
3. Availability of construction materials - local and external
4. Awareness of the need for improvement in sanitation
5. Women participation
6. Good plans at village level
7. Good plans at district level
8. Continued mobilisation by leaders at all levels
9. Availability of understandable policies and guidelines and local bylaws
10. Availability of health officers and extension workers at Ward and village level
11. Accountability of stakeholders (Communication to leaders and vice versa)
12. Affordable/acceptable technologies
13. Presence of institutions working in sanitation
14. Enough funding from donors and external support agencies

Most of the above factors may be considered to act at village level, although item 4 may also relate to a personal/household level and items 7, 9 and 14 have a wider context.

5.10 Sanitation sustainability factors reported by WaterAid Tanzania

WaterAid Tanzania had also held a half-day meeting in their Dar es Salaam office on the 9th September 2005 to discuss the issues surrounding sustained sanitation uptake, and the following summary was compiled (see table 5.22). (Abbot 2005)

Table 5.22 Sustained sanitation uptake factors reported by WaterAid Tanzania staff

Factors affecting sustainability of sanitation identified by WaterAid Tanzania staff
1. Rainfall
2. Soil condition
3. Access to technology
4. Wealth levels/social status
5. Ethnic (or mix of) groups
6. Settlement patterns/land ownership
7. Enforcement – institution/ campaigns
8. Institutional influence (health centres/other/health extension centres
9. Forced resettlement
10. Educational levels
11. Type of technology and investment amount/level/home made/fundi made
12. External inventions
13. Age of head household (household age composition), (gender composition)
14. Who in the household is responsible for Operation & Maintenance / construction?

In addition to the above, the following obstacles in achieving sanitation were recognised (see table 5.23). (Abbot 2005)

Table 5.23 Obstacles to achieving sustained sanitation as reported by WaterAid Tanzania

Obstacles to achieving sustained sanitation identified by WaterAid Tanzania staff
• **Tradition and customs** – These beliefs have a tendency to deny women e.g. to access latrines as men are the builders of latrines.
• **Access to technology options** – There is limited dissemination of technologies that are adaptable with changing environmental conditions, those that could attract use of on site defecation.
• **Approaches** – There is a belief that Sanitation and latrine development should be tackled through hygiene promotion only and not from other sociological approach particularly for rural communities.
• **Funding** – There is generally less priority to fund sanitation or latrine development as these are seen as not being a felt need to most people, by planners and politicians.
• **Data** - There are no accurate data on sanitation status in most areas as this is not a priority area and as such is left out from planning and resources allocation

From the above tables (5.22 and 5.23) it can be seen that most issues recorded may be considered to act at village level, but items 13 and 14 would relate more to individual households and item 1, rainfall, could be seen in a wider context.

5.11 Combined summary of proposed village-level factors considered likely to influence sustained sanitation

The purpose of this phase was to identify those factors that may be considered to act on sanitation at village level so as to test the impact of these during the next phase of the research. The combined and categorised results are presented in the following table 5.24.

Table 5.24 Summary of proposed village factors relating to sanitation uptake in rural Tanzania

Factor	Proposed indicators		
	Village Data	***WAMMA***	***WaterAid Tanzania***
Good village leadership	Active VG	Good leadership at village level	Enforcement
		Good plans at village level	
		Continued mobilisation by leaders	
		Accountability of stakeholders (communication from/to leaders)	
		Participation of women	
Village status	Size of Village		
	Administration Level		
Settlement pattern	Housing Density		Settlement Patterns
	Remoteness		
	Accessibility		
	Level of Bush cover		
Diversity	# or % Pastoralists		Ethnic (or mix of) Groups
Education level		Awareness of need for sanitation improvement	Educational Levels
Wealth	Wealth/ poverty level	Economic growth of community (purchasing power)	Wealth levels/ social status
	# or % Vulnerables		

Infrastructure		Presence of institutions working in sanitation	Institutional influence (health centre/other)
		Availability of Health Officers and Extension Workers	
Interventions			External interventions
Technologies		Affordable/acceptable technologies	Technology type, cost etc.
			Access to technology
Access to materials	Access to hardwood	Availability of construction materials	
	Access to water source		
Geography	Hard/rocky ground		Soil condition
	Soft/unstable ground		
	High GWT		

Thus, eleven categories of factors were recognised as relating to villages as opposed to individuals or districts. While the factors not included in this table were considered as potentially relevant to latrine uptake, they do not fit into the specifically village-level focus of this research. The above factors were carried forward to Phase 2 for further assessment and to determine which, if any, could be proven to be associated with sustained or unsustained sanitation villages.

6 Phase 2: methodology for village-level data collection

6.1 Overview

Phase 2 attempts to identify those factors that may be considered as determinants of sustainable sanitation in the Dodoma Rural District of Tanzania. A strategy was be developed (section 6.2) to evaluate the influence of those factors and indicators already identified in the earlier chapters of this thesis. It was not feasible (due to time and financial constraints) to visit all sustained and unsustained sanitation villages. Thus, the more in-depth data required during Phase 2, necessitated selecting a sample of villages from each of the sustained and unsustained sanitation village categories according to the classification of chapter three. Such samples were purposefully selected, as they would be too small for randomisation to work (section 6.3). The indicators were then analysed for significance in the sample villages.

Some village data had already been collected during Phase 1, and hence the following were assessed for all villages where data was available:

1 Village status: number of households; administrative level.
2 Infrastructure: presence of clinic, community centre, organised market, police post; number of Traditional Birth Attendants (TBAs) and Traditional Healers (THs); presence of a mosque and the number of churches.
3 Education: number of primary schools, presence of a secondary school
4 Wealth: number/percentage of households with income from other than agriculture.
5 Interventions: number of sanitation interventions which village has been part of <2004
6 Latrine Sharing: percentage of households that share a latrine with at least one other family.

Geographical Information System (GIS) data were obtained through WaterAid Tanzania from GeoData Consultants Ltd in Dar es Salaam (GeoData 2004). These data were collected during 2004 and has provided information that will be included to assess the influence of the following:

1 Village status: land area of ward, (village area interpolated).
2 Settlement pattern: ward (and village) housing density, proximity to Dodoma town.
3 Access to materials: number of water sources (total, functioning/non functioning, improved/unimproved.

The above data had already been collected but would feed into the modelling of Phase 2. In addition to the above, Phase 2 explored the factors identified in chapter five (table 5.24). Some factors and indicators would elicit a specific number from respondents e.g. the percentage of Muslims in a village. Other questions required a range of estimates from which the appropriate estimate was selected (since exact numbers were unlikely to be known) e.g. in considering the quality of village leadership. In an attempt to develop a level of consistency to the response strategy, various scales were considered and a 5-point scale as in the Likert scale (Likert 1932), was adopted. When using a Likert scale, the respondent would typically be asked to

indicate his or her degree of agreement with a statement or any kind of subjective or objective evaluation of the statement. Traditionally a five-point scale is used, however many psychometricians advocate using a seven or nine point scale.

While Phase 2 data collection did not specifically address attitudes, the scale was adapted to suit (section 6.2) and was applied to all questions where a range of options were presented. Data such as these are ordinal in nature though the steps between the scale levels are unlikely to be equidistant and therefore one cannot assume that respondents would perceive them as such. As ordinal data, the 5-point scale responses can be collated into bar charts and the central tendency is summarised by the median or modal value, but not the mean. Similarly, the dispersion of results is summarised by the range across quartiles, not the standard deviation, or analysed using non-parametric tests such as the Chi-square test (for any association between two sets of observations), Mann-Whitney test (for comparison of two unrelated samples), Wilcoxon signed-rank test (for paired samples) or the Kruskal Wallis test (for three or more samples). Phase 2 will compare two unrelated groups of villages i.e. sustained sanitation villages with unsustained sanitation villages, and therefore the Mann-Whitney test was employed for analysis.

This chapter has been laid out in three distinct stages, which combine to create the foundation and structure of Phase 2 (see table 1.2).

a. Discussion and development of the various factors and associated questions (section 6.2)
b. Rationale for village selection and inclusion in Phase 2 (section 6.3)
c. Method for gathering and recording data from the selected villages in Phase 2 (section 6.4)

6.2 Development of measurable indicators

In chapter five, various categories of potential village-level sustainability factors were developed. These may be sub-divided into two groups, namely physical factors and social factors as follows:

Table 6.1 Summary of factors

Physical Factors	***Social Factors***
Village situation/status	Village leadership
Village ground conditions	Village diversity
Village settlement pattern	Village education level
Village infrastructure	Village wealth level
Access to materials and technologies	Past sanitation interventions

In the following sections, we consider how a system was developed to score each village with respect to each of these groups of factors.

6.2.1 Physical factors

6.2.1.1 Village status

The first and possibly most basic aspect of a village is its size. This can be measured in various ways such as population, land area, number of households, number of sub-villages etc. The research so far has focused on households rather than population and Phase 1 resulted in a figure being estimated for the number of households within each village. The number of sub-villages was also recorded but the data shows that some villages have a large number of small sub-villages, while others have a small number of large sub-villages and therefore this sub-village number alone may not be seen as a reliable indicator of village size. For example, Itiso, the third largest village in the district with an estimated 1734 houses had 10 sub-villages; while Lamaiti, with an estimated 632 households (close to the median value of 661 houses) had 13 sub-villages. The land area of a village is unlikely to correspond with the number of households directly as the housing density will affect this. Sparse housing on a large, possibly remote, land area will have a very different profile to a more tightly packed village on a smaller land area. That said, approximate land areas for each village can be included as a possible factor to test these assumptions. Another comparable aspect of villages relates to their administration level. As mentioned in chapter 1, the district is made up of eight divisions, 48 wards and 128 villages. Each ward has a Ward Government office in the "ward village". Eight of these will also be "divisional villages" and therefore have a higher administrative level. Hence, it should be possible to test for associations with these three aspects of village status: estimated number of households; approximate land area and administrative level (table 6.2). Data for each of these was obtained prior to Phase 2.

Table 6.2 Village status indicators

Physical factor	***Measurable indicators***	***Data Source***
Village status	Number of households	Phase 1
	Land area	GIS data from GEODATA
	Administrative level	Phase 1

6.2.1.2 Village ground conditions

Three aspects have been identified as potentially influencing the ease or difficulty of latrine construction. Ground that is hard or rocky can be difficult to excavate although ultimately stronger to support the final construction. Soft ground has a tendency to collapse (even during construction) and after completion the potential life of latrines is likely to be short, especially where the pit walls have not been supported. High GWT (groundwater table) can prevent the excavation of latrine pits as they can fill up with water during construction. It can also lead to the

collapse of latrine pits in soil that is sandy or loose during the rainy season when the GWT rises. High GWT also means that the groundwater has the potential to become polluted from latrine pit contents and thus transmit disease-causing bacteria through the ground to any shallow wells in the vicinity. Although an expert opinion from a geologist or geographer would provide a more definitive measure, responsible ward officials who know the area estimated the proportion of households affected by each of the above within the villages of their ward. The five-point scale was utilised to facilitate village comparisons. The factor and indicators are summarised in table 6.3.

Table 6.3 Village ground condition indicators

Physical factor	***Measurable indicators***	***Data Source***
Village ground conditions	Hard/rocky ground	Phase 2
	Soft/unstable ground	Phase 2
	High GWT	Phase 2

6.2.1.3 Village settlement patterns

Following on from those factors raised under the village status section above, the first aspect to be considered with relation to settlement pattern is the overall housing density as measured by dividing the total estimated number of houses by the approximate land area. Phase 1 provided an estimate of houses, GIS data provides ward areas, and the DHO provided a map showing approximate village boundaries. This will only begin to define the settlement pattern, however, as it cannot describe how the housing is laid out within the village boundaries. Therefore, the next issue to be targeted relates to the proximity of housing within the respective villages. This was to address whether the villages range from being entirely spread with no houses close to each other, to where all the homes are close together in one or two specific sections of the available land area. Related to housing proximity is the amount of bush coverage within the village. Bush can be seen to provide a level of privacy where people can hide for open defecation, hence the lack of bush is thought to afford an impetus for villagers to find alternative forms of privacy such as by building a latrine. Some villages suggested accessibility could be a factor - with respect to information dissemination from those such as district health officers who may visit to add their weight to the argument for building latrines. This could be measured in two possible ways: firstly, the proximity of the village to Dodoma town; or secondly, the proximity of the village to a main road. GIS data has the potential to facilitate approximations for each of these. The level of remoteness as it relates to services available within a village may be estimated on a five-point scale ranging from the village being perceived as a centre with all necessary amenities locally available, to the village being seen as very remote with most services only reachable from beyond the village boundary. This may be crosschecked against village infrastructure in the next section. Table 6.4 provides a summary of the settlement pattern indicators to be used.

Table 6.4 Settlement pattern indicators

Physical factor	*Measurable indicators*	*Data Source*
Village settlement pattern	Overall housing density	Phase 1/GIS(Σhouses/Σarea)
	Proximity of houses	Phase 2
	Level of bush coverage	Phase 2
	Proximity to Dodoma	GIS data from GEODATA
	Proximity to a main road	GIS data from GEODATA
	Remoteness (of services)	Phase 2

6.2.1.4 Village Infrastructure

The infrastructure relates principally to the facilities and services available within the village. Phase 1 already collected data on whether there was a clinic, community centre, organised market, police post, as well as the number of TBAs & traditional healers. Places of religious worship may also be included here and can be represented by the presence of a mosque and the number of churches within a village as collected during Phase 1. Most of these eight, however, are likely to also be related to the size of the village or how well established it is. Therefore, where the TBAs, healers and churches are concerned, the number of households served by each was included to recognise the ratio per household. Table 6.5 gives an overview of the infractructure indicators.

Table 6.5 Infrastructure indicators

Physical factor	*Measurable indicators*	*Data Source*
Village Infrastructure	Clinic	Phase 1
	Community centre	Phase 1
	Organised market	Phase 1
	Police post	Phase 1
	# of TBAs	Phase 1
	# of traditional healers	Phase 1
	Mosque	Phase 1
	# of churches	Phase 1

6.2.1.5 Access to materials

Alongside the infrastructure, villages need to be able to obtain construction materials and know about the type of latrine technologies, which are available and affordable to them. In an attempt to assess such access, the ready availability of water and hardwood were considered a prerequisite. GIS data was already available on the number and type of water sources within

each village for 2004; however, the typical number of water sources still functioning at the end of the dry season may be a better indicator. This is especially the case since construction work cannot easily be done during the rainy season. The availability of timber was judged by the distance that people must go to obtain hardwood. Again, a five-point scale was used here, ranging from very close to more than half a days' walk away. Focusing specifically on latrine construction required an understanding of the proportion of "permanent" latrines (with a roof) as compared to "temporary" ones. Newer technologies have also been introduced over the years and these were typified by gauging the number of VIP latrines, and the number of pour-flush toilets within each village. Table 6.6 provides a summary of the indicators to be used to assess the impact of access to materials and technologies.

Table 6.6 Access to materials and tecnhologies indicators

Physical factor	***Measurable indicators***	***Data Source***
Access to materials	Number and type of all water sources	GIS data
	# functioning water sources at the end of the dry season	Phase 2
	Distance to hardwood	Phase 2
	% "permanent" latrines	Phase 2
	% VIP latrines	Phase 2
	% pour-flush toilets	Phase 2

6.2.2 Social factors

6.2.2.1 Village leadership

The quality of village leadership was rated on a 5-point scale although clearly this could not be done by a member of the VG to avoid bias. A reflection of leadership quality could also be seen in the openness of the village people to new ideas in the sense that good leadership would tend towards villagers feeling more secure in their living situation and less unsettled by the possible introduction of development and progressive thinking. Another indication relating to the promotion of sanitation would be an active VHC (village health committee). Leadership is responsible to lead, guide, follow up, rebuke and punish offenders. Therefore, another indicator of an active leadership would be the level of enforcement or penalty charges imposed on lawbreakers as measured by the total monies generated from fines. While bylaws exist requiring households to have a latrine, clearly the number of offenders would be expected to vary according to the coverage levels reported in Phase 1, therefore, a more accurate way to judge village leadership would be to measure the total of all fines for the previous year as opposed to one specific charge. That said, the total revenue from fines related to the absence of a latrine was also assessed for comparison. The indicators for leadership quality are summarised in table 6.7.

Table 6.7 Indicators of good leadership

Social factor	*Measurable indicators*	*Data Source*
Good village leadership	Leadership quality	Phase 2
	Openness of people	Phase 2
	Active VHC	Phase 2
	Total revenue from fines	Phase 2
	Revenue from toilet fines	Phase 2

6.2.2.2 Village diversity

As observed in chapter 5, communities may include various expressions of difference or diversity including aspects of ethnicity, religion and economic activity/occupation. In an attempt to capture the possible influence of such variety, diversity was recorded in the following ways: ethnicity – tribes by proportion within village; religion – proportion of Christians, Moslems and Animists/traditional religion within village; economic activity – pastoralist/ agriculturalist balance. A summary of the indicators for village diversity is given in table 6.8.

Table 6.8 Indicators of village diversity

Social factor	*Measurable indicators*	*Data Source*
Village diversity	Tribes & proportions	Phase 2
	% Christian/Moslem/Animist	Phase 2
	Pastoralist vs. Agriculturalists	Phase 2

6.2.2.3 *Village education level*

A number of aspects can influence education levels, not least the opportunity to attend a school within one's own village. Phase 1 has already identified that most villages have a primary school as well as those with a secondary school. However, opportunity to attend does not guarantee attendance and a school built within the last five years is unlikely to have helped villagers over 25 years of age. An overall impression of the village education standard was requested from each of the three interviewees, and a more detailed picture was sought from the WEC (Ward Education Coordinator) by asking about: current adult illiteracy level; adult illiteracy five years ago; % children currently not attending school; % children not attending school five years ago. In addition to these, it was considered useful to explore the numbers of people: a) completing primary school; b) passing the secondary school entrance exam; and c) actually attending secondary school. It was recognised that larger villages will have the potential to have more children in school than smaller villages, but the above should provide a picture of the proportional pass rate and secondary attendance relating to the number completing primary school. Such information was only likely to be available from the WEC. Education level indicators are summarised in table 6.9.

Table 6.9 Indicators of village education level

Social factor	*Measurable indicator*	*Data Source*
Village education level	Primary school(s) in village	Phase 1
	Secondary school in village	Phase 1
	Education level ranking	Phase 2
	Current adult literacy level	Phase 2 - WEC
	Adult literacy five years ago	Phase 2 - WEC
	% children not in school now	Phase 2 - WEC
	% children not in school 5yrs ago	Phase 2 - WEC
	# completed primary school last year	Phase 2 - WEC
	Of those, # passed secondary entrance exam	Phase 2 - WEC
	Of those ,# actually attending secondary school	Phase 2 - WEC

6.2.2.4 Village wealth level

During Phase 1, data were collected from each village including about the number of households that generate income from sources other than agriculture (i.e. agriculturalists or pastoralists). This was an attempt to assess what proportion of the village are solely dependant on crops and animals – as well as the proportion with additional income. In addition to this, a simple wealth ranking scale was developed for Phase 2 to enable villages to be rated for general wealth-level. Like previous scales this again had five points and ranged from rich to poor set against the perspective of a WG member who is both familiar with the village and has had a broad range of experience e.g. the WEO.

The other side of wealth is poverty and this may equally be assessed as an inverse wealth indicator. Such poverty measurements should include an assessment of the proportion of houses that would not have adequate food security in a typical year. These were considered as "food insecure". Needier than these would be those recognised as "vulnerable". The style or materials used in house construction are a measure of what is affordable – as well as available. Therefore, % metal roofs; % houses with cement; and % poorly built houses were also included here. A further attempt to classify village wealth was to compare livestock numbers and agricultural produce levels. This information was only considered available from a WEO or an agricultural extension officer and was requested in an attempt to recognise wealth differences. The village wealth indicators are listed in table 6.10.

Table 6.10 Indicators of village wealth or poverty

Social factor	*Measurable indicator*	*Data Source*
Village wealth level	# h/hs with non-ag. income	Phase 1
	Perceived village wealth rank	Phase 2
	Food insecure	Phase 2
	Vulnerables	Phase 2
	% metal roofs on houses	Phase 2
	% houses with cement	Phase 2
	% poorly built houses	Phase 2
	# Cattle	Phase 2 (Ag. ext officer/WEO)
	# Sheep	Phase 2 (Ag. ext officer/WEO)
	# Goats	Phase 2 (Ag. ext officer/WEO)
	# Pigs	Phase 2 (Ag. ext officer/WEO)
	Agricultural produce	Phase 2 (Ag. ext officer/WEO)

6.2.2.5 Past sanitation interventions

Sanitation promotion messages may well be regularly communicated by village leaders as indicated in the Focus Group Interview (FGI) results from the previous chapter, however, the FGIs also raised the issue that the villagers sometimes pay more attention to outsiders. Therefore, two external intervention factors were considered here. Firstly, whether there had been an external programme in the village (in recent years) (*that included sanitation as a primary focus*); *and* secondly, how many such interventions had been reported. This second aspect relates to the possible value of repeated messages. In the Phase 1 village data, it was not always clear when the various interventions began or ended, as some villages were unable to provide specific years. Some other villages reported concurrent i.e. overlapping interventions. Thus, the number of reported interventions was used where the start date (if reported) was prior to the year 2004 – since the 10 years under consideration in Phase 1 ended in 2003. Thus, the number of past interventions was taken as an indication of the level of repetition of sanitation promotional messages by external agents. Hence, the indicators used in assessing the impact of sanitation interventions are as shown in table 6.11.

Table 6.11 Indicators of impact of sanitation interventions

Social factor	*Measurable sub-factor*	*Data Source*
Past sanitation interventions	At least one reported	Phase 1
	Number of interventions	Phase 1

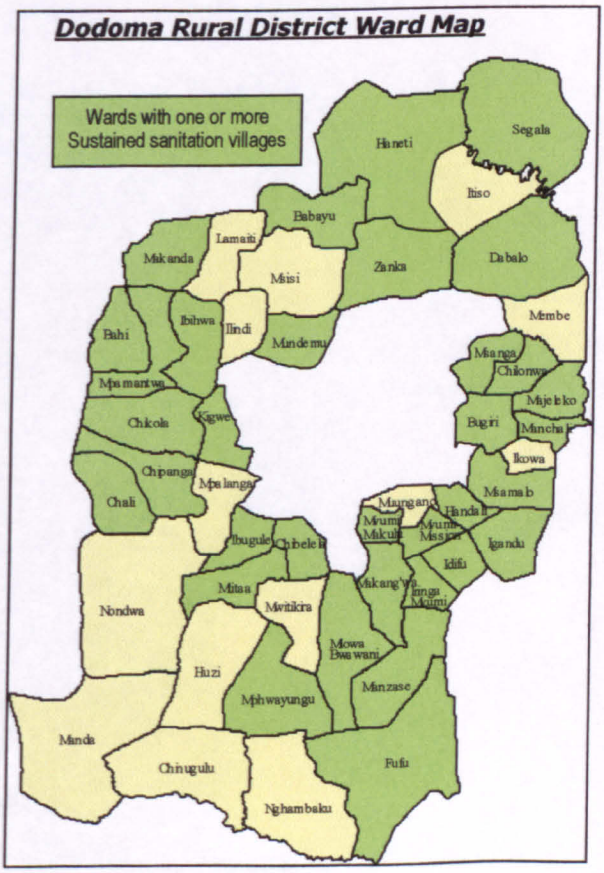
Thus, while there were 10 categories of factors to be measured (see table 6.1), a total of 56 sub-factors or indicators were measured, or at least attempted, during the remaining part of the research.

6.3 Rationale for village selection

As mentioned in section 6.1, time and financial constraints did not permit the above factors and indicators to be tested for all sustained/unsustained sanitation villages. Therefore, in order to test the above factors for any association with sustainable sanitation, it was necessary to compare the factors across a sample of villages with sustained and unsustained latrine coverage. To that end, a total of 16 villages (eight with sustained and eight with unsustained sanitation) were selected for inclusion in the sample.

While a larger number of villages could have provided stronger statistical evidence, it was hoped that the combination of Phase 1 results, alongside Phase 2, would be sufficient to show a satisfactory level of association to define those factors that are determinants of sustainability. The ward and village selection was made purposefully since the sample size was too small for randomised sampling to work. In making such a selection, it was essential to look at the village settings i.e. within their respective wards. Highlighting those wards that are projected to have one or more sustained sanitation village by 2008 produced Fig. 6.1.

Figure 6.1 Wards with ≥1 sustained sanitation village



Similarly, highlighting those wards that are projected to have one or more villages with unsustained sanitation by 2008 produces Fig 6.2.

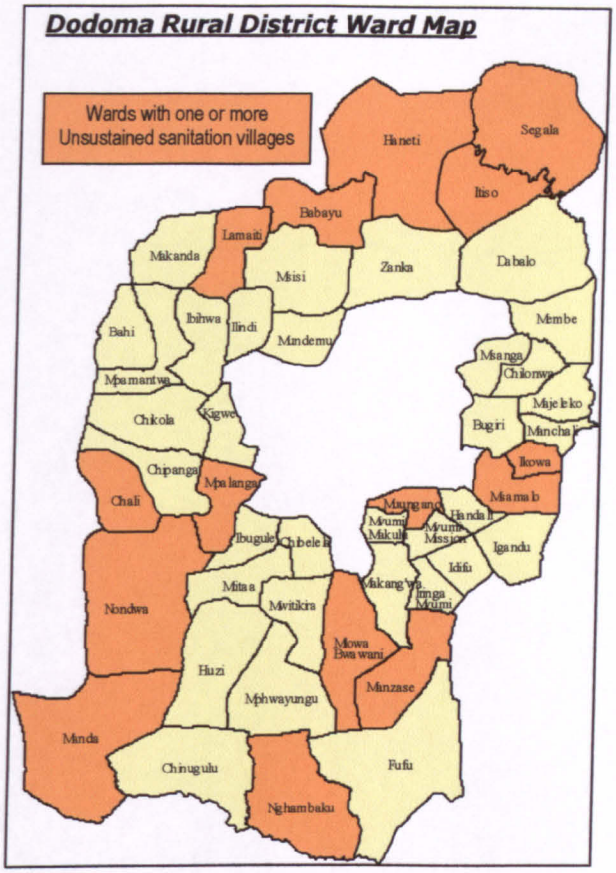
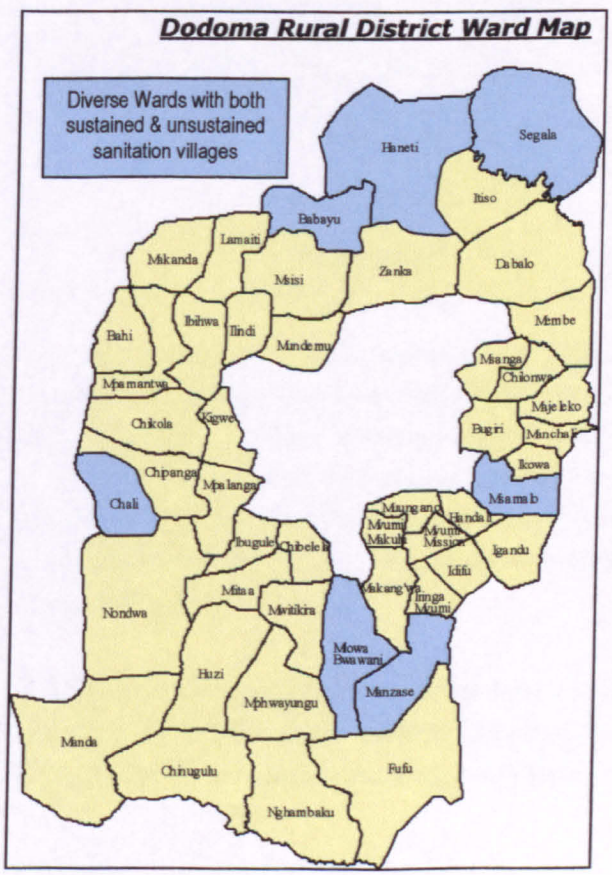


Figure 6.2 Location of wards with ≥ 1 unsustained sanitation village



A brief comparison of the two maps (Figures 6.1 and 6.2) shows that some wards are diverse in profile, containing both sustained and unsustained latrine coverage villages. Fig. 6.3 highlights specifically those diverse wards. They are located across the district rather than in only one or two areas.

Figure 6.3 Location of diverse wards

Recognising the spread of the diverse wards, it was decided to select four diverse wards; one to the North, South, East and West of Dodoma town and the surrounding Dodoma Urban District. The selected wards were Haneti, Msamalo, Manzase and Chali. From each of these wards, one sustained and one unsustained sanitation village was selected as detailed in table 6.12.

Table 6.12 Selection of villages from four diverse wards

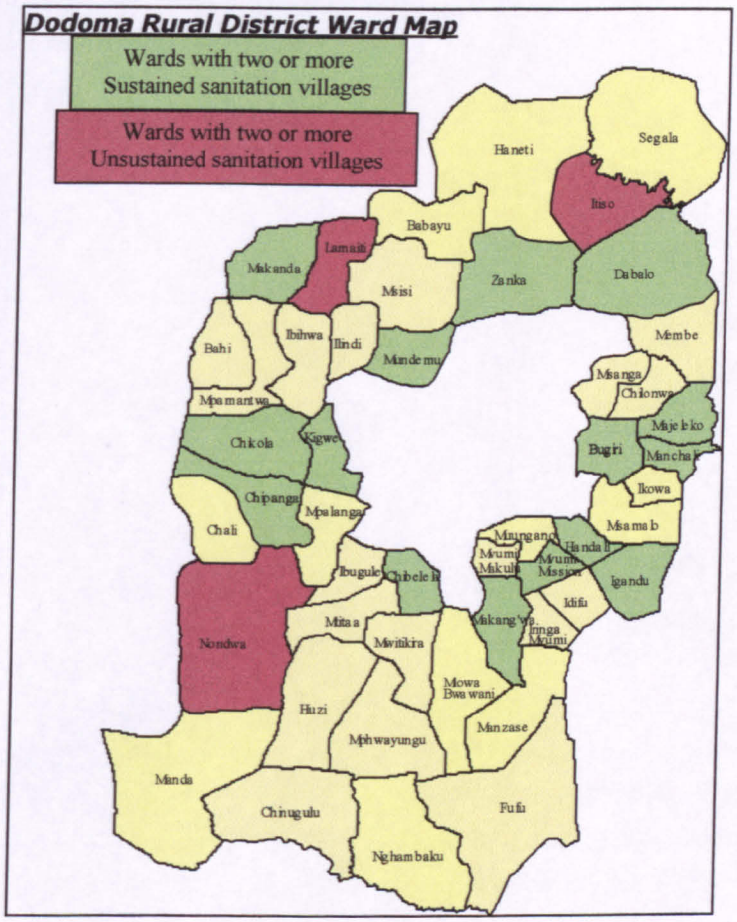
***Ward* (& location w.r.t. Dodoma)**	***Villages* (& number of households)**	***Sanitation Level* (from Phase 1 data)**	***Selected for Phase 2***
Haneti (North)	Haneti (832)	Sustained	Yes
	Kwahemu (617)	Unsustained	Yes
	Chenene (523)	Sustained	No
	Humekwa (230)	Intermediate	No
Manzase (South)	Manzase (924)	Intermediate	No
	Sasajila (582)	Sustained	Yes
	Ilewelo (295)	Unsustained	Yes
Msamalo (East)	Mgunga (1117)	Unsustained	Yes
	Mlebe (712)	Sustained	Yes
	Mnase (658)	Sustained	No
Chali (West)	Chali Makulu (585)	Unsustained	Yes
	Chali Isangha (399)	Sustained	Yes
	Chikopelo (332)	Sustained	No
	Chali Igongo (188)	No Data	No

The above table lists all of the villages within each of the four selected wards and shows how each of these villages was classified during Phase 1. Within each ward, the largest sustained and the largest unsustained sanitation villages were selected for inclusion in Phase 2. It should be noted at this point that within two of the wards, the larger village selected had sustained sanitation, and within the other two the larger village had unsustained sanitation. This point may be relevant later since the size of the village (number of households) was thought to be a factor for sustainability.

Having identified those wards considered diverse, it was now appropriate to consider which of the wards were more uniform in nature. To do this, each ward was assessed according to whether it contained two or more villages with either sustained or unsustained sanitation, and

no villages in the opposite category. The results of this are represented graphically in the ward map below (Figure 6.4).

Figure 6.4 Location of uniform wards



From the map in Fig 6.4, it can be seen that there are many more wards with two or more sustained sanitation villages than those with two or more unsustained sanitation villages. Also, the wards with unsustained sanitation villages would appear to be further from the Dodoma Urban district – with the notable exception of Makanda ward which has two sustained sanitation villages and is further from Dodoma Urban than the neighbouring Lamaiti ward with its two unsustained and one intermediate sanitation villages.

Another observation is that two of the unsustained village wards have significant borders with sustained village wards. Nondwa and Chipanga wards also border but with a much smaller length of boundary. Because of this, the Makanda, Lamaiti, Dabalo and Itiso wards were also selected for inclusion in Phase 2 and table 6.13 details the villages selected within these wards.

Table 6.13 Selection of villages from four uniform wards

Ward	*Villages (& number of households)*	*Sanitation Level (from Phase 1 data)*	*Selected for Phase 2*
Makanda	Makanda (978)	Sustained	Yes
	Chonde (518)	Sustained	Yes
Lamaiti	Lukali (1182)	Unsustained	Yes
	Lamaiti (632)	Intermediate	No
	Bankolo (299)	Unsustained	Yes
Itiso	Itiso (1734)	Unsustained	Yes
	Solowu (278)	Unsustained	Yes
Dabalo	Dabalo A (1204)	Sustained	Yes
	Igamba (573)	Sustained	Yes
	Manyemba (414)	Sustained	No
	Chiwondo (227)	Intermediate	No

As in the diverse wards, the largest two sustained or unsustained sanitation villages were selected from their wards. Thus, a total of 16 villages from eight wards were selected to be included in the final phase of this research. Eight sustained sanitation villages (four from diverse wards and four from uniform wards) would be compared to eight unsustained sanitation villages (again four from diverse wards and four from uniform wards) as shown in table 6.14.

Table 6.14 Villages proposed for inclusion in Phase 2

Unsustained sanitation villages		***Sustained sanitation villages***	
Chali Makulu	Diverse ward	Chali Isangha	Diverse ward
Ilewelo	" "	Haneti	" "
Kwahemu	" "	Mlebe	" "
Mgunga	" "	Sasajila	" "
Bankolo	Uniform ward	Chonde	Uniform ward
Itiso	" "	Dabalo A	" "
Lukali	" "	Igamba	" "
Solowu	" "	Makanda	" "

6.4 Gathering and recording data for Phase 2

To be able to gather data on issues such as village leadership, wealth levels etc. as developed in the early section of this chapter would require either a widespread survey among the local people of each of the 16 villages, or key-informant interviews from those working at ward or ward government (WG) level. It was considered that some villagers might not be able to relate easily to a number of the concepts contained in the questions for this phase and perhaps find proportions and percentages hard to capture. Therefore, the decision was made to interview several key-informants working at ward level to attempt to corroborate the responses, obtain reliable results, and invite them to assess both comparison villages from the ward they know. It was understood that this meant each ward would be assessed by different people, but if each was done by at least three independent people the responses could be compared and confirmed. More than three interviewees per village would have increased the key informant sample size, but given the type of questions developed in section 6.2, the people most likely to be able to help would be as follows:

1. The Ward Executive Officer (WEO) will have been educated, having the ability to think in terms of proportion and be familiar with all the villages in the ward. They will know about the quality of leadership within each village and have access to information on fines as well as wealth level data. In fact, the only aspects of village information that they may not be familiar with could relate to education.
2. The Ward Education Coordinator (WEC) is responsible for all the educational activities going on within the ward. They are most likely to know about how and if the literacy levels have changed over recent years and be able to report on primary and secondary

school attendance.

3. The ward Agricultural Extension Worker (AEW) would be familiar with the ground conditions and agricultural activities in the villages.

Because each of the above officials operates at ward level, they have a responsibility to all the villages within the ward and were ideally placed to be able to provide information on the questions proposed. Where one or more of these was unavailable on the day of data collection, a suitable alternative would be sought. If the WEO was found to be away on the day of a visit, his/her responsibilities require that they be available for meetings and interviews, so they would be expected to meet at an alternative time and if necessary would come to meet with the research team in Dodoma. In the absence of the WEC, their assistant should have access to the required information and if not, the head-teacher of the school would be familiar with most if not all of the relevant issues. Where there is no ward agricultural extension worker, it may be possible to meet with a different type of extension worker or a religious worker. Another alternative might be an older person who knows both villages well.

Semu Nassari, who had been the facilitator for the FGIs in Phase 1.5, was appointed to help conduct the interviews in Swahili. His abilities had already been proven and he was a trusted and capable co-worker. Two students were employed to record the answers on the data sheets and all interviews were audio recorded to provide an accurate record in case of possible disagreement. As with the earlier FGIs, a WAMMA member accompanied the team and introduce them to each interviewee. Following this introduction, each candidate was invited to confirm his or her willingness to take part by signing a consent form, which was written in Swahili (see appendix 7).

The format for each interview was planned as follows:

1. General introduction by WAMMA member
2. Introduction to exercise and research team by the facilitator
3. Interviewee invited to confirm his/her willingness to take part by signing consent form
4. Show Phase 1 graphs of all villages in respective ward. Review and discuss graphs and request comments or possible explanations for differences or similarities between villages represented. Ask if graph is perceived to reflect the reality of the sanitation situation for the 10 years shown and note any comments.
5. Proceed with interview questions for each of the two villages required for that ward.
6. Thank the interviewee for his/her time and provide them with a small financial contribution to enable them to buy a soft drink.

6.5 Piloting Phase 2 data collection

In an attempt to test the various concepts within the data collection tool and the ability of people to define the situation in a measurable way, a pilot exercise was planned for Mlowa Bwawani,

one of the diverse wards (see Fig 6.3), for Wednesday 22nd November 2006. Within this ward, the village of Wiliko (340 households) had been classified as having unsustained sanitation, and Nkwenda (343 households) had been classified as having sustained sanitation.

The first interview was with the WEC and he was comfortably able to provide information on each of the following aspects: tribal diversity; religious diversity; education levels; housing quality; food security; health promotional activities; proportion of permanent toilets and village leadership quality.

The second interview was with an old man (75yrs) who was head of the local police. He had personally been involved in the latrine assessment of Phase 1, and agreed that the graphs reflected the reality within his ward. His explanation for the low sanitation coverage in Wiliko was that houses had been deliberately constructed within the bush and there was a significant amount of bush cover – whereas in the other village, Nkwenda, there was no bush and high latrine coverage. He was able to respond well to questions on: proximity of housing; ground conditions; distance to hardwood; water supply; village history; cholera outbreaks; latrine promotion; tribal diversity; migration; housing quality; education levels (less precise); food security; leadership quality – especially with respect to fines.

The above interviews provided a level of confirmation that the concepts being explored could be grasped though the quantifying of the various factors would be easier for interviewees if it were simplified. A number of additional factors were suggested during the debriefing exercise on the following day and these were incorporated for further piloting in Manzase on Friday 24th and Saturday 25th November. During the time spent in this ward, interviews were held with a village education officer, an old man and a woman who deputised for the WEO. Further refinements were made to both the specific questions and the response scale to make the comparison of villages more efficient. The result of these days checking and testing possible data collection strategies was the data collection form as given in Appendix 8.

Questions 1,2,13 & 14 attempt to capture the following: (1) differences between villages; (2) barriers to development; (13) factors relevant to latrine construction for each of the villages; and (14) attitudinal change over recent years/generations. These are qualitative and attempt to paint the picture from the perspective of ward-level officials who could be expected to have a broader perception and experience than that of the villagers who participated in Phase 1.5. The remaining questions are essentially quantitative, and most responses would attempt to gauge differences through estimating the answer on a 5-point scale (rather than requesting specific percentages or proportions – although, where possible, this was also proposed for a few people to check that the scale was clearly understood). Questions would be asked and an A4 size page would show the possible ranges for each question. Examples of this are given in Appendix 9.

Question 21, however, did specifically request proportions of households with respect to religious diversity. To assist with this process, some plates and 50 marbles were purchased. The plates represented each of the three religious persuasions in the district, and the marbles represented the total of all households in the village. Interviewees who were not familiar with percentages or proportions would be invited to place marbles on each plate such that the number of marbles would reflect the proportion of homes engaged in each religion for the particular village (see photo 7.1, page 160). The research team would then be able to count the marbles for each plate/religion and calculate the percentage of all marbles for each. This same approach was also valid for question 19 although the number of tribes would be likely to be much more than three.

Beyond the above questions, the interview included a few questions that allowed for possible explanation of a previous question. Examples of this relating to migration would be questions 27, 28, 31 and 32. These were intended to provide greater understanding of migration both in and away from the villages. Similar types of questions relating to wealth were given in questions 36, 38 and 45.

Questions 1 to 40 were intended for all interviewees.
Questions 41 to 47 were specifically designed for WEOs although an agricultural extension worker would also be expected to be able to respond to questions 44 to 47.
Questions 48 to 54 would only be suitable for the WEC or their assistant who would have access to information on literacy and education.

6.6 Phase 2 data collection

Table 6.15 provides a timetable of the various interviews in chronological order.

Table 6.15 Phase 2 summary of data collection interviews

Date	Interview location	Interviewee	Ward	Villages	Duration
27th Nov 2006	Mnase	Old woman	Msamalo	Mlebe & Mgunga	13:05 – 13:33 abandoned
	"	Mnase VEO	"	Mlebe & Mgunga	13:37 – 15:00
	Mgunga	WEC	"	Mlebe & Mgunga	15:35 – 16:50
28th November	Chikopelo	WEC	Chali	Chali Isangha & Chali Makulu	14:45 – 16:14
	"	Catechist	"	Chali Isangha & Chali Makulu	17:24 – 18:45
29th November	Dodoma	WEO	"	Chali Isangha & Chali Makulu	09:46 – 11:25
	Manzase	WEC & Head teacher	Manzase	Sasajila & Ilewelo	15:25 – 16:35

	"	Businessman	"	Sasajila & Ilewelo	17:05 – 18:39
30th November	Dodoma	WEO	"	Sasajila & Ilewelo	10:18 – 11:53
(bonus ward)	"	*WEO*	*Chinugulu*	*Chinugulu*	*12:00 – 12:35*
1st December	Haneti	WEO	Haneti	Haneti & Kwahemu	08:13 – 10:28
	"	Principal of 2ndry school	"	Haneti & Kwahemu	10:45 – 11:05
	Chenene	Man	"	Haneti & Kwahemu	11:45 – 13:00
	"	Acting VEO	"	Haneti & Kwahemu	13:06 – 14:14
(bonus ward)	*Itiso*	*Segala ward councillor*	*Segala*	*Magungu & Zajilwa*	*15:50 – 17:04*
	"	Itiso division officer	Itiso	Itiso & Solowu	18:07 – 19:40
	"	WEC	"	Itiso & Solowu	20:30 – 21:58
2nd December	Dabalo	WEC	Dabalo	Dabalo & Igamba	09:42 – 11:15
	"	Ag. ext. wrkr	"	Dabalo & Igamba	11:39 – 13:12
	"	Old man	"	Dabalo & Igamba	14:00 – 15:40
4th December	Dodoma	WEO	Makanda	Makanda & Chonde	11:40 – 13:38
5th December	Makanda	WEC	"	Makanda & Chonde	12:09 – 14:20
	"	Old man	"	Makanda & Chonde	15:30 – 16:34
	Lamaiti	WEO	Lamaiti	Lukali & Bankolo	19:20 – 20:40
6th December	"	WEC	"	Lukali & Bankolo	09:10 – 10:55
	"	Ward asst.	"	Lukali & Bankolo	11:30 – 12:39
7th December	Dodoma	Ag. ext. wrkr	Itiso	Itiso & Solowu	11:31 – 13:25
11th December	"	WEO	Msamalo	Mlebe & Mgunga	09:34 – 11:52

The first interview had to be abandoned as the lady was unable to answer the questions in relation to the other villages in her ward – which were the ones required for the exercise. Apart from this, virtually all other interviewees coped well with the questions and retained interest throughout the duration of the meetings. The exception to this was the older man from the Dabalo ward. He had formerly been a ward councillor and appeared to become increasingly suspicious and political in his responses towards the end of his interview, stating that he was unaware of how to answer questions 22 to 38 (see appendix 8). Two of the above wards were

identified as *bonus wards* as they were not among the original wards selected for Phase 2 (section 6.3). They were included for comparison only and have not been taken into account during the statistical analysis. (The responses from these villages may be observed at the bottom of the various tables in appendix 11).

7 Phase 2 results and analysis

7.1 Overview

The purpose of Phase 2 was to Identify and confirm which village-level factors have influenced the sustained uptake of latrines. Using the strategy developed in Chapter 6 to explore the factors identified in Chapter 5, this chapter forms a summary of the results from key informant interviews and begins to develop and discuss these results and observations. This leads into the method for comparing and analysing the village results to identify determinants of sustainability. Factors and indicator results from both Phase 1 and Phase 2 were analysed to compare against the potential factors identified during Phase 1.5. Statistical analysis of the two independent groups of villages (sustained and unsustained sanitation coverage villages – as categorised in chapter three), was done using the Student's t-test and the Mann-Whitney *U* test according to the data type. The analysis is laid out in the same order as in chapter six for consistency.

7.2 Phase 2 results

7.2.1 Qualitative/descriptive results

There were four main descriptive questions in each interview, numbered 1, 2, 13 and 14 (see interview form, appendix 8). The intention was for these to explore the perception of ward level officers relating to differences between high and low sanitation coverage villages – to set alongside that of villagers and district government.

After introducing the exercise and obtaining written consent from each interviewee, the candidate was shown the sanitation coverage graph plotted for their ward following Phase 1. The graph was described and explained to them by the researcher and facilitator, and each interviewee was invited to make comment as to whether they were surprised at the results displayed, or whether they felt that the graph reflected the actual situation. This was an attempt to further validate the results of Phase 1. None of the participants had seen sanitation coverage graphs before but all caught on quickly and were enthusiastic to discuss the implications with respect to each of the villages. All villages within their respective ward were considered at this point regardless of the fact that only two villages would be assessed in detail during the rest of the interview. This part of the interview typically lasted for 5-10 minutes and provided the opportunity to examine any changes in latrine coverage over the 10-year period from 1994 to 2003 as well as possible reasons for such changes. Crucially, it also helped to introduce the concept of differences and similarities between the villages within the same ward and thus led into the main body of the interview.

7.2.1.1 Comments from graph comparison

All sanitation coverage graphs were duly agreed by each interviewee but the following comments were noted during the discussions:

- Itiso Division Officer and the Itiso ward education coordinator (WEC) both independently commented on the coverage in Solowu for the year 2003. Phase 1 data puts this at 50.4% but both interviewees thought it should be approximately 5% higher for that year because of an intervention, which had ended in 2003. Despite this comment, both accepted the sanitation graphs.
- Makanda ward executive officer (WEO) readily agreed that the graphs reflected the true situation, but suspected that the coverage for both Makanda and Chonde, at the time of the interview (2006), would be slightly lower. He attributed this to the lack of a Ward Health Officer (in charge of the dispensary) since 2004 and as a result, latrine promotion throughout the ward has been limited.

The Phase 1 data were thus acknowledged by all 24 participants and copies of the graphs were presented to the wards as feedback from the researcher to each of the villages.

7.2.1.2 Differences between villages

The overall purpose of Phase 2 was to explore possible differences between unsustained and sustained sanitation coverage villages and question 1 asked this specific question to ward leaders. The question was asked in an open-ended manner such that respondents were not led or prompted in any way, and they were encouraged to mention any aspect that they thought relevant. Many of the responses recognised similar factors but at opposite ends of the same scale as in table 7.1.

Table 7.1 Differences reported between sustained and unsustained sanitation villages

Unsustained sanitation villages rated:	*Factor*	Sustained sanitation villages rated:
Poor	***Education level***	Good
High	***Bush cover in village***	Low
Low	***Level of health education***	High
Poor/ineffective	***Quality of village leadership***	Good/active
Scattered	***Proximity of houses***	Close
Both small and large	***Size of village***	Large
No	***Presence of a dispensary***	Yes
Poor	***Poverty/wealth level***	Good village economy
Remote	***Remoteness***	Village is a centre
Less reported	***Cholera outbreaks***	More reported
Few	***Village services available***	Many
New	***Age of village***	Old/established

Beyond these, interviewees reported the following issues relating to unsustained coverage villages:

- Many pastoralists
- Cultural preference to not have/not be seen walking towards a latrine
- Lack of extension staff to promote toilets
- Lack of access to village – e.g. roads impassable during rainy season
- Lack of rainfall – with respect to food security
- Village covers a large land area

Similarly, the following factors were reported as relating to sustained coverage villages:

- More temporary latrines than permanent ones
- Few sub-villages = village less spread out
- Sharing of toilets
- Only houses with a toilet can be rented out to business people
- Many Moslem people have a toilet
- People are open and receptive

In an attempt to confirm and quantify which factors were considered most relevant to sanitation uptake, three further areas were explored.

1. Barriers to development (negative factors)
2. Main positive factor(s) relating to latrine uptake
3. How attitudes have changed over recent generations.

The number of mentions for each factor by participants was tabulated as an indicator of importance with respect to each group of villages, and rated in the following way:
Low-level issue: 1 to 4 mentions; **Medium**-level issue: 5 to 8; **High**-level issue: 9+ mentions.

7.2.1.3 *Barriers to development*

The factors tabulated in table 7.2 below were reported as relating to both sustained and unsustained sanitation villages and have been arranged according the number of references to the sustained sanitation villages:

Table 7.2 Barriers to development

Unsustained village rating	*Common factors*	*Sustained village rating*
high	Low education level	medium
high	Poor village leadership	medium
low	Drought/food insecurity	medium
low	People are unmotivated	medium
medium	Poverty/lack of capital	low
low	Lack of accessibility (road access)	low
low	Poor farming tools/methods	low
low	Lack of services/infrastructure	low
low	Scattered housing	low
low	High dependency level	low
low	Lack of unity among population	low
low	Limited economic activity	low
low	Not open to development	low
low	Youth unemployment	low

Unsustained village factors	*Rating*	*Sustained village factors*	*Rating*
Cultural issues and preferences (though this was not well defined)	low	No barriers to development	low
Lack of a credit facility	low	No secondary school in ward	low
Many pastoralists	low	Fear of curses	low
Many sub-villages (implies scattered layout of houses)	low		
People live in the bush area	low		
Village is remote	low		

The results displayed in table 7.2 suggest that ward officials perceive the main barriers to development as relating to low education level, poor village leadership, drought/food insecurity, lack of motivation and poverty/lack of capital. Most of these issues were recognised in some form during Phase 1½, though more by WAMMA and WaterAid staff than by the villagers (table 5.24). All other factors were mentioned between one and four times, and were therefore classified as low-level issues.

7.2.1.4 Main (positive) factors relating to latrine uptake

Again, these are presented below (table 7.3) according to the number of mentions with respect to the sustained sanitation villages. It was clear that both health education and the prevention of disease (cholera) outbreaks were significant factors for both sustained and unsustained villages. The reduction in bush cover appeared important for the sustained sanitation villages

and the level of general education, while significant for both categories, was reported more in relation to the unsustained sanitation villages. Government pressure and bylaws was reported as a medium level factor for both sets of villages. Beyond these, the level of Village Health Committee (VHC) activity and the resulting awareness of the importance of toilets were reported for the unsustained and sustained sanitation villages respectively. The remaining factors were rated as low for both sustained and unsustained sanitation villages.

Table 7.3 Positive factors perceived to influence sanitation uptake

Unsustained village rating	***Common factors***	***Sustained village rating***
high	Desire to avoid disease outbreak(s)	high
high	Good level of health education	high
medium	Reduction of bush cover	high
high	High general education level	medium
medium	Government pressure/bylaws	medium
low	Closeness of houses	low
low	Latrines perceived as more civilised	low
low	New ideas from visitors/incomers	low

Unsustained village factors	***Rating***	***Sustained village factors***	***Rating***
VG/VHC good level of activity/ encouragement	medium	Knowledge or awareness of the importance of toilets	medium
Village leaders set a good example	low	A desire to keep the environment clean	low
Latrine promotion during public meetings instigated by VG	low	Clinic/dispensary staff promoting latrines and good sanitary practice	low
Good village leadership	low	District Government (WAMMA) promoting latrines	low
Dislike of open defecation during the rainy season	low	Convenience of having a latrine	low
Economic activities such as mining	low	The need for privacy	low
		Interaction of the different tribes	low

7.2.1.5 Attitude change over recent generations

Interviewees were asked about if and how attitudes to sanitation had changed since the time of their grandmother. This was intended to capture the essence of what people think about toilets and how this thinking may have developed. The response to the question was always "yes" and actually produced a parallel list of reasons/factors that had led to this change of attitude, as reported in table 7.4. This list of reasons closely parallels the list generated in table 7.3.

Table 7.4 Positive factors perceived to influence sanitation attitude change

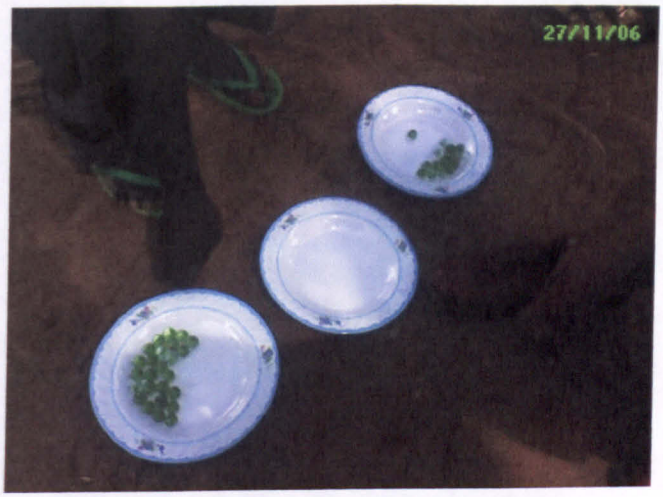
Unsustained village rating	*Common factors*	*Sustained village rating*
high	Improvement in general education level	high
low	Decreasing amount of bush	high
medium	Increased level of health education	medium
low	Desire to avoid disease outbreak(s)	medium
high	Awareness of importance of toilets	medium
low	Increased perception of civilisation	low
low	Government campaign/enforcement	low
low	Exposure to new ideas	low
low	Convenience	low
low	Need for privacy	low

Unsustained village factors	*Rating*	*Sustained village factors*	*Rating*
Livestock moved away from housing	low	Closeness of housing	low
		Peer pressure/social interaction	low
		Increased understanding of development	low
		Religious institutions promote toilets	low

7.2.2 Quantitative questions

The remaining questions asked to each participant were quantitative in nature. The questions are presented in appendix 8 and the results in appendix 11. The results of the analysis are presented later in this chapter and summarised in chapter 8. To help facilitate the data collection process for some questions, interviewees were offered a range of responses to questions where a specific answer was unlikely to be known (e.g. distance to hardwood trees; number of houses with metal roofs – see chapter 6). The answer ranges were designed to be appropriate to the relevant question. The two data recorders noted the responses from each interview and these were later checked against each other for confirmation (three interviews per ward, with each key-informant grading two villages per ward). The median of the three interview values was taken to represent the most likely value for each village and each interview produced such a value for each of two villages within the same ward. Thus, each village was graded from 1 to 5 for each question. Further questions requested proportions of a village within each category (e.g. proportions of the village that were Christian, Muslim or Animist). All households in a village could be classified as belonging to one of the three religious options, which meant that the combined percentages would represent 100% of households within each village. To assist with estimating the respective proportions, three plates had been purchased to represent each of the three categories of religion and 50 marbles

Photo 7.1 Phase 2 data collection: estimating percentages



to represent the total of all households within a village. Interviewees were asked to allocate the marbles by proportion to each plate (photo 7.1). Those who were unable to estimate percentages without assistance were able to use the plates and marbles to help them in this process. This system was found to work well. The remaining questions were specific in nature such as questions about how many VIP latrines or pour-flush toilets were in the village. For these, some responded in number and others in percentage. Where numbers were given, they were converted to percentage later for analysis.

7.2.2.1 Question response rate with respect to the 5-point scales

A total of 23 questions were posed during Phase 2 using the scaled response options. Sixteen villages with three interviews from each provided 48 scores per question. Nineteen of these questions elicited good response rates from the interviewees with no more than four scores missing from any one question (minimum 92% response rate). However, four questions relating to migration in and out of the villages proved to be much more difficult for the interviewees, and the range of missing scores spanned from 19 to 22 per question i.e. approximately 40 to 46% of the desired data were not realised. These questions had been included with those raised by the villages in an attempt to explore whether sustained sanitation villages were more or less attractive to migrants than unsustained sanitation villages. Despite the lower response rate, these question responses have been included for analyses in the same way as the other questions. Apart from the migration questions, there were a total of 22 "unknown" responses (2.4%) of a possible 912. Twelve of these missing responses related to the one individual mentioned in the early part of section 7.2 above and the remaining ten were spread across four other interviewees and five questions.

7.2.2.2 Uniformity of responses

The remaining 19 questions (excluding migration) produced data that shows a level of uniformity with 97.3% of results scored within one point of the respective village median value (Fig. 7.1). Although only three scores for each question were generated per village, this represents 19 (questions) x 16 (villages) x 3 (scores) = 912 items of data. Only 8.5% of these results were observed to be more than one point away from the median value for any question and this suggests that the scoring system had been understood by the respondents. A total of nine questions prompted 24 responses that proved to be two points or more away from the

respective median value. The number of diverse responses per question ranged from 1 to 6 (Q1=1;median=2;Q3=4). The questions that produced the greatest diversity in response related to the distance to hardwood, amount of poor quality housing, and the level of bush coverage. The diversity of results could imply that interviewees living in different areas had differing perceptions of the above issues or that they were harder to quantify. Even if this were true, those individuals had a much greater agreement with the other questions.

Figure 7.1 Uniformity of responses in relation to the village median values

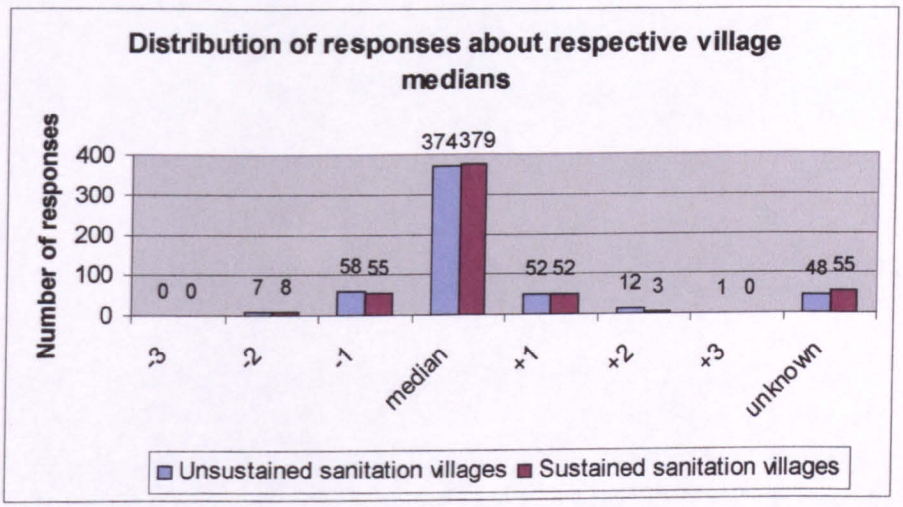
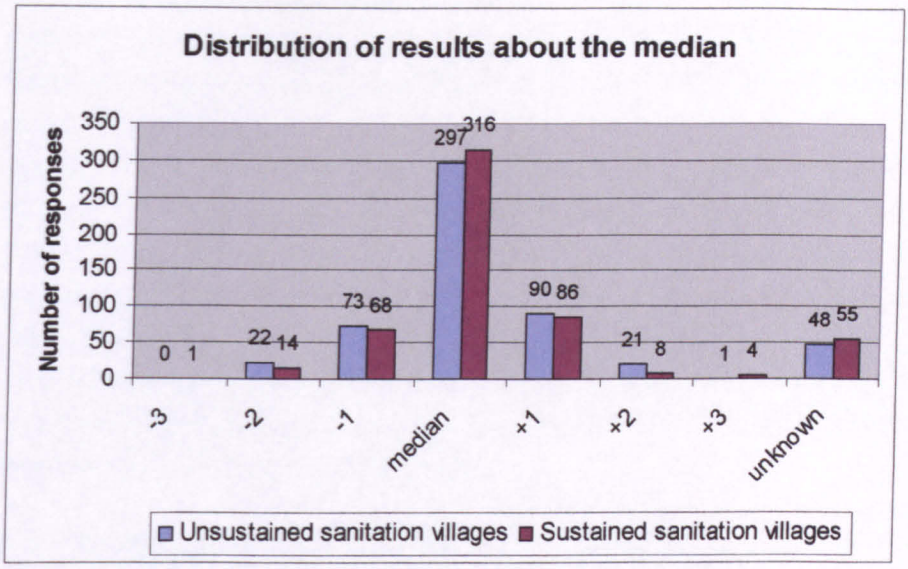


Fig. 7.1 also shows the number of questions for which no answer was given (see section 7.2.2.1). Both the unsustained and the sustained village responses follow a normal distribution pattern.

An alternative way to assess the uniformity of the responses is to take all the answers for each question within each sustainability category and compare the 24 responses against the category median. This addresses each question as a whole (rather than looking at the response in relation to individual villages) and produces a distribution similar in style to Fig. 7.1 (see Fig. 7.2 below). As in the previous graph, the responses are distributed normally – please note that (as in Fig. 7.1) the 103 responses where interviewees reported not knowing the answer are shown in the right hand bars for completeness, and excluding the questions on migration this number would be reduced to 22.

Figure 7.2 Uniformity of responses in relation to the category median for each question



7.2.2.3 Question response rate with respect to the continuous variables

Each interviewee was presented with five questions where the answers were not offered on a scale (see appendix 8 questions 9,11,12,19, 21). Responses to questions about functioning water sources, tribal and religious diversity were complete for all interviewees. However, questions relating to the two types of higher technology latrine produced a response rate 43 out of a possible 48 i.e. 89.6% for each.

In addition to these, a number of specific questions were presented to key individuals as follows:

7.2.2.3.1 Ward Executive Officer (WEO) (appendix 8 questions 41-43).

Information was obtained on only eight of the 16 villages (50%) with respect to the total revenue from fines and some stated that no records of this had been kept. Information on fines relating to the absence of toilets was given for ten of the 16 (62.5%) but the concept of what the situation had been five years previously was essentially unknown. Two villages reported that fines had reduced as the number of toilets had increased and two reported that such fines were increasing. Overall, the question on change over time proved to be unproductive.

7.2.2.3.2 WEO/Agricultural extension officer (appendix 8 questions 44-47)

The livestock situation was reported by 10 of the 16 villages (62.5%) for cattle, sheep and goats; and nine villages (56%) for pigs. Agricultural produce information was only available from six villages (37.5%) of the16 from Phase 2. It is possible that the majority of the study villages may not keep such records at all, or they may not be easily accessible. Despite not having immediate knowledge of fines and livestock information, the WEO from Msamalo ward did obtain the data afterwards and sent it to the Researcher two days after the interview.

7.2.2.3.3 Ward Education Coordinator (WEC) (appendix 8 questions 48-54)

The WEC was the person most likely to have an overall perception of the educational standard across the villages within his/her ward. Questions relating to adult illiteracy and school attendance were answered without exception for all villages although in three villages the situation five years earlier seemed less certain. Thus for the current situation the response rate was 100% for each, but the earlier situation produced 13 out of 16 responses (81%) for adult illiteracy five years earlier and 14 of the 16 (88%) for past school attendance. The numbers of children passing the secondary school entrance exam was known for all villages, though the number of children graduating from primary school during the previous year was only given for eight villages (50%). Similarly, the numbers that actually started secondary school were given for ten villages (63%). The situation five years earlier was universally reported as poor i.e. fewer children passing through to secondary school than at the present time. The results were taken forward for analysis despite the missing data.

7.3 Village data analysis (Phases 1 and 2)

Village data during both phases of data collection was either:

a) continuous in nature (such as estimated numbers or percentages) where the appropriate measure for each group was the mean; or
b) categorised in ordinal ranges (with either binary responses such as yes/no, three categories – as in the case of village administrative level; or five categories – as in much of Phase 2) where the appropriate measure of central tendency is the median.

The village data from Phase 1 is listed in Appendix 10, and Phase 2 in Appendix 11. Statistical analysis of the two independent groups of villages (sustained and unsustained sanitation coverage villages – as categorised in chapter three), will be done using the Mann-Whitney *U* test (ordinal data) or the Student's *t*-test (continuous data) according to the type of variable. The results of the analysis are laid out in the same order as in chapter six for consistency.

7.3.1 Physical factor : Village status

Table 7.5 Village status analysis: values

Measurable indicator	***Data Source***	***mean unsustained***	***mean sustained***	***n***	***p*** (2-tailed)	***Evidence***
Number of households	Phase 1	637 n=27 Std Error 80.9	821 n=63 Std Error 52.9	90	**0.060**	**some**
Land area (km2)	GeoData	131 n=27 Std Error 20.3	93 n=63 Std Error 9.8	90	**0.061**	**some**

Table 7.6 Village status analysis: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Administrative level (0 =ordinary village; 1 = ward village; 2 = division village)	Phase 1	0 (mean 0.29) n=24	0 (mean 0.52) n=62	86	**0.055**	**some**

Village status appears to be a significant factor in the sustainability of sanitation. Some evidence exists to suggest the following are more likely to have sustainable sanitation:

- ✓ larger villages (table 7.5)
- ✓ villages with smaller land areas (table 7.5)
- ✓ villages with higher administrative responsibilities (table 7.6)

7.3.2 Physical factor : Village soil/ground conditions

Table 7.7 Village ground condition analysis: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Hard/rocky ground (1 = none, 5 = everywhere)	Phase 2	1 n=8	1 n=8	16	**0.264**	none
Soft/unstable ground (1 = none, 5 = everywhere)	Phase 2	1.5 n=8	1 n=8	16	**0.117**	none
High GWT (1 = none, 5 = everywhere)	Phase 2	1 n=8	1 n=8	16	**1.000**	none

Despite geologic/hydro-geologic ground conditions being cited repeatedly as a barrier to sanitation, there is almost no evidence from the sample villages to support this claim. There was little variability among the sample villages with regard to hard or soft ground and none at all with respect to high groundwater table (GWT). The inclusion of additional villages in the exercise may have altered this result; however, it should be noted that villages were included from all quadrants of the district in an attempt to ensure a sufficient representation of the district as a whole. From the above we may conclude that there is no evidence from the sample villages to support the possibility of the following ground conditions having an influence on sustained sanitation:

- ✗ hard or rocky ground - the data suggest that only one unsustained sanitation village had any rocky areas (in less than half of the village), and three sustained sanitation villages reported a similar proportion of rocky ground. (table 7.7)

- soft or unstable ground conditions - the data indicate that four unsustained and one sustained sanitation villages had some soft ground but in no case was it reported to cover as much as half of any of the villages. (table 7.7)
- high groundwater table (GWT) - none of the sample villages were seen to have any high water table, although one interviewee did report it in part of one village – the other two interviewees for that village reported none, and hence the village median value was zero. (table 7.7)

It is suggested that for future research in ground conditions, the potential for useful results could be improved if stratified sampling were employed. This could ensure that enough villages from each category and ground condition were included.

7.3.3 Physical factor : Village settlement pattern

Table 7.8 Village settlement pattern analysis: values

Measurable indicator	Data Source	mean unsustained	mean sustained	n	p (2-tailed)	Evidence
Ward housing density (hh/km2)	Phase 1/ GeoData	8 n=27 Std Error 1.0	12 n=63 Std Error 1.0	90	**0.036**	**strong**
Village housing density (hh/km2)	Phase 1/ GeoData	8 n=27 Std Error 1.2	13 n=63 Std Error 1.3	90	**0.014**	**strong**
Proximity to Dodoma (km)	GeoData	58 n=21 Std Error 4.3	46 n=54 Std Error 2.1	75	**0.007**	**very strong**

Table 7.9 Village settlement pattern analysis: ratings

Measurable indicator	Data Source	median unsustained	median sustained	n	p Asymp. Sig. (2-tailed)	Evidence
Proximity of houses (1 = all houses close, 5 = all houses spread)	Phase 2	3 n=8	2 n=8	16	**0.053**	**some**
Level of bush coverage (1 = no bush, 5 = bush everywhere)	Phase 2	3 n=8	3 n=8	16	**0.085**	**some**
Remoteness (of services) (1 = village is a centre, 5 = village is very remote)	Phase 2	2.5 n=8	1 n=8	16	**0.032**	**strong**

The village settlement patterns are seen to be significant for sustained sanitation. There is strong evidence to support that sustained sanitation villages are likely to be:

- ✓ villages from wards with higher overall ward housing density (total # houses/total land area of ward – table 7.8)
- ✓ villages with higher village housing density (table 7.8)
- ✓ villages nearer Dodoma (main urban centre) - taking the GIS coordinates of the village offices and that of the main road intersection in Dodoma facilitated a comparison of the straight-line distance to Dodoma. (table 7.8)
- ✓ villages considered more central / less remote, with respect to available services (table 7.9)

In addition to the above, there is some evidence to suggest that villages are likely to have sustained sanitation if they are:

- ✓ villages where the houses are more closely built together and less spread out. (table 7.9)
- ✓ villages with less bush coverage (table 7.9). N.B. A mis-translation of the answer options to this particular question was discovered part way through the exercise and it was not possible to repeat the earlier interviews for confirmation. Interviewees were shown five response options, but option two had been mis-translated and was very similar to option four. This translation error was corrected on discovery for subsequent villages, and after the data collection was completed, it was possible to identify likely errors from those earlier villages. A total of only three of the 48 scores were adjusted (from a two to a four) in recognition of this. The initial results showed no evidence to support the hypothesis, but the above were the results after correction of the data as described above.

7.3.4 Physical factor : Village infrastructure

Table 7.10 Village infrastructure analysis: values

Measurable indicator	*Data Source*	*mean unsustained*	*mean sustained*	*n*	*p* (2-tailed)	*Evidence*
# of TBAs per 100 households	Phase 1	0.98 n=23 Std Error 0.229	1.17 n=50 Std Error 0.132	73	**0.449**	none
# of trad. H'lers per 100 households	Phase 1	1.05 n=22 Std Error 0.239	0.67 n=50 Std Error 0.066	72	**0.045**	**strong**
# of churches per 100 households	Phase 1	0.93 n=23 Std Error 0.094	0.95 n=52 Std Error 0.072	75	**0.843**	none

Table 7.10 shows that there is strong evidence to support the influence of traditional healers on the sustainability of sanitation within the Dodoma Rural District. The analysis suggests that

higher concentrations of traditional healers per household are likely to be found in villages with unsustained sanitation. This may indicate that villages, which hold to more traditional beliefs or customs, could be less likely to be open to the concept of sanitation if it is not already an accepted part of their culture. This point may be checked against the open-ness of people to new ideas later in the analysis (section 7.3.6).

Table 7.11 Village infrastructure analysis: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Clinic (1=y,0=n)	Phase 1	0 (mean 0.42) n=26	1 (mean 0.61) n=56	82	**0.121**	none
Community centre (1=y,0=n)	Phase 1	0 (mean 0.04) n=26	0 (mean 0.13) n=55	81	**0.214**	none
Organised market (1=y,0=n)	Phase 1	0 (mean 0.10) n=26	0 (mean 0.37) n=55	81	**0.011**	**strong**
Police post (1=y,0=n)	Phase 1	0 (mean 0.00) n=26	0 (mean 0.11) n=55	81	**0.082**	**some**
Infrastructure scoring - totals of above four aspects	Phase 1	0 (mean 0.54) n=26	1 (mean 1.22) n=54	80	**0.018**	**strong**
Infrastructure scoring – excluding the markets	Phase 1	0 (mean 0.46) n=26	1 (mean 0.81) n=54	80	**0.073**	**some**
Mosque (1=y,0=n)	Phase 1	0 (mean 0.19) n=26	0 (mean 0.39) n=54	80	**0.095**	**some**

Four main aspects of village infrastructure were considered in this test i.e. the presence of a clinic, a community centre, an organised market and a police post. Individually, only the organised market appeared strongly statistically significant. However, combining the four aspects to form an infrastructure scoring was thought to present a more accurate perception of the overall scenario as different villages were seen to have differing services. That said, because the influence of the organised market appeared so strong, this index was repeated excluding the markets to cross check the impact of infrastructure. Even without including the markets, there was some evidence to support the impact of village infrastructure on sustained sanitation. The presence of a mosque was found to be significant for sustained sanitation in that 19.2% (5/26) unsustained sanitation villages reported having a mosque compared to 38.9% (21/54) of the sustained sanitation villages. Overall, the strongly significant factors for sustained sanitation villages were seen to be:

- ✓ A lesser proportion of traditional healers per household (table 7.10)
- ✓ The presence of an organised market (table 7.11)

- ✓ greater infrastructure (including an organised market) is strongly evidenced to be more likely to have sustained sanitation. (table 7.11)

There is some evidence to support the positive influence of:

- ✓ the presence of a police post (table 7.11)
- ✓ villages with greater infrastructure (excluding an organised market) (table 7.11)
- ✓ the presence of a mosque (table 7.11)

There was some evidence that the presence of a mosque may have some influence, although this does not remain if considering the village size (number of houses served by each mosque). While the Christian faith has resulted in multiple churches (even in smaller villages), the Islamic faith has resulted in the presence of only one mosque per village except in the largest villages of the Dodoma Rural District. However, the influence of the mosque is seen to have statistical significance in respect of sustained sanitation. Several churches were to be found in all villages though the number of churches per household did not prove to be significant for sustained sanitation. In all of these, the larger villages had more churches and TBAs, but dividing by the number of houses in each village balances this size factor. Therefore, the following were not found to be significant in directly influencing sustained sanitation (table 7.11):

- * the presence of a clinic
- * the presence of a community centre
- * the ratio of TBAs per household
- * the ratio of churches per household

7.3.5 Physical factor : Access to materials and technologies

Table 7.12 Access to materials and technologies analysis: values

Measurable indicator	Data Source	mean unsustained	mean sustained	n	p (2-tailed)	Evidence
H/hlds per all water sources	GeoData	130 n=24 Std Error 16.6	130 n=60 Std Error 10.9	84	**0.984**	none
H/hlds per functioning water source	GeoData	253 n=24 Std Error 44.4	16929 n=60 Std Error 16662.2	84	**0.530**	none
H/hlds per improved water source	GeoData	191 n=24 Std Error 27.3	16863 n=60 Std Error 16663.3	84	**0.530**	none
H/hlds per functioning improved water source	GeoData	250218 n=24 Std Error 90263.0	166959 n=60 Std Error 48501.5	84	**0.386**	none
# functioning water sources at the end of the dry season	Phase 2	7 n=6 Std Error 3.1	3 n=5 Std Error 0.6	11	**0.216**	none
# functioning improved water sources at end of dry season	Phase 2	1 n=8 Std Error 0.5	2 n=8 Std Error 0.4	16	**0.719**	none
% VIP latrines	Phase 2	0.8% n=8 Std Error 0.45%	0.9% n=8 Std Error 0.33%	16	**0.844**	none
% pour-flush toilets	Phase 2	2.9% n=8 Std Error 2.03%	5.9% n=8 Std Error 1.80%	16	**0.289**	none

Table 7.13 Access to materials and technologies analysis: ratings

Measurable indicator	Data Source	median unsustained	median sustained	n	p Asymp. Sig. (2-tailed)	Evidence
Distance to hardwood (1 = very close, 5 = walk for more than ½ day)	Phase 2	3 n=8	3 n=8	16	**0.777**	none
% metal roofs on houses in village (1 = all, 5 = none)	Phase 2	4 n=8	3 n=8	16	**0.078**	**some**
% houses with cement (1 = all, 5 = none)	Phase 2	4 n=8	4 n=8	16	**0.334**	none

The main construction materials used in rural areas are mud and timber. Mud requires water as well as earth, and therefore the ease of access to water sources becomes critical. Hence, the two main aspects relating to materials access became the number of village water points and the distance people had to travel to obtain hardwood for construction. The water point information was obtained from the GIS data acquired from GEODATA in Dar es Salaam, and this provided details of the type and functional status of all water points in the district in 2004. Beyond this, Phase 2 interviews enabled data to be collected from the 16 villages regarding those water points still functional at the end of a typical dry season. The proportion of houses that have ventilated improved pit (VIP) latrines or pour-flush toilets was taken to indicate something of the availability of that type of technology within a village. It is also recognised that these are more expensive technologies and their presence is likely to indicate a degree of wealth as well as access to the technology. Therefore, these factors are also included in section 7.3.9. The distance to hard-wood was assessed according to how long it took to walk to the trees, and again this was set out in five categories ranging from very close to more than half a day's walk. Beyond these materials, the access to cement and metal roofing sheets was measured through the proportion of households that have utilised them in the construction of their homes. It should be appreciated that this statistic will also imply something of the financial state of these households since these materials must be purchased and are significantly more expensive than timber or mud. For this reason, these indicators are also included in section 7.3.9 (village wealth level). Despite all these indicators for accessibility to construction materials, virtually none of the indicators proved statistically significant for sustained sanitation – especially when taking the number of households served into consideration. There is some evidence to support:

- ✓ sustained sanitation villages have a higher percentage of houses with metal roofs – though this factor alone is not considered sufficient to confirm the overall significance of access to materials. (table 7.13)

There is no evidence in regard to sustained sanitation for any of the following indicators:

- × the number of water points (regardless of type or functionality)
- × the number of functional water points (regardless of type)
- × the number of improved water points (regardless of functionality)
- × the number of improved and functional water points
- × the percentage of VIP latrines
- × the percentage of pour-flush toilets
- × the distance to hard-wood trees
- × the percentage of homes which have cement as a construction material or rendering

Overall, access to materials and technologies does not appear to be a significant factor for sustained sanitation. The only indicator with some evidence to suggest significance was the percentage of houses with metal roofs and on its own this was not considered to be sufficient,

since there may be other houses that also had access but could not make use of such since they were unable to afford the metal sheets (see also section 7.3.9).

7.3.6 Social factor : Good village leadership

Table 7.14 Good village leadership analysis : ratings

Measurable indicator	Data Source	median unsustained	median sustained	n	p Asymp. Sig. (2-tailed)	Evidence
Leadership quality (1 = very good, 5 = very poor)	Phase 2	3.5 n=8	2.5 n=8	16	**0.006**	**very strong**
Openness of people (1 = very open, 5 = very closed)	Phase 2	3 n=8	2.5 n=8	16	**0.085**	**some**
Active VHC (1 = very active, 5 = very inactive)	Phase 2	4 n=8	2.5 n=8	16	**0.045**	**strong**

Table 7.15 Good village leadership analysis: values

Measurable indicator	Data Source	mean unsustained	mean sustained	n	p (2-tailed)	Evidence
Total revenue from fines per h/h	Phases 1 & 2	475 n=4 Std Error 223.6	718 n=4 Std Error 118.1	8	**0.375**	none
Revenue from fines for those without a toilet per h/h	Phases 1 & 2	130 n=5 Std Error 74.2	244 n=4 Std Error 111.6	9	**0.407**	none

Village leadership as a whole was rated on a five-point scale ranging from very good to very poor. Strongly traditional villages are less likely to be open to new ideas beyond their immediate experience. Phase 2 included eight villages with unsustained sanitation and the level of openness of people may be taken to gauge the degree of traditionalism. Section 7.3.4 highlighted that villages with unsustained sanitation were likely to have a higher number of traditional healers per 100 households and thus may be more traditional in their customs and outlook. The more open nature of the sustained sanitation villages may be seen to corroborate this point. The level of activity of the village health committee (VHC) was also rated from very active to very inactive as a proxy for the commitment of the village government to sanitation promotion. Looking at the revenue generated from fines provides an indicator of how effective the leadership are in the area of following through on rulings. Village governments (VGs) may be busy in their daily activities, but their effect must also be seen to be carried through. The two measures of total fines and fines relating to not having a toilet were used here though neither was seen to be statistically significant for the sample villages. The quality of village leadership was assessed using the above indicators. Overall, the following were observed to show a strong level of significance for sustained sanitation:

- ✓ good village leadership (table 7.14)
- ✓ Sustained sanitation villages almost always had a more active VHC (table 7.14)

One indicator was seen to have some evidence of significance for sustained sanitation:

- ✓ Villages which were recognised to be more "open" to new things (table 7.14)

The following factors did not prove to be significant (table 7.15):

- ✗ There was no evidence to support a difference in the amount of monies raised from all fines when the village size was taken into consideration.
- ✗ Similarly, there was no evidence to support a difference between village categories in respect of fines for not having a latrine.

7.3.7 Social factor : Village diversity

Table 7.16 Village diversity analysis: values

Measurable indicator	Data Source	mean unsustained	mean sustained	n	p (2-tailed)	Evidence
Total # of tribes	Phase 2	5 n=8 Std Error 0.9	4 n=8 Std Error 0.7	16	**0.457**	none
# of tribes ≥ 10% of village	Phase 2	1.3 n=8 Std Error 0.25	1.5 n=8 Std Error 0.38	16	**0.590**	none
Max % tribe	Phase 2	90% n=8 Std Error 4.1%	79% n=8 Std Error 8.2%	16	**0.272**	none
% Christian	Phase 2	63% n=8 Std Error 5.3%	61% n=8 Std Error 4.9%	16	**0.817**	none
% Moslem	Phase 2	9% n=8 Std Error 2.6%	17% n=8 Std Error 6.5%	16	**0.270**	none
% Animist	Phase 2	29% n=8 Std Error 6.7%	22% n=8 Std Error 5.2%	16	**0.468**	none

Table 7.17 Village diversity analysis: ratings

Measurable indicator	Data Source	median unsustained	median sustained	n	p Asymp. Sig. (2-tailed)	Evidence
% Pastoralists (1 = all agriculturalist, 5 = all pastoralist)	Phase 2	2 n=8	2 n=8	16	**0.317**	none

There was no statistical evidence (tables 7.16, 7.17) to support any difference between the two groups of villages with respect to either tribal, religious or lifestyle diversity in the following aspects:

- the number of tribes in the villages
- the number of tribes having a minimum of 10% by proportion of the villages
- the maximum percentage of any tribe within the villages
- the proportion of Christians - this goes along with the earlier findings relating to the *number of churches per household (see above)*
- the proportion of Moslems – despite the earlier findings relating to the presence of a mosque within the village (see above)
- the proportion of Animists in each village
- the proportion of pastoralists compared to agriculturalists

7.3.8 Social factor category : Village education level

Table 7.18 Village education level analysis: values

Measurable indicator	Data Source	mean unsustained	mean sustained	n	p (2-tailed)	Evidence
# primary schools per 100 h/h	Phase 1	0.3 n=26 Std Error 0.03	0.2 n=55 Std Error 0.01	81	**0.013**	strong[2]
Current adult illiteracy level	Phase 2	34% n=8 Std Error 5.3%	34% n=8 Std Error 4.1%	16	**1.000**	none
Adult illiteracy five years ago	Phase 2	37% n=6 Std Error 4.8%	38% n=8 Std Error 3.5%	14	**0.888**	none
Adult literacy improvement	Phase 2	8% n=6 Std Error 2.5%	9% n=8 Std Error 2.5%	14	**0.732**	none
% children not in primary school now	Phase 2	15% n=8 Std Error 5.4%	12% n=8 Std Error 4.4%	16	**0.599**	none
% children not in primary school 5yrs ago	Phase 2	21% n=7 Std Error 3.5%	18% n=8 Std Error 3.3%	15	**0.546**	none
Improvement in primary school attendance	Phase 2	11% n=7 Std Error 2.8%	9% n=8 Std Error 2.3%	15	**0.643**	none
# passed secondary entrance exam/ 100 h/hlds	Phase 2	2 n=8 Std Error 0.6	3 n=8 Std Error 0.9	16	**0.695**	none
# attending s. school / # completed p. school	Phase 2	52% n=4 Std Error 13.6%	61% n=4 Std Error 12.8%	9	**0.641**	none
Proportion of sec. sch exam passes attending sec. sch	Phase 2	59% n=5 Std Error6.7%	95% n=5 Std Error 3.9%	10	**0.002**	**very strong**

[2] NB. While this indicator appears significant, it is rejected because even small villages have a primary school and this raises the mean index of schools per 100 households without guaranteeing the quality of the teaching and hence the resulting educational level of those being taught.

Table 7.19 Village education analysis: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Secondary school in village y/n	Phase 1	0 (mean 0.00) n=26	0 (mean 0.19) n=55	81	**0.021**	**strong**
Education level ranking (1 = high, 5 = low)	Phase 2	3.5 n=8	3 n=8	16	**0.020**	**strong**

The education levels of each of the two groups of villages were assessed as shown in the above tables 7.18 and 7.19. The first indicator under consideration was that of the number of primary schools within a village. Clearly, the larger the village, the more primary schools it was likely to have therefore the number of schools would firstly be directly related to village size. To remove the size factor, the data in question was divided by the number of households served. However, this would not necessarily produce a valid measure in this instance as even the smaller villages all reported at least one primary school; thus the ratio of schools to households would automatically be higher and imply, though not necessarily represent, a better education level. For this reason, this indicator was considered invalid – despite the apparent significance level in table 7.18.

There was evidence to support a difference in educational level as follows:

- ✓ The proportion of students who passed the secondary entrance exam and continued on to attend secondary school was much higher in the sustained sanitation villages. There was very strong evidence to support this difference between the village categories. (table 7.18)
- ✓ The presence of a secondary school within a village was seen to present the opportunity for better education. There was strong evidence to support this factor as villages with sustained sanitation coverage were seen to be more likely to also have a secondary school, though this could also be related to village size. (table 7.19)
- ✓ The perceived educational standard of each village was ranked on a five-point scale ranging from very high to very low, and there was strong evidence to support a difference between the two groups. Sustained sanitation villages were seen to have a higher educational standard than the unsustained sanitation group. (table 7.19)

Despite these three factors, no evidence was found to support the statistical significance of the difference in the following educational indicators (see table 7.19) between the two groups of villages:

- × current adult illiteracy rates
- × adult illiteracy rates from five years ago
- × change in adult literacy
- × percentage of children currently not attending school

- percentage of children not attending school five years ago
- change in proportion of children attending school
- proportion of those passing the secondary school entrance examination
- proportions of primary school graduates who actually go on to attend secondary school

The combination of these educational outcomes may appear to negate an aspect of the educational impact. However, the data on table 7.19 shows that the perception of those interviewed is that the sustained sanitation villages do have a higher level of education. The sustained sanitation villages being generally larger could complicate this however, as typically, it is the larger villages that are more likely to have a secondary school. That said, the catchments for secondary schools are not limited to the villages in which they are constructed. It is clear that the sustained sanitation villages appear more committed to send their children to secondary school if they have passed the entrance exam. In considering the impact of schools, it is likely that some primary and secondary schools have been constructed only within recent years and in those situations, there will be a lag time before the educational level will be felt by the current generation of young adults. This has the potential to mean that schools built within the previous five to ten years could only now be beginning to influence the educational profile of the respective villages. Hence, adult literacy may be unlikely to reflect the impact of the more recent schools, and perhaps a better measure might have been the number of years that the village school has been functioning.

7.3.9 Social factor : Village wealth level

Table 7.20 Village wealth level analysis: values

Measurable indicator	*Data Source*	*mean unsustained*	*mean sustained*	*n*	*p* (2-tailed)	*Evidence*
# h/hlds with non-ag. income	Phase 1	50 n=22 Std Error 16.1	64 n=48 Std Error 22.7	70	**0.697**	none
% h/hlds with non-ag. income	Phase 1	8% n=22 Std Error 1.535%	7% n=48 Std Error 1.687%	70	**0.949**	none
% VIP latrines	Phase 2	0.8% n=8 Std Error 0.45%	0.9% n=8 Std Error 0.33%	16	**0.844**	none
% pour-flush toilets	Phase 2	3% n=8 Std Error 2.0%	6% n=8 Std Error 1.8%	16	**0.289**	none
# Cattle	Phase 2	3046 n=6 Std Error 623.4	2513 n=6 Std Error 459.0	12	**0.506**	none
Combined # sheep & goats	Phase 2	3407 n=6 Std Error 869.2	2417 n=6 Std Error 429.1	12	**0.331**	none
# Pigs	Phase 2	78 n=5 Std Error 43.4	25 n=6 Std Error 13.0	11	**0.238**	none
Total of all livestock in village	Phase 2	6519 n=6 Std Error 1266.7	4955 n=6 Std Error 848.0	12	**0.329**	none
Total livestock per household	Phase 2	10 n=6 Std Error 2.6	6 n=6 Std Error 1.0	12	**0.186**	none
Agricultural produce (tonnes)	Phase 2	2207 n=3 Std Error 873.5	632 n=3 Std Error 507.2	6	**0.194**	none
Agricultural produce per household	Phase 2	3.7 n=3 Std Error 2.03	0.8 n=3 Std Error 0.61	6	**0.241**	none

Table 7.21 Village wealth level analysis: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Perceived village wealth rank (1 = very rich, 5 = very poor)	Phase 2	3 n=8	3 n=8	16	**0.317**	none
Food insecure (1 = no homes, 5 = all homes)	Phase 2	2 n=8	2 n=8	16	**0.317**	none
Vulnerables (1 = none, 5 = all)	Phase 2	2 n=8	2 n=8	16	**1.000**	none
Houses with metal roofs (1 = all, 5 = none)	Phase 2	4 n=8	3 n=8	16	**0.078**	**some**
Houses with cement (1 = all, 5 = none)	Phase 2	4 n=8	4 n=8	16	**0.334**	none
Poorly built houses (1 = none, 5 = all)	Phase 2	2 n=8	2 n=8	16	**0.782**	none
"temporary" or "permanent" latrines (1 = all permanent, 5 = all temporary)	Phase 2	5 n=8	4 n=8	16	**0.046**	**strong**

Of the eighteen factors (tables 7.20, 7.21) considered as relating to village-level wealth or poverty, only two showed a statistically significant difference when comparing the two groups of villages. The only factor that showed strong statistical evidence was the proportion of "permanent" latrines. In this, the evidence is seen to support that there are a higher proportion of permanent latrines in the sustained sanitation coverage villages than in the unsustained coverage villages. The principal difference between a permanent latrine and a temporary one – as defined by the villagers – is the presence of a roof. Most latrine roofs were seen to be of the simple *tembe* construction (see photos 3.7,10,11,13) which is not hugely expensive – compared to the cost of cement or metal roofing sheets. This does, however, imply a cost in regard to time and effort to install. Beyond this, and as noted in section 7.3.5, there is some evidence to suggest that the houses in sustained sanitation villages may be more likely to have a metal roof. The use of metal roofing sheets implies both access to that material and the availability of finances to purchase it. If a number of other factors within the wealth category supported these findings, it may have added to their weight, however, none of the other factors were statistically significant. Therefore, it may be unlikely that this particular result can be considered sufficient to reflect a difference in wealth levels between the groups of villages. Perhaps the wealth difference is so small as to not be discernable in any of the other factor indicators, or alternatively, the data capture tools may have been too insensitive to recognise what may be a very slight difference.

The numbers as well as the percentage of households with income from other than agriculture were included to explore the possibility of there being an impact of a "critical mass" of such households on a village as a whole. Looking at the difference in agricultural produce tonnage might initially appear worthwhile exploring, however, only six of the sixteen villages were able to provide this information and that sample size may be too small to generate conclusive results.

Thus, there is strong evidence to support:

- ✓ The proportion of "permanent" latrines is greater in sustained sanitation villages (table 7.21)

There is some evidence to suggest that:

- ✓ *the proportion of houses which have metal roofs (as an indicator for wealth) may be* higher in sustained sanitation villages (table 7.21)

The following is a list of wealth/poverty indicators that have all shown no significant association with sustained sanitation:

- ✗ numbers of households with non-agricultural income.
- ✗ percentage of households with non-agricultural income.
- ✗ Perceived village wealth level
- ✗ proportion of people who are classified as "food insecure"
- ✗ proportion of people who are classified as "vulnerable"
- ✗ proportion houses which have been built or plastered with cement
- ✗ proportion of houses that were poorly constructed.
- ✗ Ten of the sample villages had VIP latrines and the mean percentages of these ranged from 0.4% to 3.67% of the respective village latrines. Consequently, there is no evidence to support a difference between the groups in respect of the proportion of VIP latrines.
- ✗ More of the villages had a local version of the "pour-flush" latrine though usually without a water-trap. The proportions of this type of toilet ranged from 0.74% up to 16.25%, however, there was no evidence that the two village groups were statistically different in this regard.
- ✗ numbers of cattle
- ✗ combined numbers of sheep and goats
- ✗ numbers of pigs
- ✗ total livestock numbers
- ✗ total livestock numbers per household
- ✗ tonnage of agricultural produce in the previous year
- ✗ agricultural tonnage per household

Jenkins' research would suggest a level of latrine uptake significance in relation to household wealth (Jenkins 1999); however, this was not supported at village level by this thesis. A village

may contain many households, and there will be a proportion of poor people in virtually all villages – certainly both sustained and unsustained sanitation villages within the scope of this study. Poorer households may well be less likely to be able to afford a high quality latrine – although some could possibly obtain a simple one. One comment that exemplifies this was made by an agricultural extension worker about people in one of the unsustained sanitation villages:

» "People cannot afford permanent latrines although they do have temporary ones".

The comment was taken to reflect that while the quality of the construction could be better, even the poor were able to have a simple latrine with a privacy barrier surrounding it. If so, then poverty would not prevent sustained sanitation at village level. It has long been assumed that a degree of wealth would be required for a household to obtain a latrine in the first place and certainly, where the latrine in question is made from concrete or other non-indigenous construction material(s), money would be required to obtain the materials and specialist labour skills required for construction. In the villages of the Dodoma Rural District, the vast majority of latrines were observed to be of the same type of construction materials as the houses i.e. timber and mud/mud bricks. Families that can afford to build a house from these are likely to be able to use such familiar materials to build a toilet – should they choose to do so. The barrier essentially becomes making the choice to have one (see Jenkins and Scott 2007).

It is probable that a family that is classified as "vulnerable", or even "food insecure", would be unlikely to afford the costs of paying someone to build a toilet for them. However, the proportion of each of these categories of people (vulnerable and food-insecure) was not observed to be significantly different for the two village sustainability classifications. Therefore, a small proportion of very poor people in any village would not prevent the majority from having toilets, and therefore the village could still be seen to have sustained sanitation. Thus, sustained village sanitation is not seen as impossible for poorer villages although it may be so for the poorest individuals regardless of the overall wealth level of their village. Overall, it would appear that village wealth level may not be a highly significant factor for sustained sanitation.

7.3.10 Social factor category : Past sanitation interventions

Table 7.22 Impact of past sanitation interventions analysis: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Village was part of a past sanitation intervention (1=y, 0=n)	Phase 1	1 (yes) n=26	1 (yes) n=58	84	**0.868**	none

Table 7.23 Impact of past sanitation interventions analysis: values

Measurable indicator	***Data Source***	***mean unsustained***	***mean sustained***	***n***	***p*** (2-tailed)	***Evidence***
Number of interventions	Phase 1	0.8 n=26 Std Error 0.14	1.2 n=58 Std Error 0.14	84	**0.064**	**some**

The implementation of past sanitation interventions was included as a "people-factor" rather than a "village-factor" because the purpose of such an intervention is to persuade people to build household latrines. Therefore, the focus is on people rather than the village. Two aspects were considered here. Firstly, to explore whether there was any difference between the group of villages which has had one or more sanitation intervention over recent years, with the group of villages which reported having had no intervention at all; and secondly, to explore if the exposure of villages to multiple sanitation interventions was likely to make a difference.

- ✖ There is no evidence to support any difference between the groups of villages with respect to whether or not they have been part of a sanitation intervention. (table 7.22)
- ✓ However, there is some evidence to support that there may be a difference between the groups with respect to multiple interventions (table 7.23)

This implies that few villages responded to their first intervention but having the sanitation messages repeated at least once more had begun to have an impact with the sustained sanitation villages.

7.3.11 Sharing of latrines between households

In addition to the above factors as proposed by the villages, WAMMA and WaterAid, an attempt was made during Phase 1 to assess the degree to which families allowed others to share their household latrine. Data were obtained on the number of households, which claimed to share such facilities. It was noted that in some sub-villages, more households claimed to share a latrine than the actual number of latrines reported within the sub-village. This is likely to imply that both the household that owns the latrine and the other household(s) that share it, both reported sharing though only one reported having a latrine. This situation could not be accurately gauged from the data provided. Therefore, the data were treated in two different ways in an attempt to ascertain if unsustained sanitation villages (since they had fewer latrines in general) were more likely to share than the sustained villages.

In the first case, the data were cleaned such that the number of instances of sharing did not exceed the number of reported latrines within any sub-village. This would allow for an upper limit of shared latrines for any village. Secondly, in recognition that some households reported sharing when they did not currently have their own latrine, the un-cleaned data provided a value for latrine sharing which was taken to represent the combination of those with and without their own toilet. In this instance that number was taken without adjustment, halved (to assess the possibility of two households sharing), and used to represent the minimum possible number of

shared latrines for each village. Table 7.24 shows the results of analysing the proportion of households which claimed to share a latrine (for both maximum and projected minimum), and by interpolation, the proportion of households that reported having their own private latrine. In addition to these, the next two rows depict the maximum and projected minimum proportion of all shared latrines within each village.

Table 7.24 Analysis of latrine sharing practice between households: values

Measurable indicator	***Data Source***	***mean unsustained***	***mean sustained***	***n***	***p*** (2-tailed)	***Evidence***
% of households that share a latrine	Phase 1	25% n=27 Std Error 2.4%	32% n=63 Std Error 2.3%	90	**0.072**	**some**
Projected minimum % of households that share a latrine	Phase 1	12% n=27 Std Error 1.2%	16% n=63 Std Error 1.2%	90	**0.065**	**some**
Maximum % of all latrines which are shared	Phase 1	43% n=26 Std Error 4.1%	38% n=63 Std Error 2.9%	89	**0.319**	none
Projected minimum % of all latrines which are shared	Phase 1	23% n=27 Std Error 2.5%	19% n=63 Std Error 1.5%	90	**0.156**	none

There was evidence to support a higher proportion of households from sustained sanitation villages having more shared latrines. However, when considering only those households that had a latrine, there appeared to be a slightly higher degree of latrine sharing among the unsustained sanitation villages though this was not proved to be statistically significant.

- ✓ There is some evidence to suggest that the sustained sanitation village group had more households with shared latrines than the unsustained group – based on an assumed maximum number of shared latrines. (table 7.24)
- ✓ There is some evidence to suggest that the sustained sanitation village group had more households with shared latrines than the unsustained group – based on an assumed minimum number of shared latrines. (table 7.24)
- × However, there is no evidence to suggest that the households with latrines in unsustained sanitation villages were more, or less, likely to share their facilities than those in sustained sanitation villages. This was the case for both the projected minimum and maximum proportion of shared latrines. Thus, the concept of latrine sharing is seen to be common to both sanitation categories without a significant difference in proportion.

7.3.11.1 The impact of including or excluding shared latrines from the coverage statistics

The proportion of households that reported sharing a latrine with others, varied from village to village and a comparison was done using the 16 villages sampled in Phase 2 to assess possible differences between villages.

It was observed that in five of the eight sustained sanitation villages, more people reported sharing a latrine than would actually be required to do so in order to facilitate every household from their village that reported not having a latrine at that time. This suggests that, for those villages:

- *more people may be willing to share their toilet than actually do share and/or possibly* some who did share until recently may now have been able to build their own latrine and if so, they may be more open to sharing with a neighbour since they previously benefited in this way

From the reported prevalence of sharing, it would appear that latrine sharing may be happening on the basis of a "host" household, which has a latrine sharing with one other family that does not currently have one of their own. On this basis, the average coverage increase due to sharing was estimated as follows (see table 7.25):

- 10.9% increase for unsustained sanitation villages
- 17.3% increase for sustained sanitation villages
- 13.9% increase for all villages

The following considerations arise from the data:

- if sharing latrines between only two households prevents or reduces the potential for indiscriminate defecation, this means the sanitation coverage of a village is actually higher than indicated by household latrine ownership
- It is possible that latrine sharing between more than two households occurs in the unsustained sanitation villages where latrines are fewer

Table 7.25 Latrine sharing in 2004 in the 16-village sample of Phase 2

	Unsustained sample		Sustained sample		Combined sample	
	number	%age	number	%age	number	%age
Total households reporting from sample villages	4,654		4,117		8,772	
Total number of latrines recorded and coverage %	2,328	**50.0%**	3,216	**78.1%**	5,544	**63.2%**
By deduction, total number and % of households without a latrine in 2004	2,326	50.0%	901	21.9%	3,227	36.8%
Sharing level required if a maximum of 2 households share (2 x # w/o latrine)	4,652		1,802		6,454	
Actual sharing reported during Phase 1 survey	1,014		1,427		2,441	
From reported sharing, number and % of additional households with potential access to a neighbour's latrine	507	10.9%	713	17.3%	1,220	13.9%
Effective households remaining un-served by a latrine (number and %)	1,819	39.1%	188	4.6%	2,007	22.9%
Potential revised % latrine coverage		**60.9%**		**95.4%**		**77.1%**

If no more than two households agreed to share the household latrine at one of their houses until the other could be replaced, there would be less likelihood that the condition of the latrine would be significantly worsened since both families were accustomed to latrine use and maintenance.

The actual number of families sharing a latrine is likely to be critical for its condition and hygiene and if that number is small, (e.g. two) this could be recognised as a benefit to the village as a whole, since open defecation would be reduced (where the benefiting family have never had a latrine) or at least not increase (where the benefiting family are waiting to replace their old latrine). Further research is required to confirm the actual numbers of families sharing each latrine, but the implication is that limited sharing may be a benefit rather than a negative concept. In such conditions, the case is made to include household latrines shared by two families and only exclude shared facilities where access is less controlled, or by multiple (>2) households.

7.3.12 Impact of migration

During Phase 2, an attempt was made to gauge the impact of migration. Questions were asked about migration out of, and into, each village during the previous year and how this had changed over the past five years, The results were rated on five-point scales and the results were as follows (see table 7.26):

Table 7.26 Analysis of migration: ratings

Measurable indicator	***Data Source***	***median unsustained***	***median sustained***	***n***	***p*** Asymp. Sig. (2-tailed)	***Evidence***
Migration-in last yr (1 = none, 5 = at least 20 families)	Phase 2	3.75 n=8	4.25 n=8	16	**0.913**	none
Change in migration-in over last 5 years (1 = much more, 5 = much less)	Phase 2	2 n=8	2 n=8	16	**0.583**	none
Migration-out last yr (1 = none, 5 = at least 20 families)	Phase 2	3.5 n=6	2 n=8	14	**0.238**	none
Change in migration-out over last 5 years (1 = much more, 5 = much less)	Phase 2	4 n=6	4 n=8	14	**0.327**	none

The purpose of exploring migration was to see if more people were migrating into sustained sanitation cover villages and to test if fewer households were leaving them. The median values obtained appear to support these hypotheses but the statistical tests reveal no significant evidence to that effect (table 7.26). There is no evidence of any difference in

- the inward bound migration towards the villages in either group
- the median rates of change of migration-in between the two groups over the past five years.
- migration levels away from the sample villages in the two groups
- the median rates of change of migration-out between the two groups over the past five years.

7.4 Summary of Phase 2 research findings

7.4.1 Physical determinants of sustained sanitation at village level

Table 7.27 records the physical characteristics of villages that proved to be significant for sustained sanitation.

Table 7.27 Physical village factors found to be significantly associated with sustained sanitation

Village physical characteristic	*Sustained sanitation village profile*	*Significance of association*
Size (number of households) (table 7.6)	Large	p=0.060, n=90
Size (land area) (table 7.6)	Small	p=0.061, n=90
Housing density (table 7.9)	High	p=0.014 to 0.036, n=90
Spread of housing (table 7.10)	Close together	p=0.053, n=16
Level of bush cover (table 7.10)	Low	p=0.085, n=16
Administrative responsibility level (table 7.7)	High	p=0.055, n=86
Distance to urban centre (table 7.9)	Near	p=0.007, n=75
Remoteness of services (table 7.10)	Central	p=0.032, n=16
Infrastructure level (table 7.12)	High	p=0.018 to 0.073, n=80

With regard to the physical characteristics in table 7.27, not much can be done in the sense that they each reflect a different feature of the village – rather than an aspect that can somehow be influenced or improved. However, these can be used as indicators to help identify villages in need of a boost, i.e. the opposite profiles are indicators of likely unsustained sanitation villages. These unsustained sanitation villages will be the hardest to access and would therefore need a special effort in order to engage with them. Cairncross in his assessment of the International Drinking Water Supply and Sanitation Decade proposes that interventions should target the most needy communities, especially where the local authorities have been able to recognise the need and ask for assistance (Cairncross; 1992).

Thus, *unsustained sanitation villages are likely to have some or all of the following* characteristics: relatively few households; large land area; low housing density; houses are generally spread out; high level of bush cover; low/no administrative responsibility; distant from Dodoma (urban centre); remote from services and a low level of infrastructure.

7.4.2 Social determinants of village level sustained sanitation

Key findings in relation to the significant social factors for sustained sanitation are listed in table 7.28.

Table 7.28 Social village factors found to be significant for sustained sanitation

Village social characteristic	*Sustained sanitation*	*Significance of association*
Village leadership quality (table 7.15)	Better	p=0.006, n=16
Activity level of village health committee (table 7.15)	More active	p=0.045, n=16
Openness of people (table 7.15)	More open	p=0.085, n=16
Village education level (table 7.20)	Higher	p=0.020, n=16
Presence of secondary school (table 7.20)	Yes	p=0.021, n=81
% of students passing entrance exam who go on to secondary school (table 7.19)	Higher	p=0.002, n=10
Proportion of "permanent" latrines (table 7.22)	Higher	p=0.046, n=16
Houses with metal roofing sheets (table 7.22)	More	p=0.078, n=16
Number of past sanitation interventions (table 7.23)	More	p=0.064, n=84
% houses which share their latrine (table 7.25)	Higher	p=0.065 to 0.072, n=90

Determinants relating to people (table 7.28) may be influenced by interventions for the change and development of a village. Each factor in table 7.28 can be actively encouraged in some way that has the potential to inspire sustained sanitation since they have been recognised as determinants.

Table 7.29 Snapshot of determinants of sustained sanitation in the Dodoma Rural District of Tanzania

Physical Factors	***Evidence of determinacy?***	***Social Factors***	***Evidence of determinacy?***
Village situation/status	Yes	Village leadership quality	Yes
Village ground conditions	No[3]	Village diversity	No
Village settlement pattern	Yes	Village education level	Yes
Village infrastructure	Yes	Village wealth level	No[4,5]
Access to materials and technologies	No[6]	Past sanitation interventions	Yes
		Latrine sharing	Yes
		Migration	No

The above physical factors (Table 7.29) are supported by Jenkins' findings on drives for latrine adoption in Benin (Jenkins 1999) though she focused on the household rather than village level. Her findings indicate a higher individual drive for latrine adoption where the village environment has:

- Higher population
- Higher population density
- Fewer sites available for open defecation
- Greater administrative activity
- Greater infrastructure level
- Nearer an urban centre
- Less remote

Clearly, the physical factors can be observed at village level but equally are unlikely to be changed as a result of a sanitation intervention. Conversely, the social factors are unlikely to be immediately visible to anyone but because some can be shown to be significant for sustained sanitation, the District Government or international organisations may wish to give special attention to these areas.

[3] There was insufficient difference in the ground conditions between the sample villages to come to any significant conclusion.
[4] Households with a metal roof implies both access to the roofing sheets and the finances necessary to purchase them and this was not considered sufficient to indicate either in the absence of other supporting evidence.
[5] More permanent latrines in sustained villages was taken to imply a slight difference in village wealth levels, but again the difference was not large enough to impact any of the other indicators.
[6] See [4] above.

8 Research findings, implications and recommendations

8.1 Summary of research

Household survey data are generally considered to be more reliable than administrative data (U. N. 2003), and in order to monitor development and identify the needs of specific locations, there is a need to be able to obtain data at a neighbourhood level rather than district or ward level (WHO/Unicef JMP 2006). The data collection strategy developed for Phase 1 (Chapter 2) enabled household data to be collected by each village for all households, rather than a small sample, with minimal instruction from District Government staff. Overall, data was collected from 65,644 households in 118 out of a possible 128 villages across the Dodoma Rural District of Tanzania. These data were entered onto computer and combined to generate village-level sanitation profiles for the period from 1960 to 2004. Individual village sanitation profile graphs (latrine acquisition curves (Smith 1988)) were obtained and adding trend lines to these (1994 – 2003) demonstrated that both individual village sanitation coverage levels and the rates of change of coverage could be easily quantified and thus compared. Categories of high, medium and low coverage were established and rates of change in sanitation coverage were observed to be falling, rising or constant. Combining these village sanitation characteristics led to the proposed village classification system for sustainability (Chapter 3). In this way, all 118 villages were classified as having sustained, unsustained or intermediate sanitation and the exercise was successfully repeated in a small sample of villages to validate the results and associated classifications. Additionally, it was noted that in order to obtain reliable results from a reduced sample of households, the sample selected should not be smaller than 100 households per village. Therefore, the initial objective to "develop and test a classification system for sustained village sanitation uptake" was deemed to have been achieved successfully.

Household latrines were found to exist in all villages to varying degrees, and were reported as being replaced over time though in a small proportion of cases delays were noted prior to eventual replacement. Latrine sharing was found to be commonplace though a comparison of the reported numbers suggested that perhaps only a small number of households might share the same latrine. Latrines, like the houses, were built from locally available materials, and using simple locally familiar construction techniques. Overall, the district sanitation coverage was measured at 78% which was lower than the official figure of 88% (United Republic of Tanzania 2003), but significantly higher than the national estimate for rural sanitation coverage of 41% (WHO/Unicef JMP 2004b).

The literature review of past sanitation programmes (Chapter 4) highlighted that sanitation is as much about people as it is about products since products can only be validated through the people who choose to make use of them. Therefore, Chapter 4 concludes that where sanitation interventions seek to maximise the engagement of local stakeholders, this would be likely to

lead to increased involvement and participation of the "target" communities, in turn leading to an increased sense of local ownership, less opposition or resentment, and more appropriate and locally acceptable sanitation technologies. Chapter 4 also noted that while programmes may record the (sometimes large) numbers of latrines reportedly built as a result of their intervention, none of those included in Chapter 4 were able to suggest a possible impact on sanitation coverage for the geographical scope of their intervention. However, this could yet be achieved by conducting an assessment such as that used during Phase 1 of this research.

To gauge the perceptions of sanitation at village level, 17 meetings and interviews were held across different parts of the Dodoma Rural District (Chapter 5). The outcome of these enabled the generation of a list of factors perceived to influence latrine adoption (Table 5.20). This table shows that some factors relate to the situation or choices of individual households, and others relate to the village or environment where the houses are located. These emic village-level factors were combined with those identified by DG and WA staff and were taken forward to be evaluated during Phase 2 (Table 5.24).

Chapter 6 recorded the development of the methodology used to assess the significance of the identified factors and indicators in both sustained and unsustained sanitation villages through the perspective of key informants. The results of the key-informant interviews have been presented in Appendix 11, and were summarised and tested for significance in Chapter 7. The village-level aspects tested during this research phase were divided into two further categories i.e. physical factors and social factors.

The physical factors of village size/status, settlement pattern and level of infrastructure were found to be determinants of sustainability, but were also seen to be aspects of communities which were unlikely to change significantly as the result of an intervention. Thus, these characteristics may be more valuable in assessing where sanitation coverage is currently less likely to be sustained and assistance is needed. The following village characteristics were recognised to be physical determinants of unsustained sanitation:

- low housing density
- distant from an urban centre
- remote from services
- little organised infrastructure (particularly the absence of an organised market)
- smaller numbers of households
- larger land areas
- low administrative responsibilities
- houses generally not close together
- higher bush coverage

In the absence of further information, such features may be used to help identify villages that are generally likely to need a sanitation boost. There was insufficient evidence to support access to materials and technologies as a determinant of sustainability. The majority of latrines observed were built of the same materials as local housing – implying that people already have access to simple construction materials which are locally available as well as having the ability (within the village) to construct simple latrines – since every village had some latrines. Within the limits of this study (the Dodoma Rural District), there was insufficient variability in geologic or hydro-geologic conditions to confirm or deny the determinacy of those ground condition features for sanitation sustainability.

Social factors which proved significant for sustained sanitation related to the quality of village leadership, village education level, sanitation interventions and the sharing of latrines. These features of villages were recognised as those which had the greatest potential to be influenced by intervention or other assistance. Thus, the following were assessed to be social determinants of sustained sanitation:

- good quality village leaders
- active health committee members
- good village education level
- the presence of a secondary school
- a high proportion of children who pass the secondary school entrance exam actually going on to attend secondary school
- a greater openness of people to new ideas
- having had a greater number of past sanitation interventions
- a higher percentage of households which allow at least one other household to share their latrine

While villages were found to be diverse in regard to their cultural and religious profiles, there was no statistical evidence to support any significance of this diversity with regard to sustained sanitation coverage. Although household income may influence their choice of construction style or materials, a comment reported in section 7.3.9 suggests that even poorer households could afford a simple latrine. There was no significant difference in the proportion of poorer households in sustained sanitation villages than in those villages with unsustained sanitation. Thus, village wealth level was not seen to be significant for sustained sanitation. Finally for the Phase 2 villages, the issue of migration into or away from villages was not found to be statistically significant for sustainable sanitation.

Overall, the second objective to "identify and confirm which village-level factors influence the sustained uptake of latrines" was also deemed to have been met, based on the classification system developed earlier.

8.2 Conclusions and recommendations

8.2.1 Village sanitation profiles

As mentioned above, each village generated their own respective data, and many of these villages asked for feedback on the results. This suggests a willingness not only to take part in such assessment activities, but also to be aware of the findings and to learn from them. The approach and methodology utilised to successfully generate this sanitation data also has the potential to be applied to other behavioural issues such as to gauge the spread or scale of point-of-use water treatment; the use of cloth filters to control Guinea Worm; the usage of insecticide treated bed nets in relation to malaria etc. Even beyond the water supply and sanitation arena, a similar strategy could be adopted in regard to measuring the progress towards many of the other MDG targets. Areas such as poverty, hunger, primary education may particularly lend themselves to this approach although gender equality, child mortality and maternal health also have the potential to be adapted. Thus, the uptake, demand or change for a variety of issues or options could be monitored and the respective graphs plotted.

Village sanitation profiles can be used to evaluate the impact of past interventions – even where there may be an absence of baseline data. The situation could be assessed over a time period which precedes the intervention by, say 10 years, and then provides annual data up until some point after the programme has ceased – say 5 to 10 years afterwards. A comparison could be made of the average coverage values and the change in rate of uptake (using the trend-line gradients) both for the period leading up to an intervention as well as during and after the particular programme being assessed. The data would not take into account any additional activities which were taking place in the village at the same time, but any change in village sanitation coverage would be measurable and in that sense the impact over time could be gauged – even in the absence of additional baseline information.

Baseline data from differing sources (or even from the same source but recorded at different times) can be unhelpful if different criteria are applied at various points in time. As noted in section 3.10 and table 4.3, differing sanitation coverage definitions (what is, or is not, considered acceptable for inclusion) make actual progress hard to quantify. The longitudinal data collection strategy utilised during Phase 1 has the benefit of ensuring uniformity when looking at how sanitation (or other household issues as mentioned above) have changed over time.

A follow-up survey for the Dodoma Rural District would be valuable to chart the subsequent progress of each of the villages. Such a survey need only focus on the ten years from 2001 to 2010, which would both overlap slightly with the past survey (for confirmation and continuity), and facilitate a five year projection to 2015 with a greater degree of confidence towards the MDG target deadline. Ideally, all villages should be included in this survey although the main

interest would be in those which have been classified as having unsustained or intermediate sanitation as discussed in 8.2.2.

In retrospect, the village sanitation profiles and subsequent sustainability classification could have been developed if data collection had been restricted to the years 1994 to 2003. While this is true, data from 1990 was valuable to generate the MDG sanitation targets for each village. Therefore, if such a survey were to be repeated in other districts, it would be wise to begin from the year 1990 (or earlier if required) but to base forward projections on the most recent 10-year period. This exercise has the potential to be repeated in any or all other districts in order to define village sanitation profiles across entire regions or potentially the nation as a whole, and from these to target resources as discussed in section 8.2.2.

8.2.1.1 International policy recommendation 1

Village sanitation profiles should be generated for past or future sanitation interventions with the following applications:

- ***Impact assessment (past interventions)***

Village sanitation profiles may be used to assess the impact of sanitation interventions over time (latrine coverage and rate of change in coverage – before, during and after an intervention) and are applicable regardless of the type of programme activities or approach taken, even where no baseline data is available.

- ***Generate baseline/current data***

New/proposed interventions could use village sanitation profiles to generate baseline information – especially where this is not otherwise available; or if diverse criteria have previously been used to generate an uncertain picture. As noted above, this approach may also be developed and applied towards monitoring many of the other MDG targets.

- ***Demand-responsive approaches***

Sanitation interventions (especially those of a demand-responsive approach) could use the participatory nature of data collection for sanitation profiles to generate a level of sanitation awareness among villagers. This will be particularly applicable since each household head would be involved in the survey and the graphs would provide a stimulus for discussion on village sanitation for both village leaders and ordinary villagers.

8.2.1.2 Governmental policy recommendation 1

Village sanitation profiles should be generated to assess sanitation uptake at village level and inform villages and District Government with regard to:

- ***Sanitation uptake across the district***

Sanitation profiles would provide an overview of the recent sanitation coverage and trends for each village within the respective District and allow the DG to classify the villages according to the sustainability classification as discussed below.

- ***Participatory sanitation monitoring***

Where a village sanitation profile has already been established, village leaders should be encouraged to reassess their situation by repeating the exercise every five to ten years. In this way they would be able to monitor the longer term sanitation development of their own village.

8.2.2 Sustainability classification system

The classification system as developed in section 3.4 has application at District Government level rather than VG level. DGs may be required to raise their sanitation coverage in an attempt to reach the MDG sanitation target, but are unlikely to have all the staff or other resources necessary to be able to address every village within their jurisdiction. If the villages were classified as in Phase 1 of this study, DG staff could specifically restrict their sanitation efforts to only those villages which have been classified as not already having sustained sanitation. For example, in the Dodoma Rural District, section 3.9.5 would suggest that no more than 55 of the 118 villages assessed (i.e. less than 47%) would require significant further sanitation promotion.

The village sanitation data provide a measure for sanitation coverage in 1990 which can be used to formulate individual MDG targets for each village (section 3.9.4), such that the DG can monitor sanitation progress both towards individual village targets as well as a national target. Section 3.9.5 demonstrated that if each of the above mentioned 55 villages were to reach their individual MDG targets, this would have the maximum impact in raising the overall District-level sanitation coverage. The data shows that if this were possible for the Dodoma Rural District, and those villages were able to reach their own MDG targets by 2015, the overall district coverage would be raised from 78% to 86% (unsustained sanitation villages only) or 90% (both unsustained and intermediate villages). If this strategy were to be adopted throughout the Dodoma Region or even the country of Tanzania as a whole, the implication is that the maximum overall sanitation improvement would occur by being able to channel the necessary resources – perhaps through a demand responsive approach such as Sanitation Marketing or CLTS – to only those villages which really need the assistance.

Conversely, further sanitation promotion is likely to have less benefit for the sustained sanitation villages to close the final few percentage points of their village sanitation gap to 100% coverage. Much of this gap for the village of Igamba was found to be due to households being unable to replace full or collapsed latrines immediately. Such villages may be better served by somehow facilitating households to be able to replace their latrines without any delay – see 8.2.3.

As noted in 8.2.1, the village profiles have application beyond the field of sanitation. In the same way, the village classification system discussed here has application beyond the uptake of latrines. The sustainability classification may be applied to other household behavioural activities and the examples of point-of-use water treatment, cloth filters for Guinea worm and insecticide treated bed-nets are only a few examples of potential application.

8.2.2.1 Government policy recommendation 2

Building on the village sanitation profiles, the sustainability classification system developed in section 3.4 should be applied at District Government level (potentially across the country as a whole) to accomplish the following:

- ***Identify localised areas of need***

National, regional or district level sanitation data are unable to identify which villages are in greatest need of sanitation assistance. Classification of villages will identify which villages have sustained, intermediate or unsustained sanitation and in this way generate a priority list of which villages have the greatest sanitation need.

- ***Target available resources***

The above classification should be used to enable DG to target their limited resources to the priority villages i.e. unsustained then intermediate sanitation villages if resources permit.

- ***Monitor progress towards the MDG sanitation target***

The village sanitation profiles enabled the calculation of individual village MDG targets. The sustained sanitation category of villages were seen to be progressing well towards achieving their targets, though the villages in other categories have not seen the same degree of progress. A further survey in 2011 is recommended as a follow-up such that the revised trends may then be projected to 2015 and the categories updated. This would enable the DG to assess the on-going village by village progress and further refine and allocate the necessary resources in an attempt to reach the MDG sanitation targets for all villages.

- ***Maximise increase in District-level sanitation coverage***

To achieve the greatest increase in District-level sanitation coverage, DGs should assist specifically the non-sustained sanitation villages (as in 8.2.2.2). This research has shown that if these villages were to reach their individual MDG targets, this would provide the greatest increase in coverage for the District as a whole. If the unsustained and intermediate sanitation village MDG targets can be reached, this study has suggested that the District level coverage would increase from 78% to 90%.

8.2.3 Latrine replacement

Section 3.11 demonstrates that latrine coverage at any point in time may be less than its potential due to a small proportion of households being unable to immediately replace their old

latrine on every occasion. In the case of Igamba village, the impact of postponed replacement meant that the village sanitation coverage was 15% below what would be possible if households had been able to replace their latrines immediately. Such delays may be due to rainfall, limited cash flow, or some other reason and further research is required to understand more about the barriers and potential solutions for this situation. It was noted that the lack of rainfall in one year has the potential to reduce a household income for several years afterwards (see 3.11.2).

8.2.3.1 Policy research recommendation 1

Further understanding is required of the issues surrounding postponed latrine replacement as well as possible mechanisms to help overcome these delays.

8.2.4 Latrine sharing

The village sanitation profiles generated from Phase 1 data reflect those households which have their own latrine (regardless of whether they allow anyone else to use it or not). These data represent the actual household latrines within the Dodoma Rural District as opposed to the number of people who have access to a latrine. If an allowance is made for responsible latrine sharing, such as between two neighbouring households, section 7.3.11.1 would suggest that actual coverage may be on average 13.9% higher than the household latrine data indicate. Thus, rather than excluding all shared latrines from sanitation coverage statistics, (WHO/Unicef JMP; 2004, 2006) perhaps a level of responsible sharing should be recognised (or at least not discouraged).

8.2.4.1 Policy research recommendation 2

More appreciation is necessary as to the extent of latrine sharing with respect to:

- ***actual numbers of households sharing the same latrine***
- ***variation in latrine condition and hygiene level with increased numbers of households sharing***
- ***duration/limits over which sharing occurs***
- ***whether households which have shared someone else's household latrine are more or less likely to build or rebuild their own in the future***

8.2.5 Village leadership and openness of local villagers

Good village leadership was identified as a village-level determinant of sustained sanitation. This does not imply that poor village leadership (in whatever form) cannot improve – given the opportunity. Inclusion and involvement of village leadership within an intervention has the potential to equip those in such appointed positions of leadership who may not have had any significant training beyond primary school – if that. Village executive officers (VEOs) are appointed by the respective District Government and officially are required to have attended primary school. The other office bearers may have had some education (and this is likely to become more normal as the village education levels increase) but this cannot be guaranteed.

Support for village leadership could come in the form of one or possibly a series of elementary leadership training programmes potentially developed by Government, held at the village office or possibly the local school, and led by either DG staff or a local teacher. If using a local teacher would lead to possible conflict or unease within the village, then possibly a teacher from a neighbouring village or ward might serve the purpose better. Leadership training has become a normal part of staff development in the UK and USA over recent years, and a simplified programme could be prepared to assist and enhance any natural leadership which appointed village leaders already have. This would, however, need to include those who had not been able to attend school during their youth and thus be an appropriate interactive programme to benefit all, and each programme could lead to the VG member receiving a certificate for that particular training package or module.

Some comments relating to leadership were recorded during data collection:

- "If something bad happens (in a village) and the leadership is good, the village will not suffer badly." (General comment by a Ward Assistant without reference to any specific village)
- "People are not well mobilised and this implies that leadership are not functioning well and not successfully mobilising their people." (Ward Assistant regarding an unsustained sanitation village)

The second comment (above) could suggest that good leadership inspires openness of people to new ideas and thus a degree of mobilisation. Openness of villagers was certainly another significant factor (determinant) of sustained sanitation recognised during Phase 2.

Another aspect of leadership is the ability to "follow-up" on situations. Gauging this concept was attempted by recording the level of revenue resulting from fines. This may have been a poor choice of indicator and it did not show as significant. Despite this, the following comments were noted:

- "There is a problem in leadership with respect to monitoring and follow-up. For example, there may be public meetings, but there is no follow-up to check on change or impact. Also, the dispensary health officer did a survey on toilets in March 2006 and submitted the names of all households without toilets to the VEO. The VEO then seems to have ignored it and done nothing about it. Now the relationship between the health officer and those households without a latrine has been damaged. Some of the people even tried to tell the health officer that they were not going to build a latrine and he had no authority to make them." (Ward agricultural extension officer regarding an unsustained sanitation village)

8.2.5.1 Government policy recommendation 3

District Governments should build the capacity of village leadership to further equip them to thrive within their respective leadership capacities and generate an increased level of village mobilisation and an environment of openness and trust.

8.2.6 Sanitation promotion: activity level of Village Health Committee

Sanitation promotional activity at village level was gauged by rating the level of activity of the village health committee (VHC) within each village. One of the specific functions of this committee is to promote latrines within their village. To facilitate their work may mean helping them to work through some of the specific barriers that they recognise. Many barriers may relate more to culture, beliefs and tradition rather than style or type of latrine technology, and these may be particularly challenging. Some of the barriers mentioned during Phase 2 were as follows:

- "They don't believe that it is good to share a toilet with their mother-in-law. In addition, it is a shame to be seen going towards a latrine. He might even take a machete with him to use the bush as his toilet. Then he can bring back some sticks to make it seem that he has been chopping wood rather than going to the toilet." (a WEO regarding an unsustained sanitation village)
- "People in *(that village)* fear that if they build a good house or other development activity that they will be bewitched. Therefore, some of them are moving away." (Agricultural extension worker regarding a sustained sanitation village)
- "People had come there to escape from development policies and issues." (Head teacher regarding an unsustained sanitation village)

The concerns of one village may already have been addressed by another and thus WAMMA may perform a vital role as they discuss strategies and successes throughout the district.

8.2.6.1 Government policy recommendation 4

WAMMA members should meet regularly with VHCs in an attempt to recognise and work through those issues faced by them as they promote latrines within their village.

8.2.7 Education level

Village education level was rated and proved significant alongside the presence of a secondary school and the proportion of students passing the secondary school entrance exam who actually go on to study in secondary school. The educational standard was rated higher in sustained sanitation villages, and this would suggest that enhancing or somehow improving the educational standard of unsustained sanitation villages has the potential to improve sustained sanitation coverage as a direct or possibly secondary effect. Various references were made to education during the study, and the following are a few examples:

- "People thought that if they took their boys to school, who will look after their livestock?" (WEC regarding an unsustained sanitation village)
- "Last year 11 students passed the entrance exam for secondary school but none were allowed to go by the village people. To prevent them, they were forced to marry which meant that they could not go to school. There were eight boys and three girls. Girls start school early since they cannot attend primary school when they are pregnant. Therefore, they begin attending primary school at around 6 years of age and will thus be finished by the time they reach 14. Boys normally start primary school at 10 years of age and finish when they are 18." (WEO regarding an unsustained sanitation village)
- "With education, even some of the Wagogo have overcome the traditional fear of being seen by someone (going towards a toilet). In addition, the mother-in-law sharing is no longer an issue for some. Some may even be seen taking a container of water with them for anal cleansing." (businessman regarding a sustained sanitation village)

There appears to be something of a fear of education among the unsustained sanitation villages, rather than a sense of it being a benefit. The above comments suggest that these villages may be more traditional in their thinking, preferring to retain older customs and perspectives. Such villages may need to recognise value and benefits in education, before any significant change in attitude towards it can take place. The goal would be to encourage villagers to embrace available educational opportunities (especially at secondary school) rather than to be fearful of change or development. There may be some potential here to develop adult literacy and education classes for those who are interested.

8.2.7.1 Government policy recommendation 5

District Government as a whole should promote the advantages of education within the context of the traditional cultures and beliefs of the people living in the district; villages with characteristics typical of unsustained sanitation would be appropriate priority targets.

8.2.8 Sanitation interventions

The number of past interventions was shown to be a determinant for sustained sanitation. The implication of this is that most villages have already had at least one intervention, but those with more interventions showed a greater level of sustained latrine uptake. This implies that the more times the sanitation message is repeated, the greater the likelihood that the message will be received and implemented. Therefore, the greater the exposure to sanitation interventions, the stronger the potential for villages to achieve sustained sanitation coverage.

- "At the time of the general election in 1995, leaders did not enforce latrines as they wanted votes. Then in 1996/97 they started to be more forceful." (Head teacher regarding a sustained sanitation village)

- "The impact of religious institutions (e.g. churches) has been significant as church leaders have been promoting the use of toilets. Churches have a Friday session and they meet to look at practical applications within their community. The application will vary according to the season but all include general development education. There are many churches, but the Anglican church seems particularly active in this regard." (WEO regarding the impact of the Anglican Diocese of Central Tanganyika in several sustained sanitation villages)

Sanitation interventions should be encouraged (especially in the non-sustained sanitation villages) regardless of whether they are run by the District Government, non-government, faith-based or other group. Different sanitation programmes should not be thought to be in competition, but as complementing and reinforcing a positive sanitation message.

8.2.8.1 Government policy recommendation 6

Sanitation interventions should continue to be implemented in target villages regardless of any past programme involvement in the area.

8.2.9 Village wealth level

Despite the recognised significance of the proportions of permanent latrines and houses with metal roofing sheets, which imply a greater level of wealth; none of the 16 other wealth indicators proved significant (section 7.3.9). This may be taken to imply that any wealth differences, at village level, were so small that they could not be recognised using the survey tool from Phase 2. Clearly, sustained household latrine service does not require the latrine in question to have a roof so long as it can be used and replaced when necessary. The availability of metal roofing sheets may also be related to the proximity of the village to the main urban centre (Dodoma) and it was noted that the sustained sanitation villages were generally closer than the unsustained. Thus, while cash flow and wealth may well be a household sanitation factor (Jenkins; 1999), it does not appear to be highly significant at village level.
Repeating the comment reported in section 7.3.9:

- "People cannot afford permanent latrines although they do have temporary ones". (Agricultural extension worker in relation to an unsustained sanitation village)

8.2.9.1 International policy recommendation 2

Sanitation interventions should promote "permanent" latrines, but at the same time recognise the value of having a "temporary" latrine where household constraints prevent the construction of anything more substantial (at least in the short term). Familiar, locally available materials and construction techniques should be utilised in preference to newer technologies – at least until the village has sustained a high sanitation coverage or until there is clearly a demand for more "modern" alternatives (see 4.8.4 and 7.3.9).

8.3 Further remarks

8.3.1 Water supply and sustainable sanitation

It had been expected that access to water supply would prove significant as a determinant of sustained sanitation (Cairncross 1992; Jenkins 1999). Jenkins particularly noted that access to piped water was a key aspect of a village's physical and social environment that influenced the arousal of drives for latrines in rural Benin. An assessment of the water points in the Dodoma Rural District suggested that there was no difference with respect to the sustained or unsustained sanitation villages. Water sources were assessed according to whether they were improved or unimproved as well as according to their functional status. In no instance was any significant difference noted between the village classifications. This would suggest that for this district, water supply was equally challenging for both categories and therefore has not been identified as a determinant for sustainable sanitation. This may have implications with respect to the integration of water supply and sanitation programmes, and deserves further consideration.

8.3.2 Sanitation coverage – personal or household?

In industrialised nations such as in Europe or America, households are likely to average more than one toilet each; many may have three or more. This is clearly not the situation for most developing nations, where an estimated 50% of people are not using improved sanitation facilities at all (U. N. 2007a). For an individual, access to a latrine is not the same as having a latrine at one's house. A toilet is not associated with an individual i.e. it is not the possession of one household member to the exclusion of the others. A toilet is a household amenity which can be utilised by the members of that family (Cairncross 2004). If the preference were to assess the actual number of household toilets, then the unit of the household would seem more appropriate than personal accessibility. Data relating to sanitation is usually based on the household – e.g. arising from household surveys such as DHS or that used in Phase 1 of this study – and this is logical since a toilet is a household concept. However, the Millennium Development Goal sanitation target and the WHO/Unicef JMP documents describe sanitation in terms of individuals and population. Clearly, the two standpoints are different and while issues such as education, literacy and health are personal; others such as income, water source and sanitation facilities relate to the household as a whole. To this end, the monitoring of sanitation coverage would seem to require a further degree of clarity or uniformity.

8.3.3 Benefit of local surveys

National sanitation data is based on sample surveys and can be used to help monitor progress towards the MDG sanitation target. However, such data are unable to identify specific problems or to direct efforts towards addressing local issues. To accomplish this, local data on individual communities are needed, such as in Phase 1 of this study. Working through established local structures, (District Government, Village Governments and volunteers such as 10-cell leaders) the financial cost of such activities can be achievable even for a full-scale household survey throughout an entire district. The budget for the Phase 1 household survey (excluding costs of

the lead researcher) was the equivalent of approximately £50-£55 per village or £0.10 per household (see appendix 2).

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Appendix 1

Phase 1 data collection tools:

- *Survey form srs1: Summary of village details (English version – blank)*
- Sample of completed Swahili version of form srs1 from Phase 1 survey (Zajilwa village)
- Survey form srs2: Listing of historical events (English version – blank). NB. The left side of this page was completed by District Government staff, and the right side was for Ward/Village Government to add local events. The sheet was intended as a prompt/aid for household heads being surveyed to help them identify specific years.
- Sample of Swahili version of form srs2 showing events reported by District Government
- Survey form srs3: Summary of houses and toilets (English version – blank)
- Sample of completed Swahili version of form srs3 from Phase 1 survey (a 10-cell from Igamba village)
- Sample of 10-cell map drawn on reverse side of one of the srs3 forms (a 10-cell from Haneti village)
- Survey form srs4: Sub-village latrine inventory (English version – blank)
- Sample of completed Swahili version of form srs4 from Phase 1 survey (a sub-village from Chali Isangha village)
- Survey form srs5: Sub-village housing inventory (English version – blank)
- Sample of completed form srs5 showing housing data from a sub-village of Zajilwa village. NB. The right-hand sustainability columns were unused as they referred to household-level sustainability and this aspect was not taken forward as the focus was restricted to village-level factors.

Survey form srs1 – English version

Summary of Village Details

Division: | Ward: | Village:

Number of households in village

Number of households with income from other than agriculture

Sub-village	Number of 10-cells
1	:
2	:
3	:
4	:
5	:
6	:
7	:
8	:
9	:
10	:
11	:
12	:
13	:
14	:
15	:
16	:
17	:
18	:
19	:
20	:

Date the survey forms were given to village

Date the survey forms were collected from village

Data collection form page numbers provided to this village

From: To:

: :

Summary data form page numbers provided to this village

From: To:

: :

Name of Village Executive Officer

Name:

Signature:

Name of Ward Executive Officer:

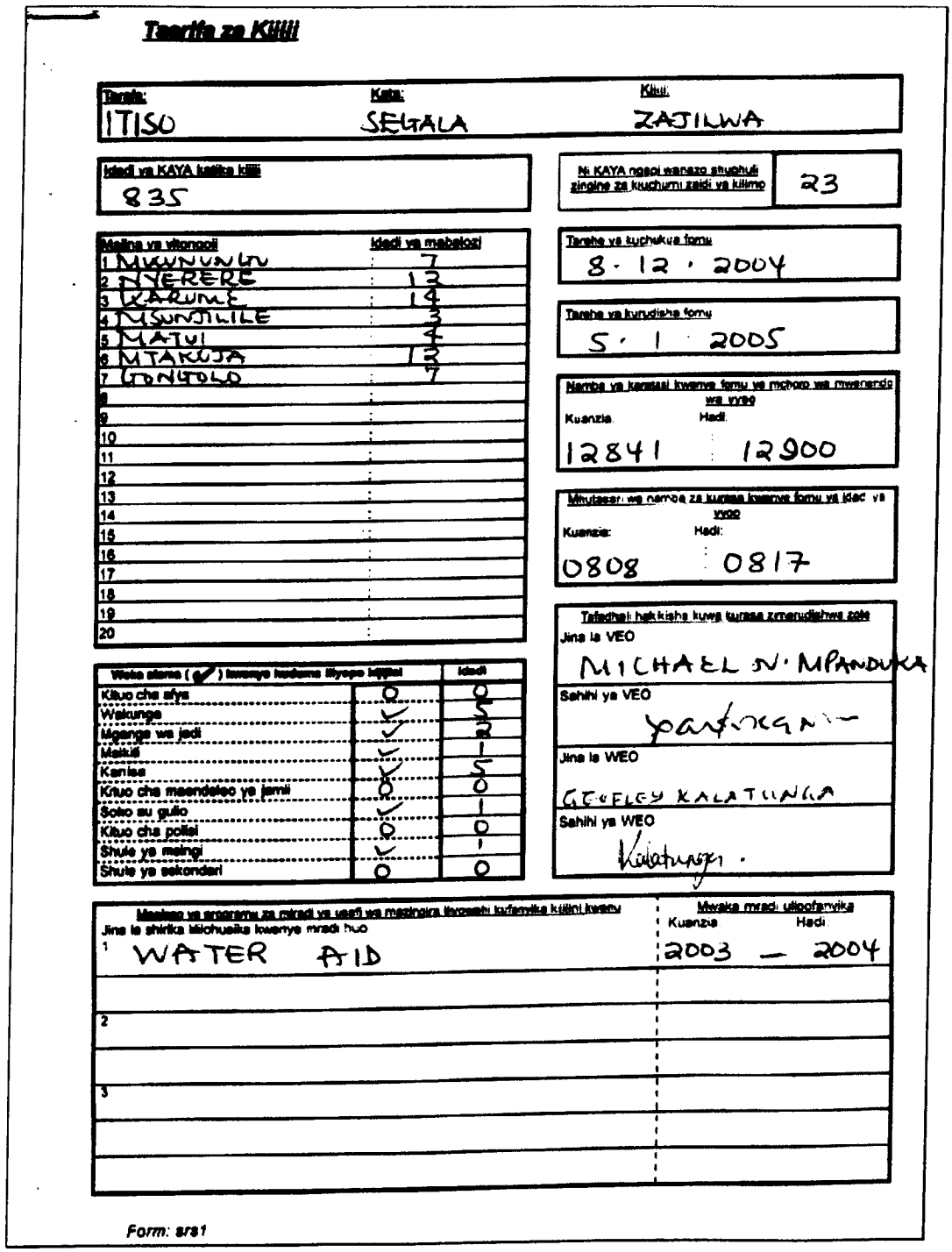
Signature:

Which of the following are found in your village?		How many?
Clinic/Dispensary		
TBAs		
Traditional Healers		
Mosque		
Church		
Community Centre		
Organised Market		
Police Post		
Primary School		
Secondary School		

Details of past sanitation programmes Name of Organisation:	Years of Programme From: To:
1	
2	
3	

Form: srs1

Sample of a completed survey form srs1 from Zajilwa village



Taarifa za Kijiji

Tarafa:	Kata:	Kijiji:
ITISO	SEGALA	ZAJILWA

Idadi ya KAYA katika kijiji: 835

Ni KAYA ngapi wanazo shughuli zingine za kuchumu zaidi ya kilimo: 23

Majina ya vitongoji	Idadi ya mabalozi
1 MWUNUNGU	7
2 NYERERE	13
3 KARUME	14
4 MSUNJILILE	3
5 MAJUJI	4
6 MTAKUJA	13
7 UDONGOLO	7
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Tarehe ya kuchukua fomu: 8 · 12 · 2004

Tarehe ya kurudisha fomu: 5 · 1 · 2005

Namba ya karatasi kwenye fomu ya mchoro wa mwenendo wa vyoo

Kuanzia	Hadi
12841	12900

Mfuatano wa namba za kurasa kwenye fomu ya idadi ya vyoo

Kuanzia:	Hadi:
0808	0817

Tafadhali hakikisha kuwa kurasa zimenudiishwa zote

Jina la VEO: MICHAEL N. MPANDUKA

Sahihi ya VEO: [signature]

Jina la WEO: GEOFLEY KALATUNGA

Sahihi ya WEO: [signature]

Weka alama (✓) kwenye huduma ifuyopo kijijini		Idadi
Kituo cha afya	0	0
Wakunga	✓	5
Mganga wa jadi	✓	2
Maktaba	✓	1
Kanisa	✓	5
Kituo cha maendeleo ya jamii	0	0
Soko au gulio	✓	1
Kituo cha polisi	0	0
Shule ya msingi	✓	1
Shule ya sekondari	0	0

Maelezo ya programu za miradi ya usafi wa mazingira inayoendeshwa kijijini kwenu

Jina la shirika linalohusika kwenye miradi huo	Miaka miradi ulipofanyika: Kuanzia	Hadi
1 WATER AID	2003	2004
2		
3		

Form: srs1

Survey form srs2 – English version

Listing of historical events

National/Regional event	Year	Ward/Village event
(events as listed by District Government)	1960	(local events to be entered by Ward/Village Government)
	1961	
	1962	
	1963	
	1964	
	1965	
	1966	
	1967	
	1968	
	1969	
	1970	
	1971	
	1972	
	1973	
	1974	
	1975	
	1976	
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	1992	
	1993	
	1994	
	1995	
	1996	
	1997	
	1998	
	1999	
	2000	
	2001	
	2002	
	2003	
	2004	

form: srs2

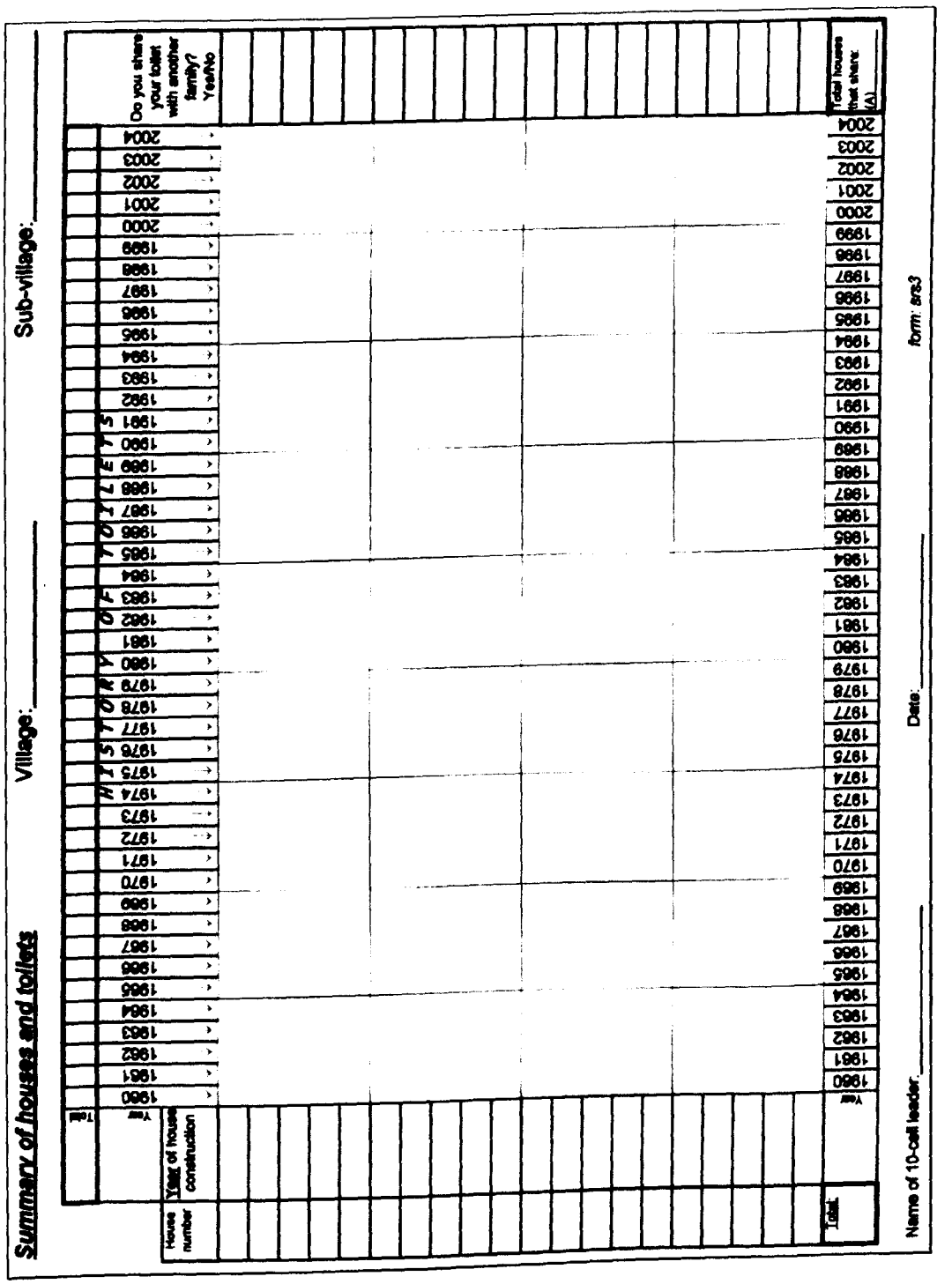
Survey form srs2 as presented to Village Governments

Matukio muhimu ya kihistoria

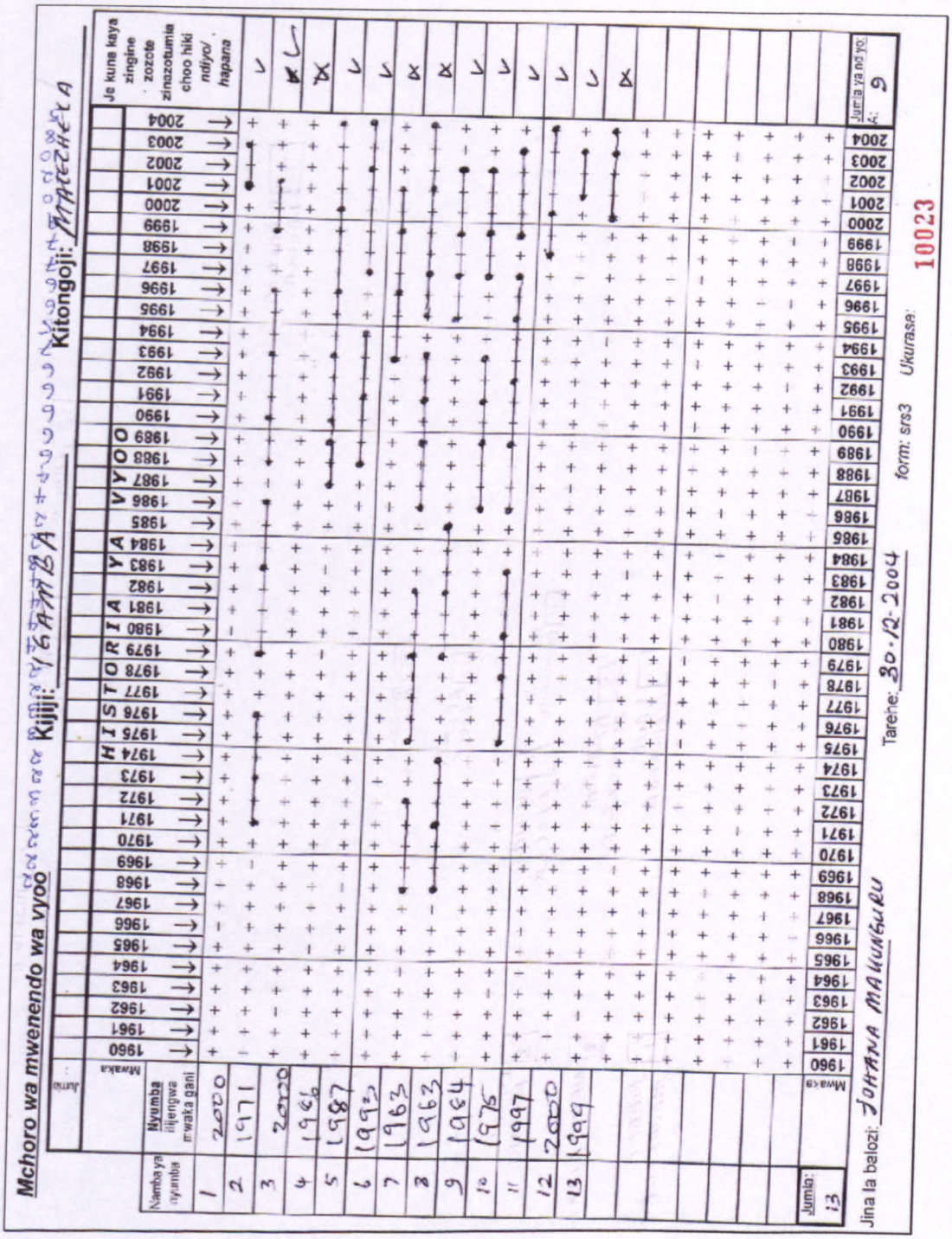
Kitaifa National/Regional event	Year	*Eneo Husika Ward/Village event*
(events as listed by District Government)	1960	*(events to be entered by Ward/Village Government)*
Tanganyika kupata uhuru	1961	
Tanganyika kuwa Jamhuri	1962	
	1963	
Muungano wa Tanganyika & Zanzibar	1964	
	1965	
Kuanzishwa kwa fedha za Tanzania	1966	
Azimio la Arusha	1967	
	1968	
	1969	
Kisomo cha Watu Wazima, Uchaguzi mkuu	1970	
	1971	
Maderaka Mikoani	1972	
Vijiji vya ujamaa	1973	
	1974	
Uchaguzi mkuu	1975	
	1976	
Kuzaliwa C. C. M.	1977	
Sensa ya kitaifa / Vitavya iddi amini	1978	
	1979	
Uchaguzi mkuu	1980	
	1981	
	1982	
	1983	
Alifariki waziri mkuu Sokoine	1984	
Mwl. Nyerere kung'atuka Urais	1985	
	1986	
	1987	
Sensa ya kitaifa	1988	
	1989	
(Uchaguzi Mkuu) Njaa	1990	
	1991	
Kuanzishwa vyama vingi	1992	
	1993	
	1994	
Uchaguzi mkuu	1995	
	1996	
Mvua za elinino	1997	
	1998	
Alifariki Mwl. J.K.Nyerere	1999	
Uchaguzi mkuu	2000	
	2001	
Sensa ya kitaifa	2002	
	2003	
	2004	

form srs2

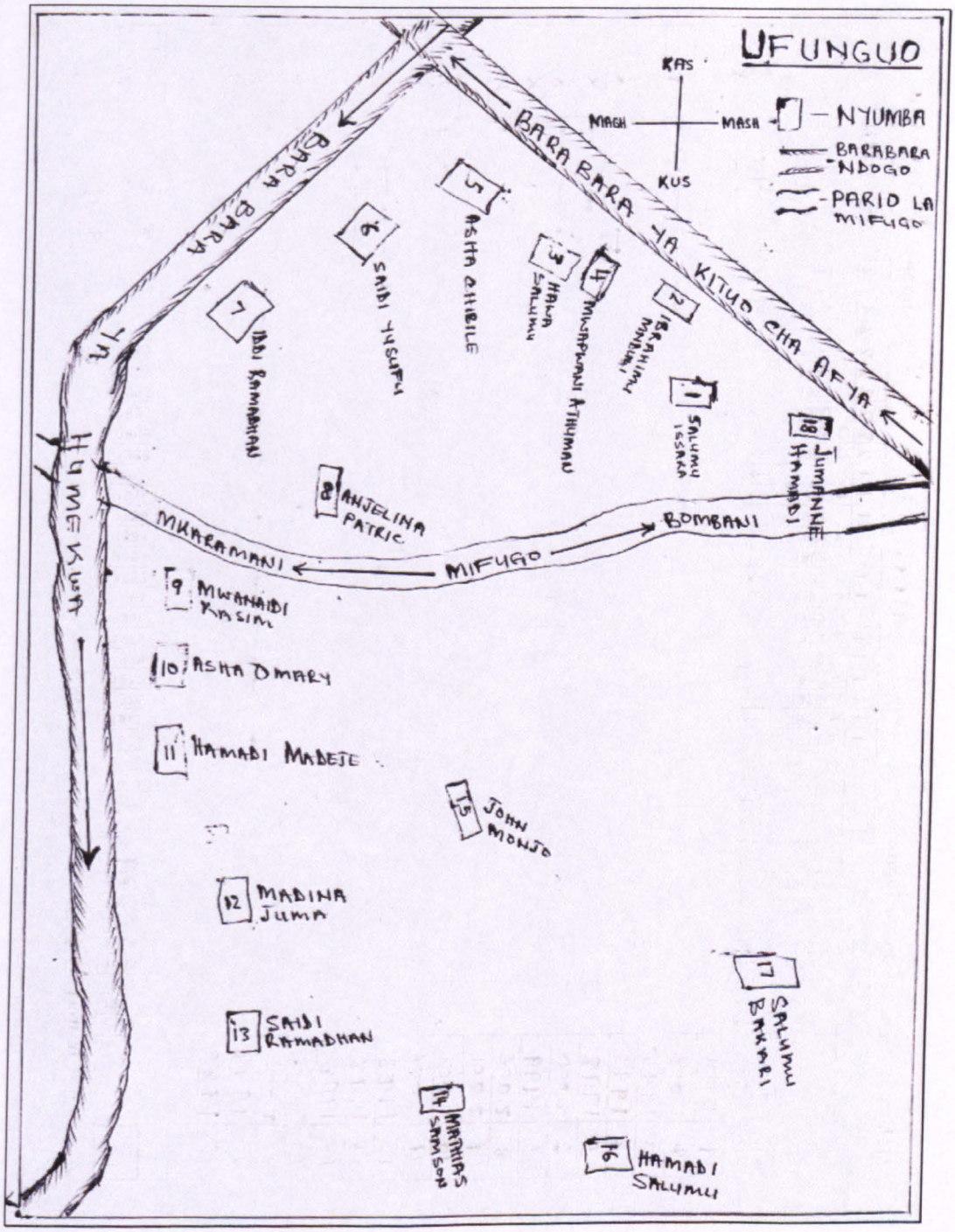
Survey form srs3 – English version



Sample of a completed survey form srs3 from Igamba village



10-cell map as drawn on the reverse of the respective srs3 form in one of the sub-villages of Haneti village



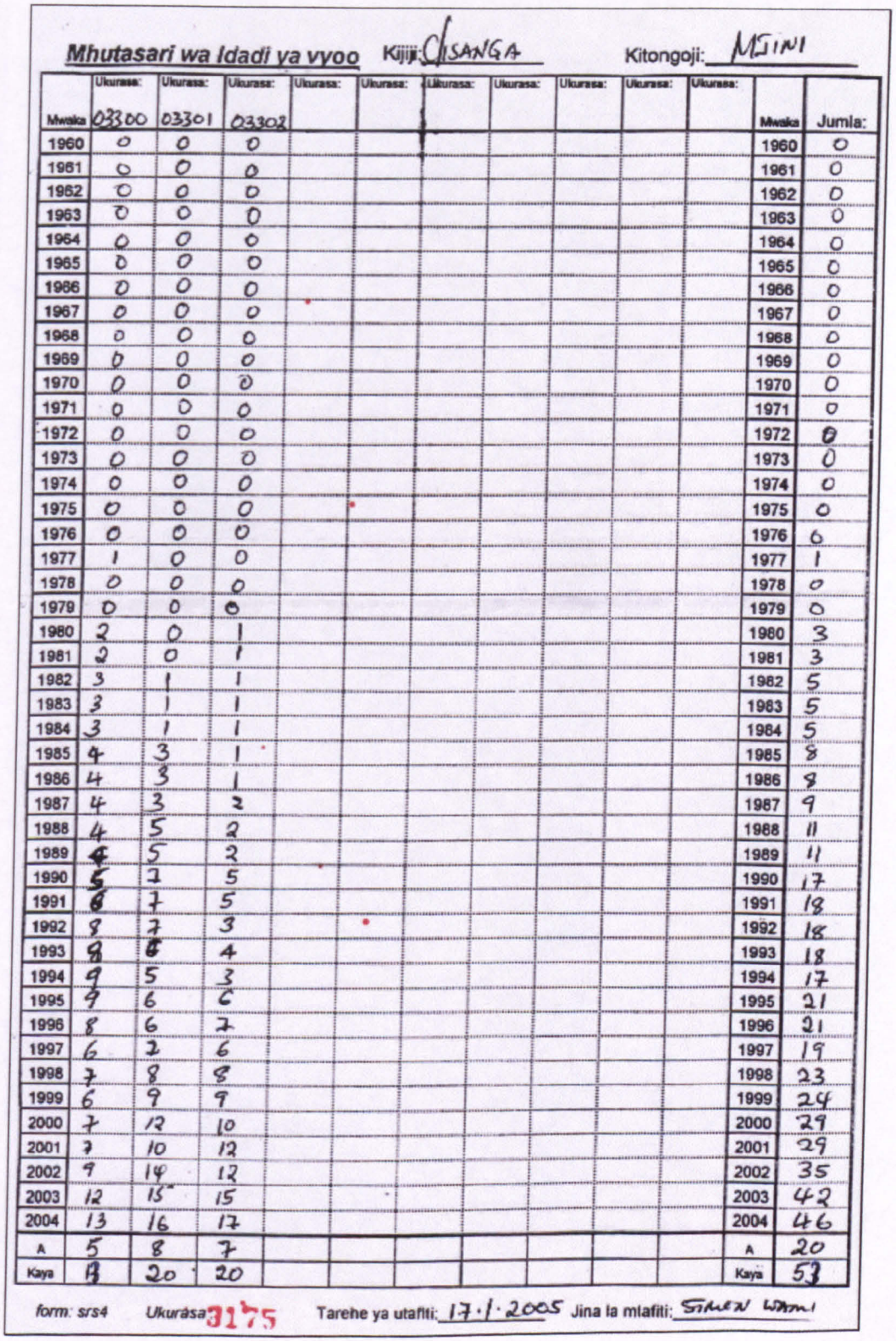
Survey form srs4 – English version

Sub-village Latrine Inventory Village:_____

Year	Page No	Page No	Page No	Page No	Page No	Page No	Page No	Page No	Page No	Page No	Year	Totals
1960											1960	
1961											1961	
1962											1962	
1963											1963	
1964											1964	
1965											1965	
1966											1966	
1967											1967	
1968											1968	
1969											1969	
1970											1970	
1971											1971	
1972											1972	
1973											1973	
1974											1974	
1975											1975	
1976											1976	
1977											1977	
1978											1978	
1979											1979	
1980											1980	
1981											1981	
1982											1982	
1983											1983	
1984											1984	
1985											1985	
1986											1986	
1987											1987	
1988											1988	
1989											1989	
1990											1990	
1991											1991	
1992											1992	
1993											1993	
1994											1994	
1995											1995	
1996											1996	
1997											1997	
1998											1998	
1999											1999	
2000											2000	
2001											2001	
2002											2002	
2003											2003	
2004											2004	
	Additional details from each 10-cell											Totals
A:											A:	
Houses											Houses	

form: srs4 Page: Date compiled:_____ Compiled by:_____

Sample of a completed survey form srs4 representing the Mjini sub-village of Chali Isangha

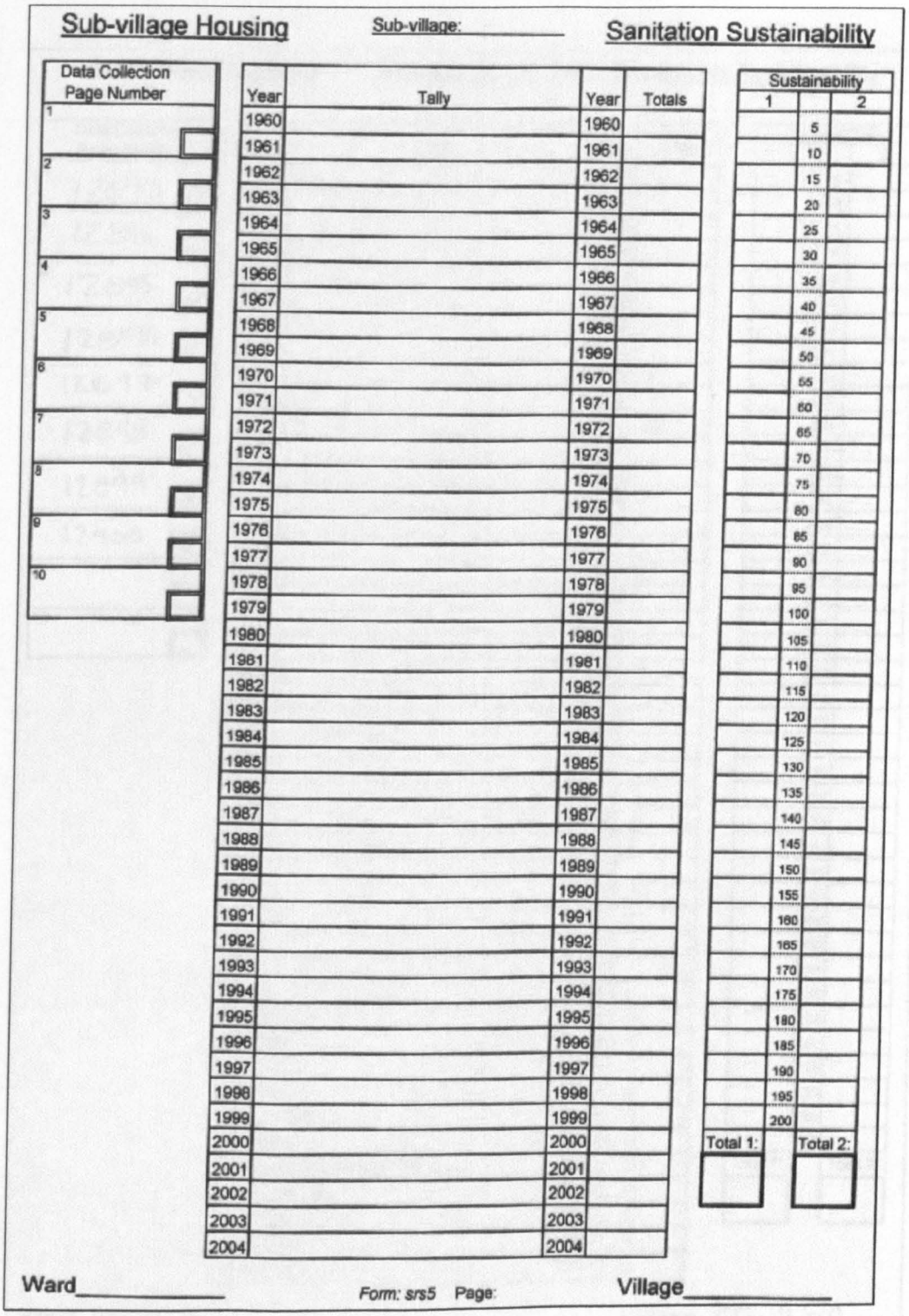


Mhutasari wa Idadi ya vyoo Kijiji: CHISANGA Kitongoji: MJINI

Mwaka	Ukurasa: 03300	Ukurasa: 03301	Ukurasa: 03302	Ukurasa:	Ukurasa:	Ukurasa:	Ukurasa:	Ukurasa:	Ukurasa:	Ukurasa:	Mwaka	Jumla:
1960	0	0	0								1960	0
1961	0	0	0								1961	0
1962	0	0	0								1962	0
1963	0	0	0								1963	0
1964	0	0	0								1964	0
1965	0	0	0								1965	0
1966	0	0	0								1966	0
1967	0	0	0								1967	0
1968	0	0	0								1968	0
1969	0	0	0								1969	0
1970	0	0	0								1970	0
1971	0	0	0								1971	0
1972	0	0	0								1972	0
1973	0	0	0								1973	0
1974	0	0	0								1974	0
1975	0	0	0								1975	0
1976	0	0	0								1976	6
1977	1	0	0								1977	1
1978	0	0	0								1978	0
1979	0	0	0								1979	0
1980	2	0	1								1980	3
1981	2	0	1								1981	3
1982	3	1	1								1982	5
1983	3	1	1								1983	5
1984	3	1	1								1984	5
1985	4	3	1								1985	8
1986	4	3	1								1986	8
1987	4	3	2								1987	9
1988	4	5	2								1988	11
1989	4	5	2								1989	11
1990	5	7	5								1990	17
1991	6	7	5								1991	18
1992	8	7	3								1992	18
1993	8	6	4								1993	18
1994	9	5	3								1994	17
1995	9	6	6								1995	21
1996	8	6	7								1996	21
1997	6	7	6								1997	19
1998	7	8	8								1998	23
1999	6	9	9								1999	24
2000	7	12	10								2000	29
2001	7	10	12								2001	29
2002	9	14	12								2002	35
2003	12	15	15								2003	42
2004	13	16	17								2004	46
A	5	8	7								A	20
Kaya	13	20	20								Kaya	53

form: srs4 Ukurasa 3175 Tarehe ya utafiti: 17.1.2005 Jina la mtafiti: SIMEON WAMI

Survey form srs5



Sub-village Housing

Sub-village:

Sanitation Sustainability

Data Collection Page Number
1
2
3
4
5
6
7
8
9
10

Year	Tally	Year	Totals
1960		1960	
1961		1961	
1962		1962	
1963		1963	
1964		1964	
1965		1965	
1966		1966	
1967		1967	
1968		1968	
1969		1969	
1970		1970	
1971		1971	
1972		1972	
1973		1973	
1974		1974	
1975		1975	
1976		1976	
1977		1977	
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1994		1994	
1995		1995	
1996		1996	
1997		1997	
1998		1998	
1999		1999	
2000		2000	
2001		2001	
2002		2002	
2003		2003	
2004		2004	

Sustainability 1		2
	5	
	10	
	15	
	20	
	25	
	30	
	35	
	40	
	45	
	50	
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	65	
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	85	
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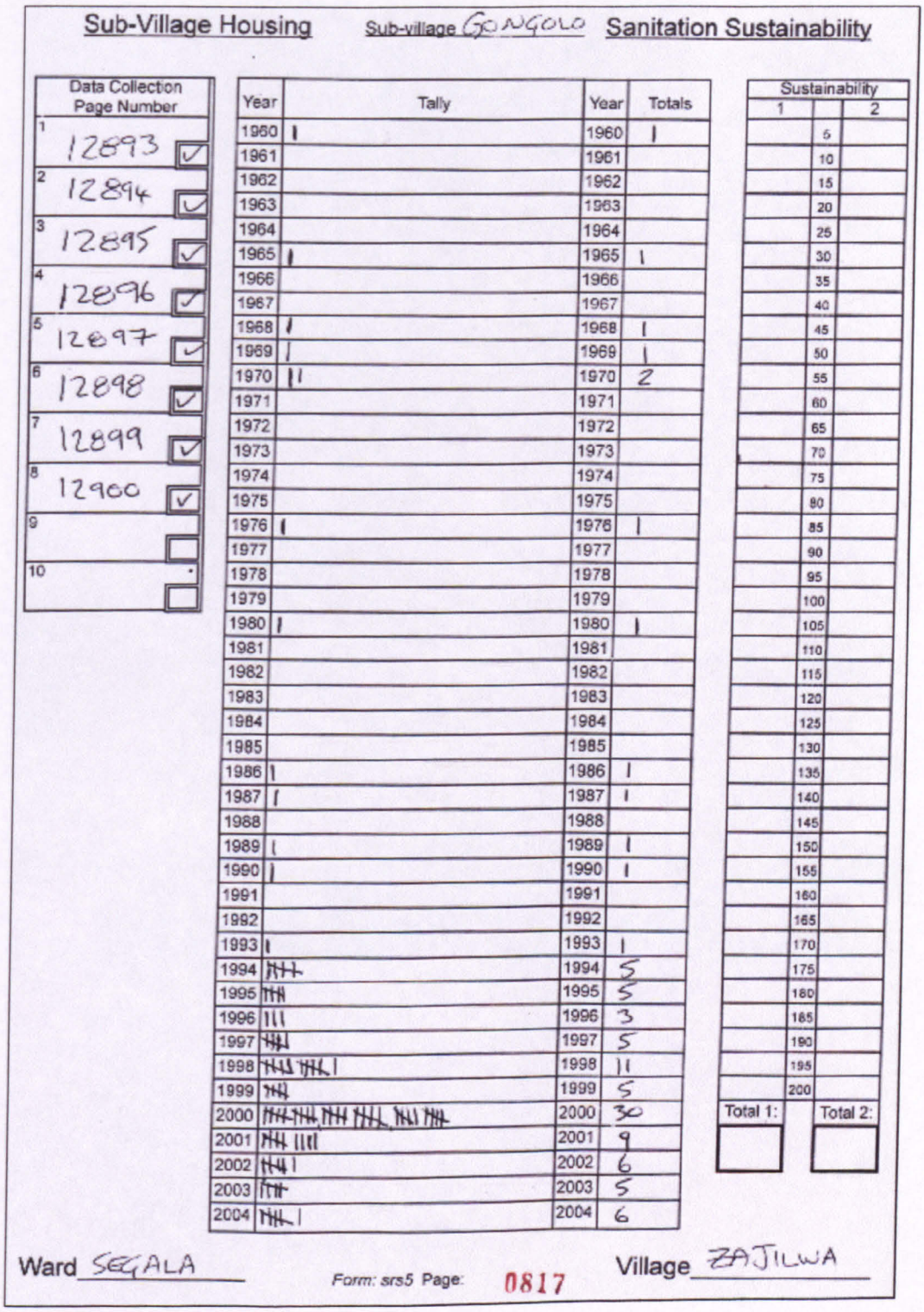
	100	
	105	
	110	
	115	
	120	
	125	
	130	
	135	
	140	
	145	
	150	
	155	
	160	
	165	
	170	
	175	
	180	
	185	
	190	
	195	
	200	
Total 1:		Total 2:

Ward_____ *Form: srs5* Page: Village_____

Sample of a completed survey form srs5 representing the Gongolo sub-village of Zajilwa



Sub-Village Housing Sub-village GONGOLO Sanitation Sustainability

Data Collection Page Number	
1	12893 ✓
2	12894 ✓
3	12895 ✓
4	12896 ✓
5	12897 ✓
6	12898 ✓
7	12899 ✓
8	12900 ✓
9	
10	

Year	Tally	Year	Totals
1960	1	1960	1
1961		1961	
1962		1962	
1963		1963	
1964		1964	
1965	1	1965	1
1966		1966	
1967		1967	
1968	1	1968	1
1969	1	1969	1
1970	11	1970	2
1971		1971	
1972		1972	
1973		1973	
1974		1974	
1975		1975	
1976	1	1976	1
1977		1977	
1978		1978	
1979		1979	
1980	1	1980	1
1981		1981	
1982		1982	
1983		1983	
1984		1984	
1985		1985	
1986	1	1986	1
1987	1	1987	1
1988		1988	
1989	1	1989	1
1990	1	1990	1
1991		1991	
1992		1992	
1993	1	1993	1
1994	𝍸	1994	5
1995	𝍸	1995	5
1996	111	1996	3
1997	𝍸	1997	5
1998	𝍸 𝍸 1	1998	11
1999	𝍸	1999	5
2000	𝍸 𝍸 𝍸 𝍸	2000	30
2001	𝍸 111	2001	9
2002	𝍸 1	2002	6
2003	𝍸	2003	5
2004	𝍸 1	2004	6

Sustainability 1		2
	5	
	10	
	15	
	20	
	25	
	30	
	35	
	40	
	45	
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	145	
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	155	
	160	
	165	
	170	
	175	
	180	
	185	
	190	
	195	
	200	
Total 1:		Total 2:

Ward SEGALA Form: srs5 Page: 0817 Village ZAJILWA

Appendix 2

Costs relating to Phase 1

Costs associated with data collection in Dodoma Rural district

Who/What	Rate	unit	duration	no of people	comment	total in Tsh
Research asst.	110,000	per month	2	1	part time	220,000
	210,000	per month	2	1	full time	420,000
WAMMA	15,000	per day	3	3	Deliver letters	135,000
fuel	20,000		3			60,000
oil	3,000	for all	1			3,000
Printing	800,000	for all	1		data collection forms	800,000
Stationery	100	per pen		1024	number reqd	102,400
	350	per folder		128	villages	44,800
WAMMA	15,000	per day	18	7	initial ward meetings	1,890,000
drivers	15,000	per day	18	2		540,000
fuel	500,000	for all	1			500,000
reserve	100,000		1			100,000
WEO	4,000	allowance		48	2 ward meetings	192,000
VEO	2,000	travel/lunch		128	ward meeting 1	256,000
	2,000	travel/lunch		128	ward meeting 2	256,000
	2,000	allowance		128		256,000
Sub-village	2,000	allowance		1223	data collection	2,446,000
WAMMA	15,000	per day	16	7	collecting data forms	1,680,000
driver	15,000	per day	16	2		480,000
fuel	500,000	for all	1			500,000
reserve	100,000		1			100,000
Data Entry	100,000	per month	2	2	person months	400,000
Reserve	500,000		1			500,000
Overall Total					Tsh	11,881,200
					GBP	£6,413.39
					Considering all 128 villages, average cost per village:	£50.10
					Considering only 118 villages from which data was received, average cost per village:	£54.35
					On the basis of 65,644 households providing data, the average cost per house was:	£0.10

Appendix 3

Spreadsheet template used for Phase 1 data entry

The following pages have been copied from the data-entry template for Chidilo village and are presented here as a sample of how the template was set up. The first page shows the village data indicating a village estimate of 302 households spread out in five sub-villages. The blocks of five columns each represent a different sub-village (three on the first page and two on the next along with one empty block since there are only five in this village). The second page also shows the overall village totals and the two graphs which were set to automatically generate from the totals as they were entered.

Division:	Ward:	Village:
Chipenge	Mpelanga	Chidilo

Number of Households Recorded: 302

Number of households with income from other than agriculture: 10

Subvillage			Number of 10-cells
1	Utandiche	:	9
2	Chimagai	:	5
3	Nzuguni	:	5
4	Miphululu	:	6
5	Chihundiche	:	5
6		:	
7		:	
8		:	
9		:	
10		:	
11		:	
12		:	
13		:	
14		:	
15		:	
16		:	
17		:	
18		:	
19		:	
20		:	

Date survey forms were given: dd/mm/yy — 17/12/2004

Date survey forms were collected: dd/mm/yy — 12/01/2005

Data collection form page numbers provided to this village: From: 2362 To: 2416

Summary data form page numbers provided to this village: From: 2724 To: 2733

Name of Village Executive Officer (VEO): David Magalamile

Name of Ward Executive Officer (WEO):

Which of the following are found in this village?		How many?
Clinic/Dispensary (0 = no)	0	0
TBAs (1 = yes)	1	3
Traditional Healer	1	2
Mosque	0	0
Church	1	5
Community Centre	0	0
Organised Market	0	0
Police Post	0	0
Primary School	1	1
Secondary School	0	0

Details of Past Sanitation Programmes		Years of Programme	
	Name of Organisation	From:	To:
1			
2			
3			

Page No.: 2726 — **Utandiche** — Page No.: 2728

HOUSEHOLDS: Total number of cells built in sub-village	HOUSEHOLDS: Cumulative totals per year	Year	LATRINES: Total number of Toilets in Sub-Village	LATRINES: Sub-Village Coverage
	0	1960		0.0%
	0	1961		0.0%
	0	1962		0.0%
	0	1963		0.0%
	0	1964		0.0%
	0	1965		0.0%
	0	1966		0.0%
	0	1967		0.0%
	0	1968		0.0%
	0	1969		0.0%
	0	1970		0.0%
	0	1971		0.0%
	0	1972		0.0%
	0	1973		0.0%
	0	1974		0.0%
	0	1975		0.0%
	0	1976		0.0%
	0	1977		0.0%
	0	1978		0.0%
	0	1979		0.0%
	0	1980		0.0%
	0	1981		0.0%
	0	1982		0.0%
	0	1983		0.0%
	0	1984		0.0%
	0	1985		0.0%
	0	1986		0.0%
	0	1987		0.0%
	0	1988		0.0%
1	1	1989	1	100.0%
0	1	1990	0	0.0%
0	1	1991	0	0.0%
0	1	1992	0	0.0%
0	1	1993	0	0.0%
0	1	1994	0	0.0%
2	3	1995	0	0.0%
1	4	1996	1	25.0%
0	4	1997	3	75.0%
26	30	1998	3	10.0%
12	42	1999	14	33.3%
13	55	2000	24	43.6%
10	65	2001	38	58.5%
10	75	2002	43	57.3%
6	81	2003	53	65.4%
9	90	2004	53	58.9%
Total Houses:	90	A	11	

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Page No.: 2724 — **Nzuguni** — Page No.: 2724

HOUSEHOLDS: Total number of cells built in sub-village	HOUSEHOLDS: Cumulative totals per year	Year	LATRINES: Total number of Toilets in sub-Village	LATRINES: Sub-Village Coverage
	0	1960		0.0%
	0	1961		0.0%
	0	1962		0.0%
	0	1963		0.0%
	0	1964		0.0%
	0	1965		0.0%
	0	1966		0.0%
	0	1967		0.0%
	0	1968		0.0%
	0	1969		0.0%
	0	1970		0.0%
2	2	1971		0.0%
0	2	1972		0.0%
0	2	1973		0.0%
0	2	1974		0.0%
1	3	1975		0.0%
0	3	1976		0.0%
0	3	1977		0.0%
1	4	1978		0.0%
0	4	1979		0.0%
0	4	1980	2	50.0%
0	4	1981	2	50.0%
1	5	1982	3	60.0%
0	5	1983	3	60.0%
0	5	1984	3	60.0%
0	5	1985	4	80.0%
0	5	1986	4	80.0%
1	6	1987	4	66.7%
5	11	1988	5	45.5%
1	12	1989	8	66.7%
1	13	1990	11	84.6%
1	14	1991	13	92.9%
0	14	1992	12	85.7%
0	14	1993	12	85.7%
0	14	1994	13	92.9%
0	14	1995	12	85.7%
3	17	1996	14	82.4%
3	20	1997	15	75.0%
6	26	1998	22	84.6%
8	34	1999	22	64.7%
5	39	2000	28	71.8%
1	40	2001	30	75.0%
1	41	2002	32	78.0%
3	44	2003	35	79.5%
8	52	2004	44	84.6%
Total Houses:	52	A	4	

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Page No.: 2727 — **Chihundiche** — Page No.: 2727

HOUSEHOLDS: Total number of cells built in sub-village	HOUSEHOLDS: Cumulative totals per year	Year	LATRINES: Total number of Toilets in sub-Village	LATRINES: Sub-Village Coverage
2	2	1960		0.0%
0	2	1961		0.0%
0	2	1962		0.0%
0	2	1963		0.0%
0	2	1964		0.0%
0	2	1965		0.0%
0	2	1966		0.0%
0	2	1967		0.0%
1	3	1968	1	33.3%
0	3	1969	1	33.3%
2	5	1970	1	20.0%
0	5	1971	1	20.0%
0	5	1972	1	20.0%
0	5	1973	1	20.0%
1	6	1974	3	50.0%
0	6	1975	2	33.3%
0	6	1976	2	33.3%
0	6	1977	2	33.3%
0	6	1978	2	33.3%
0	6	1979	2	33.3%
1	7	1980	3	42.9%
1	8	1981	3	37.5%
1	9	1982	3	33.3%
0	9	1983	3	33.3%
0	9	1984	3	33.3%
1	10	1985	4	40.0%
0	10	1986	3	30.0%
0	10	1987	3	30.0%
0	10	1988	4	40.0%
2	12	1989	6	50.0%
3	15	1990	9	60.0%
1	16	1991	9	56.3%
1	17	1992	11	64.7%
2	19	1993	13	68.4%
1	20	1994	14	70.0%
3	23	1995	15	65.2%
1	24	1996	16	66.7%
1	25	1997	19	76.0%
6	31	1998	22	71.0%
3	34	1999	24	70.6%
2	36	2000	25	69.4%
8	44	2001	30	68.2%
4	48	2002	36	75.0%
3	51	2003	38	74.5%
5	56	2004	46	82.1%
Total Houses:	56	A	11	

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Chidilo
Overall Village Totals

Households			Latrines	
Total number of cells built in Village	*Cumulative totals per year*	*Year*	*Total number of Toilets in Village*	*Coverage*
3	3	*1960*	0	0.0%
0	3	*1961*	0	0.0%
1	4	*1962*	0	0.0%
0	4	*1963*	1	25.0%
0	4	*1964*	0	0.0%
1	5	*1965*	1	20.0%
0	5	*1966*	0	0.0%
0	5	*1967*	0	0.0%
1	6	*1968*	1	16.7%
0	6	*1969*	1	16.7%
6	12	*1970*	3	25.0%
2	14	*1971*	3	21.4%
4	18	*1972*	5	27.8%
0	18	*1973*	4	22.2%
3	21	*1974*	7	33.3%
2	23	*1975*	8	34.8%
0	23	*1976*	6	26.1%
1	24	*1977*	7	29.2%
2	26	*1978*	6	23.1%
0	26	*1979*	5	19.2%
4	30	*1980*	15	50.0%
4	34	*1981*	15	44.1%
5	39	*1982*	19	48.7%
0	39	*1983*	18	46.2%
2	41	*1984*	23	56.1%
1	42	*1985*	25	59.5%
2	44	*1986*	26	59.1%
3	47	*1987*	28	59.6%
5	52	*1988*	30	57.7%
6	58	*1989*	37	63.8%
8	66	*1990*	44	66.7%
6	72	*1991*	51	70.8%
2	74	*1992*	53	71.6%
2	76	*1993*	56	73.7%
4	80	*1994*	61	76.3%
9	89	*1995*	65	73.0%
15	104	*1996*	74	71.2%
9	113	*1997*	86	76.1%
46	159	*1998*	103	64.8%
30	189	*1999*	121	64.0%
32	221	*2000*	146	66.1%
27	248	*2001*	176	71.0%
23	271	*2002*	201	74.2%
20	291	*2003*	212	72.9%
31	322	*2004*	229	71.1%
		A	50	15.5% Shared toilets

Tally from data sheets	322
Village Estimate	302
Difference	20

Data Check 1 OK
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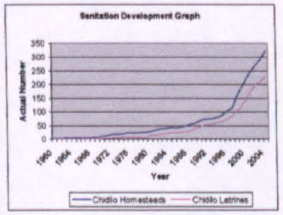

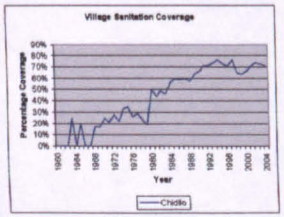

Page No.: 2725

Chimagai

Page No.: 2725

HOUSEHOLDS			LATRINES	
Total number of cells built in sub-village	*Cumulative totals per year*	*Year*	*Total number of Toilets in sub-Village*	*Sub-Village Coverage*
	0	*1960*		0.0%
	0	*1961*		0.0%
1	1	*1962*		0.0%
0	1	*1963*		0.0%
0	1	*1964*		0.0%
1	2	*1965*	1	50.0%
0	2	*1966*	0	0.0%
0	2	*1967*	0	0.0%
0	2	*1968*	0	0.0%
0	2	*1969*	0	0.0%
4	6	*1970*	1	16.7%
0	6	*1971*	1	16.7%
4	10	*1972*	3	30.0%
0	10	*1973*	2	20.0%
1	11	*1974*	3	27.3%
1	12	*1975*	5	41.7%
0	12	*1976*	3	25.0%
1	13	*1977*	4	30.8%
1	14	*1978*	3	21.4%
0	14	*1979*	3	21.4%
2	16	*1980*	9	56.3%
0	16	*1981*	7	43.8%
2	18	*1982*	9	50.0%
0	18	*1983*	8	44.4%
2	20	*1984*	11	55.0%
0	20	*1985*	11	55.0%
2	22	*1986*	13	59.1%
1	23	*1987*	14	60.9%
0	23	*1988*	14	60.9%
1	24	*1989*	15	62.5%
2	26	*1990*	17	65.4%
4	30	*1991*	21	70.0%
1	31	*1992*	22	71.0%
0	31	*1993*	23	74.2%
2	33	*1994*	25	75.8%
2	35	*1995*	29	82.9%
7	42	*1996*	32	76.2%
2	44	*1997*	34	77.3%
5	49	*1998*	38	77.6%
3	52	*1999*	41	78.8%
1	53	*2000*	40	75.5%
4	57	*2001*	44	77.2%
5	62	*2002*	51	82.3%
4	66	*2003*	46	69.7%
3	69	*2004*	46	66.7%
Total Houses:	69	A	11	

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Page No.: 2726

Mphululu

Page No.: 2726

HOUSEHOLDS			LATRINES	
Total number of cells built in sub-village	*Cumulative totals per year*	*Year*	*Total number of Toilets in sub-Village*	*Sub-Village Coverage*
1	1	*1960*		0.0%
0	1	*1961*		0.0%
0	1	*1962*		0.0%
0	1	*1963*	1	100.0%
0	1	*1964*	0	0.0%
0	1	*1965*	0	0.0%
0	1	*1966*	0	0.0%
0	1	*1967*	0	0.0%
0	1	*1968*	0	0.0%
0	1	*1969*	0	0.0%
0	1	*1970*	1	100.0%
0	1	*1971*	1	100.0%
0	1	*1972*	1	100.0%
0	1	*1973*	1	100.0%
1	2	*1974*	1	50.0%
0	2	*1975*	1	50.0%
0	2	*1976*	1	50.0%
0	2	*1977*	1	50.0%
0	2	*1978*	1	50.0%
0	2	*1979*	0	0.0%
1	3	*1980*	1	33.3%
3	6	*1981*	3	50.0%
1	7	*1982*	4	57.1%
0	7	*1983*	4	57.1%
0	7	*1984*	6	85.7%
0	7	*1985*	6	85.7%
0	7	*1986*	6	85.7%
1	8	*1987*	7	87.5%
0	8	*1988*	7	87.5%
1	9	*1989*	7	77.8%
2	11	*1990*	7	63.6%
0	11	*1991*	8	72.7%
0	11	*1992*	8	72.7%
0	11	*1993*	8	72.7%
1	12	*1994*	9	75.0%
2	14	*1995*	8	84.3%
3	17	*1996*	11	64.7%
3	20	*1997*	15	75.0%
3	23	*1998*	18	78.3%
4	27	*1999*	20	74.1%
11	38	*2000*	29	76.3%
4	42	*2001*	34	81.0%
3	45	*2002*	39	86.7%
4	49	*2003*	40	81.6%
6	55	*2004*	40	72.7%
Total Houses:	55	A	13	

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HOUSEHOLDS			LATRINES	
Total number of cells built in sub-village	*Cumulative totals per year*	*Year*	*Total number of Toilets in sub-Village*	*Sub-Village Coverage*
	0	*1960*		0.0%
	0	*1961*		0.0%
	0	*1962*		0.0%
	0	*1963*		0.0%
	0	*1964*		0.0%
	0	*1965*		0.0%
	0	*1966*		0.0%
	0	*1967*		0.0%
	0	*1968*		0.0%
	0	*1969*		0.0%
	0	*1970*		0.0%
	0	*1971*		0.0%
	0	*1972*		0.0%
	0	*1973*		0.0%
	0	*1974*		0.0%
	0	*1975*		0.0%
	0	*1976*		0.0%
	0	*1977*		0.0%
	0	*1978*		0.0%
	0	*1979*		0.0%
	0	*1980*		0.0%
	0	*1981*		0.0%
	0	*1982*		0.0%
	0	*1983*		0.0%
	0	*1984*		0.0%
	0	*1985*		0.0%
	0	*1986*		0.0%
	0	*1987*		0.0%
	0	*1988*		0.0%
	0	*1989*		0.0%
	0	*1990*		0.0%
	0	*1991*		0.0%
	0	*1992*		0.0%
	0	*1993*		0.0%
	0	*1994*		0.0%
	0	*1995*		0.0%
	0	*1996*		0.0%
	0	*1997*		0.0%
	0	*1998*		0.0%
	0	*1999*		0.0%
	0	*2000*		0.0%
	0	*2001*		0.0%
	0	*2002*		0.0%
	0	*2003*		0.0%
	0	*2004*		0.0%
Total Houses:		A		

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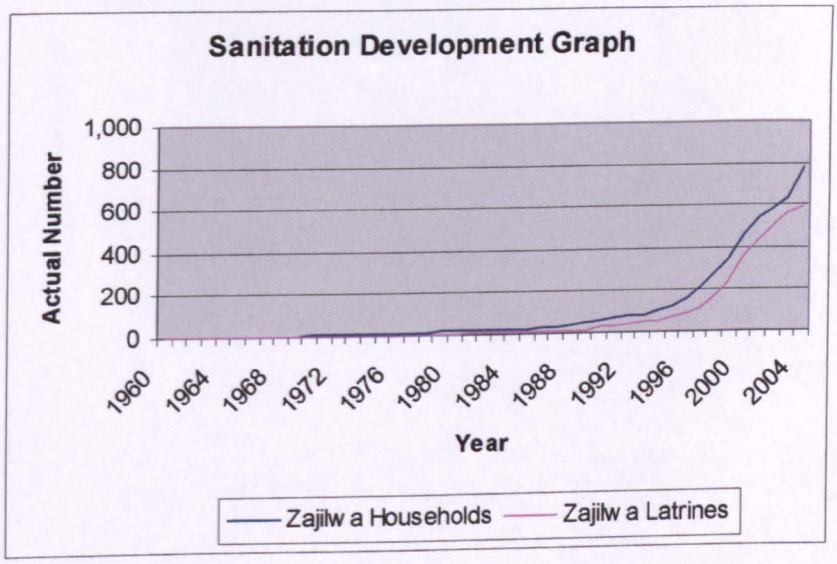
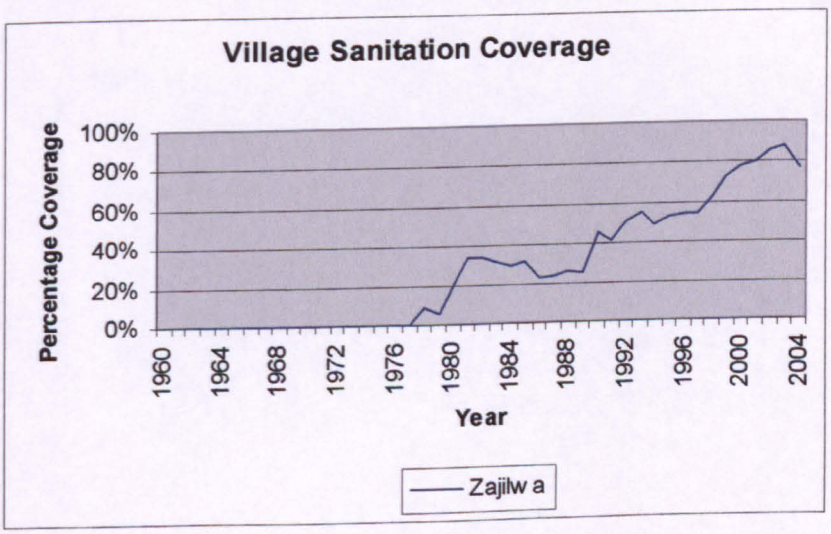
Appendix 4

Examples of latrine acquisition curves from Phase 1

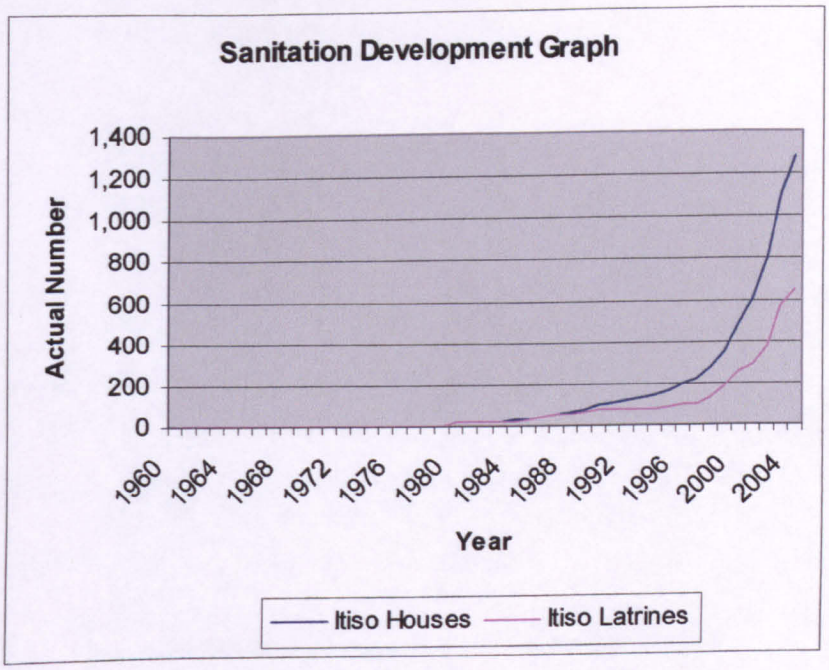
a) Zajilwa – houses and latrine numbers



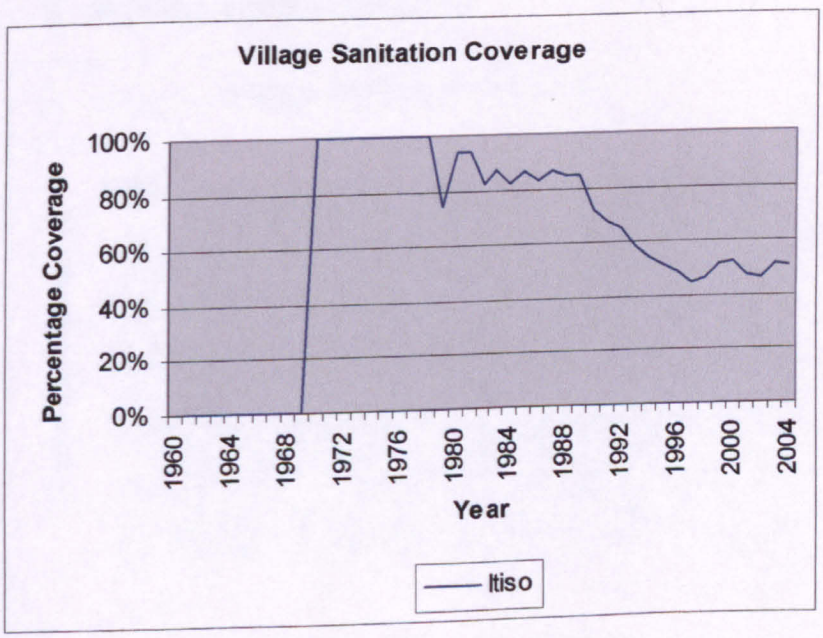
b) Zajilwa – latrine coverage



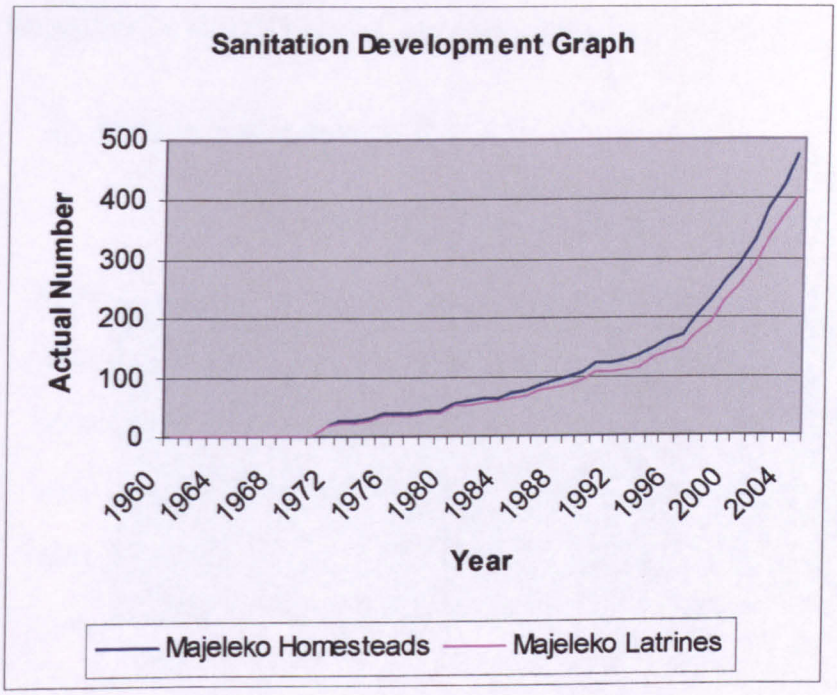
c) Itiso – houses and latrine numbers



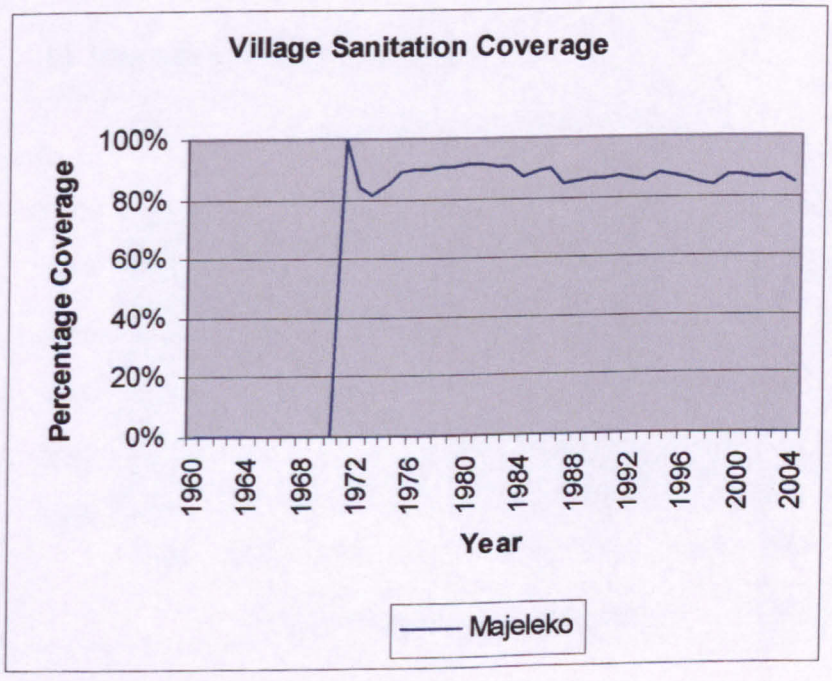
d) Itiso – latrine coverage



e) Majeleko – houses and latrine numbers



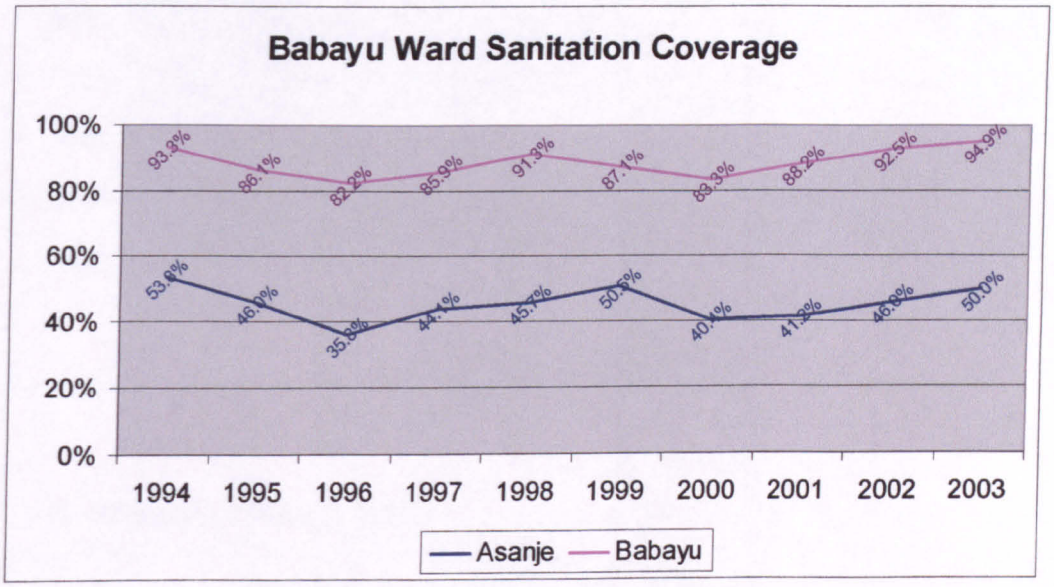
f) Majeleko – latrine coverage



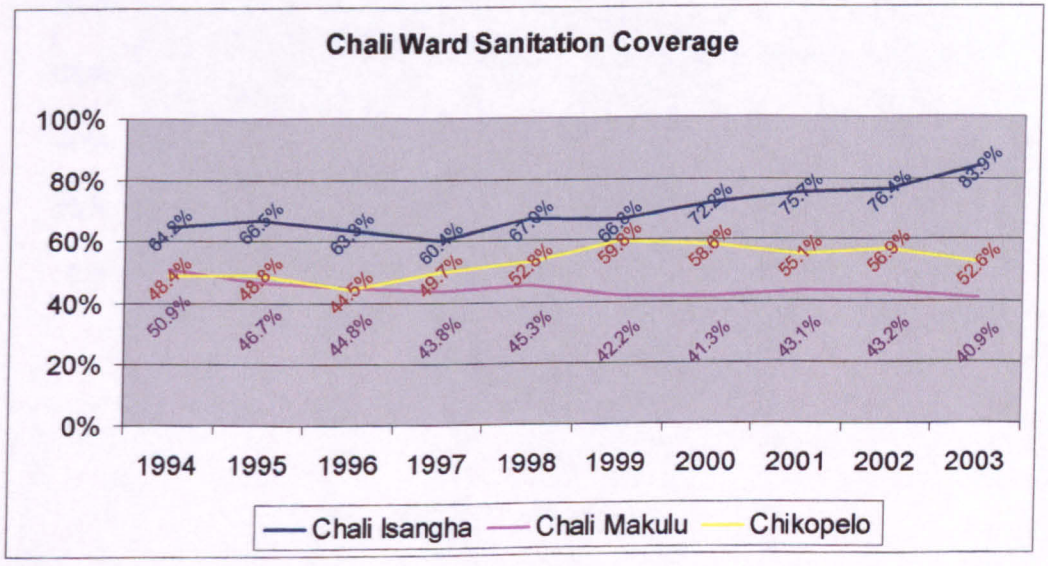
Appendix 5

Examples of 10-year latrine coverage graphs: villages within their ward

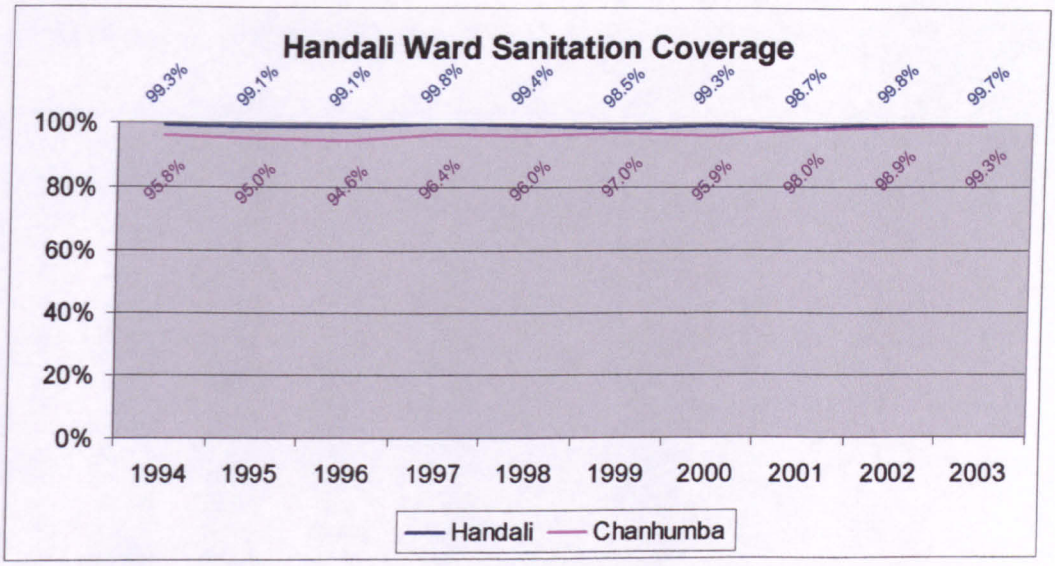
a) Villages of Babayu ward:



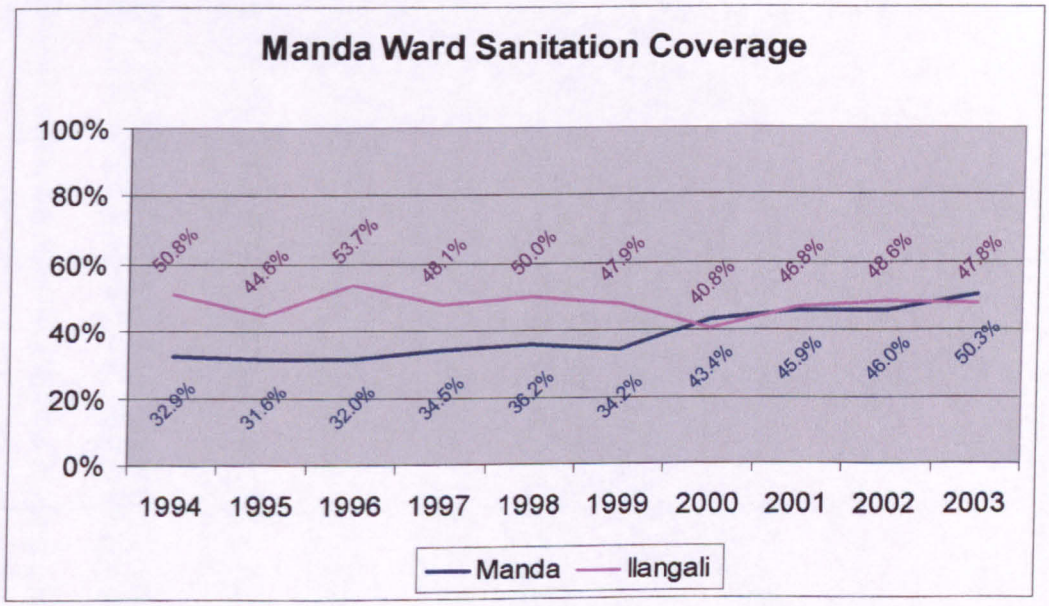
b) Villages of Chali ward:



c) Villages of Handali ward:



d) Villages of Manda ward:



Appendix 6

Dodoma Rural District village sanitation coverage trends and MDG targets

Village ID	Reported Coverage in 1990	MDG Target Coverage in 2015	10-yr Avg Coverage 1994 to 2003	10-yr Trendline Gradient	Regression analysis of trendline gradient		Projected coverage in 2008	Sustainabl'ty rating **2003** 1=sust 2=int 3=unsus.	Sustainabl'ty rating **2008** 1=sust 2=int 3=unsus.
					p value of gradient	Revised Gradient			
1	64.0%	82.0%	45.4%	-0.08%	0.897	0.00%	45.4%	3	3
2	92.2%	96.1%	88.5%	0.47%	0.359	0.00%	88.5%	1	1
3	38.6%	69.3%	51.5%	2.07%	0.0005	2.07%	71.1%	2	1
4	92.4%	96.2%	87.3%	-1.43%	9.96E-07	-1.43%	73.8%	3	3
5	62.8%	81.4%	68.0%	-1.10%	0.041	-1.10%	57.6%	3	3
6	93.9%	97.0%	92.5%	0.19%	0.079	0.00%	92.5%	1	1
7	66.7%	83.4%	69.6%	2.08%	0.0011	2.08%	89.4%	1	1
8	53.1%	76.6%	44.2%	-0.81%	0.0028	-0.81%	36.5%	3	3
9	85.7%	92.9%	89.1%	0.43%	0.171	0.00%	89.1%	1	1
10	82.7%	91.4%	89.6%	1.59%	3.89E-07	1.59%	100.0%	1	1
11	91.9%	96.0%	96.7%	0.45%	0.001	0.45%	100.0%	1	1
12	91.1%	95.6%	94.9%	0.51%	0.016	0.51%	99.7%	1	1
13	88.5%	94.3%	88.4%	-0.35%	0.219	0.00%	88.4%	1	1
14	63.6%	81.8%	68.1%	0.98%	0.031	0.98%	77.4%	1	1
15	66.7%	83.4%	70.9%	-0.33%	0.538	0.00%	70.9%	2	2
16	81.5%	90.8%	78.0%	0.78%	0.089	0.00%	78.0%	2	2
17	70.5%	85.3%	65.0%	0.19%	0.717	0.00%	65.0%	2	2
18	95.7%	97.9%	95.8%	-0.05%	0.773	0.00%	95.8%	1	1
19	79.9%	90.0%	87.1%	0.91%	0.002	0.91%	95.8%	1	1
20	60.8%	80.4%	52.7%	1.10%	0.032	1.10%	63.2%	2	1
21	65.7%	82.9%	76.0%	1.63%	0.106	0.00%	76.0%	2	2
22	88.4%	94.2%	88.9%	0.37%	0.025	0.37%	92.4%	1	1
23	89.6%	94.8%	90.2%	0.26%	0.151	0.00%	90.2%	1	1
24	78.3%	89.2%	91.1%	0.23%	0.0698	0.00%	91.1%	1	1
25	13.3%	56.7%	11.4%	1.64%	0.0025	1.64%	27.0%	2	2
26	100.0%	100.0%	90.9%	-1.11%	0.0014	-1.11%	80.4%	2	2
27	93.4%	96.7%	89.5%	-0.36%	0.1199	0.00%	89.5%	1	1
28	88.3%	94.2%	78.1%	0.04%	0.954	0.00%	78.1%	2	2
29	100.0%	100.0%	96.8%	0.21%	0.427	0.00%	96.8%	1	1
30	79.6%	89.8%	82.3%	0.71%	0.0017	0.71%	89.0%	1	1
31	78.6%	89.3%	65.1%	0.08%	0.7774	0.00%	65.1%	2	2
32	96.1%	98.1%	82.8%	-1.71%	0.0045	-1.71%	66.5%	3	3
33	97.5%	98.8%	99.3%	0.03%	0.628	0.00%	99.3%	1	1
34	87.9%	94.0%	81.8%	-0.53%	0.149	0.00%	81.8%	1	1
35	88.6%	94.3%	83.5%	-0.81%	0.0396	-0.81%	75.8%	3	3
36	90.7%	95.4%	83.2%	-0.58%	0.0263	-0.58%	77.7%	2	3
37	66.7%	83.4%	78.1%	0.72%	0.0009	0.72%	85.0%	1	1
38	65.5%	82.8%	60.9%	3.02%	0.0004	3.02%	89.6%	1	1
39	88.4%	94.2%	90.4%	0.31%	0.0961	0.00%	90.4%	1	1
40	80.5%	90.3%	82.1%	0.67%	0.186	0.00%	82.1%	1	1
41	87.8%	93.9%	89.8%	0.04%	0.806	0.00%	89.8%	1	1
42	76.1%	88.1%	79.0%	0.81%	0.101	0.00%	79.0%	2	2
43	76.1%	88.1%	64.8%	-1.75%	2.56E-08	-1.75%	48.2%	3	3
44	63.0%	81.5%	47.9%	-0.35%	0.398	0.00%	47.9%	3	3
45	66.7%	83.4%	58.0%	0.41%	0.3311	0.00%	58.0%	3	3
46	58.3%	79.2%	68.4%	0.60%	0.0476	0.60%	74.1%	1	1
47	78.2%	89.1%	76.9%	-0.43%	0.0364	-0.43%	72.8%	3	3
48	92.5%	96.3%	93.7%	-0.09%	0.227	0.00%	93.7%	1	1
49	84.2%	92.1%	89.7%	0.47%	0.004	0.47%	94.1%	1	1
50	72.1%	86.1%	49.7%	-0.21%	0.565	0.00%	49.7%	3	3

Village sanitation coverage trends and MDG targets continued:

Village ID	Reported Coverage in 1990	MDG Target Coverage in 2015	10-yr Avg Coverage 1994 to 2003	10-yr Trendline Gradient	Regression analysis of trendline gradient		Projected coverage in 2008	Sustainabl'ty rating **2003** 1=sust 2=int 3=unsus.	Sustainabl'ty rating **2008** 1=sust 2=int 3=unsus.
					p value of gradient	Revised Gradient			
51	74.6%	87.3%	82.1%	0.33%	0.154	0.00%	82.1%	1	1
52	76.7%	88.4%	78.2%	-1.09%	0.0004	-1.09%	67.8%	3	3
53	84.9%	92.5%	86.4%	0.53%	0.0114	0.53%	91.5%	1	1
54	80.0%	90.0%	68.1%	-1.29%	0.0009	-1.29%	55.9%	3	3
55	88.8%	94.4%	88.2%	-0.59%	0.0093	-0.59%	82.6%	2	2
56	96.6%	98.3%	81.6%	-3.67%	0.0005	-3.67%	46.8%	3	3
57	52.7%	76.4%	58.3%	0.55%	0.319	0.00%	58.3%	3	3
58	91.2%	95.6%	70.0%	-3.45%	2.88E-06	-3.45%	37.2%	3	3
59	90.0%	95.0%	92.0%	0.78%	0.0018	0.78%	99.5%	1	1
60	86.1%	93.1%	86.6%	0.04%	0.801	0.00%	86.6%	1	1
61	91.1%	95.6%	91.2%	0.67%	0.059	0.00%	91.2%	1	1
62	94.6%	97.3%	91.3%	0.66%	0.0001	0.66%	97.5%	1	1
63	84.8%	92.4%	85.4%	-0.66%	0.0036	-0.66%	79.1%	2	3
64	83.8%	91.9%	86.7%	0.42%	0.417	0.00%	86.7%	1	1
65	45.5%	72.8%	38.7%	2.13%	0.0001	2.13%	59.0%	2	2
66	45.3%	72.7%	61.3%	1.59%	0.0439	1.59%	76.4%	1	1
67	68.8%	84.4%	61.2%	0.02%	0.945	0.00%	61.2%	2	2
68	83.6%	91.8%	91.4%	-1.43%	0.0001	-1.43%	77.8%	2	3
69	74.1%	87.1%	73.0%	-0.26%	0.666	0.00%	73.0%	2	2
70	49.1%	74.6%	50.9%	-0.27%	0.367	0.00%	50.9%	3	3
71	66.1%	83.1%	66.6%	0.13%	0.68	0.00%	66.6%	2	2
72	65.7%	82.9%	63.6%	0.96%	0.0142	0.96%	72.7%	1	1
73	80.3%	90.2%	85.7%	-0.20%	0.48	0.00%	85.7%	1	1
74	90.2%	95.1%	94.1%	0.23%	0.0214	0.23%	96.4%	1	1
75	90.9%	95.5%	92.5%	0.53%	0.161	0.00%	92.5%	1	1
76	92.8%	96.4%	89.7%	0.72%	0.0028	0.72%	96.6%	1	1
77	61.2%	80.6%	61.2%	0.43%	0.002	0.43%	65.3%	1	1
78	95.7%	97.9%	97.4%	0.17%	0.046	0.17%	99.0%	1	1
79	72.3%	86.2%	81.4%	-1.03%	0.0002	-1.03%	71.7%	3	3
80	79.1%	89.6%	76.2%	-1.28%	2.99E-05	-1.28%	64.0%	3	3
81	61.5%	80.8%	74.7%	1.22%	0.0001	1.22%	86.3%	1	1
82	80.0%	90.0%	78.2%	0.81%	0.078	0.00%	78.2%	2	2
83	43.5%	71.8%	44.4%	0.66%	0.025	0.66%	50.7%	2	2
84	87.6%	93.8%	89.3%	0.38%	0.228	0.00%	89.3%	1	1
85	77.9%	89.0%	75.0%	0.49%	0.12	0.00%	75.0%	2	2
86	85.1%	92.6%	81.9%	3.07%	2.58E-05	3.07%	100.0%	1	1
87	91.2%	95.6%	94.1%	0.33%	0.069	0.00%	94.1%	1	1
88	92.0%	96.0%	90.5%	0.18%	0.05999	0.00%	90.5%	1	1
89	87.5%	93.8%	90.9%	0.32%	0.324	0.00%	90.9%	1	1
90	97.4%	98.7%	95.6%	-0.26%	0.005	-0.26%	93.1%	2	2
91	96.5%	98.3%	96.1%	-0.52%	0.098	0.00%	96.1%	1	1
92	62.1%	81.1%	56.3%	-1.08%	9.71E-06	-1.08%	46.0%	3	3
93	73.3%	86.7%	65.6%	0.03%	0.932	0.00%	65.6%	2	2
94	87.7%	93.9%	94.1%	0.25%	0.103	0.00%	94.1%	1	1
95	86.9%	93.5%	90.9%	0.40%	0.155	0.00%	90.9%	1	1
96	53.9%	77.0%	49.2%	0.32%	0.182	0.00%	49.2%	3	3
97	68.5%	84.3%	76.4%	1.29%	1.84E-05	1.29%	88.7%	1	1
98	43.4%	71.7%	59.0%	3.95%	0.0004	3.95%	96.5%	1	1
99	88.2%	94.1%	82.2%	1.01%	0.0016	1.01%	91.8%	1	1
100	72.5%	86.3%	73.6%	0.22%	0.04	0.22%	75.6%	1	1

Village sanitation coverage trends and MDG targets continued:

Village ID	Reported Coverage in 1990	MDG Target Coverage in 2015	10-yr Avg Coverage 1994 to 2003	10-yr Trendline Gradient	Regression analysis of trendline gradient		Projected coverage in 2008	Sustainabl'ty rating **2003** 1=sust,2=int 3=unsus.	Sustainabl'ty rating **2008** 1=sust,2=int 3=unsus.
					p value of gradient	Revised Gradient			
101	55.6%	77.8%	47.3%	-0.17%	0.722	0.00%	47.3%	3	3
102	44.8%	72.4%	45.9%	2.65%	0.0002	2.65%	71.1%	2	1
103	67.6%	83.8%	67.1%	0.12%	0.537	0.00%	67.1%	2	2
104	95.6%	97.8%	87.6%	-1.85%	0.0009	-1.85%	70.0%	3	3
105	83.1%	91.6%	86.0%	1.10%	0.006	1.10%	96.5%	1	1
106	53.4%	76.7%	51.1%	0.36%	0.235	0.00%	51.1%	3	3
107	93.7%	96.9%	80.6%	-1.39%	2.58E-06	-1.39%	67.4%	3	3
108	67.1%	83.6%	71.8%	2.16%	0.0032	2.16%	92.3%	1	1
109	75.6%	87.8%	50.3%	3.67%	1.25E-06	3.67%	85.2%	1	1
110	86.7%	93.4%	53.5%	-0.57%	0.193	0.00%	53.5%	3	3
111	50.0%	75.0%	67.7%	2.47%	0.0048	2.47%	91.1%	1	1
112	77.8%	88.9%	64.7%	0.46%	0.461	0.00%	64.7%	2	2
113	57.9%	79.0%	61.7%	1.14%	0.0008	1.14%	72.6%	1	1
114	75.3%	87.7%	60.3%	-0.65%	0.014	-0.65%	54.1%	3	3
115	96.6%	98.3%	94.6%	0.23%	0.312	0.00%	94.6%	1	1
116	46.2%	73.1%	68.0%	4.82%	8.03E-07	4.82%	100.0%	1	1
117	80.3%	90.2%	88.0%	0.88%	0.002	0.88%	96.4%	1	1
118	59.3%	79.7%	60.8%	0.04%	0.955	0.00%	60.8%	2	2

Appendix 7

Consent form for key-informant interviews in Phase 2

MWENDELEZO WA ZOEZI LA UTAFITI WA USAFI WA MAZINGIRA

Hii ni kuthibitiha ushiriki wa hiari katika majadiliano kuhusu utafiti wa usafi wa mazingira katika vijiji mbalimbali Wilayani Dodoma vijijini.
Kwa kuelewa umuhimu wa zoezi hili nashiriki majadiliano na timu ya watafiti kutoka WAMMA Dodoma vijijini na chuo cha afya na dawa kwa magonjwa ya nchi za joto (London School of Hygiene and Tropical Medicine).

Imesainiwa na:

Mimi…… , kutoka kijiji cha……

Sahihi yangu…… , tarehe……

Appendix 8

Phase 2 data capture tool

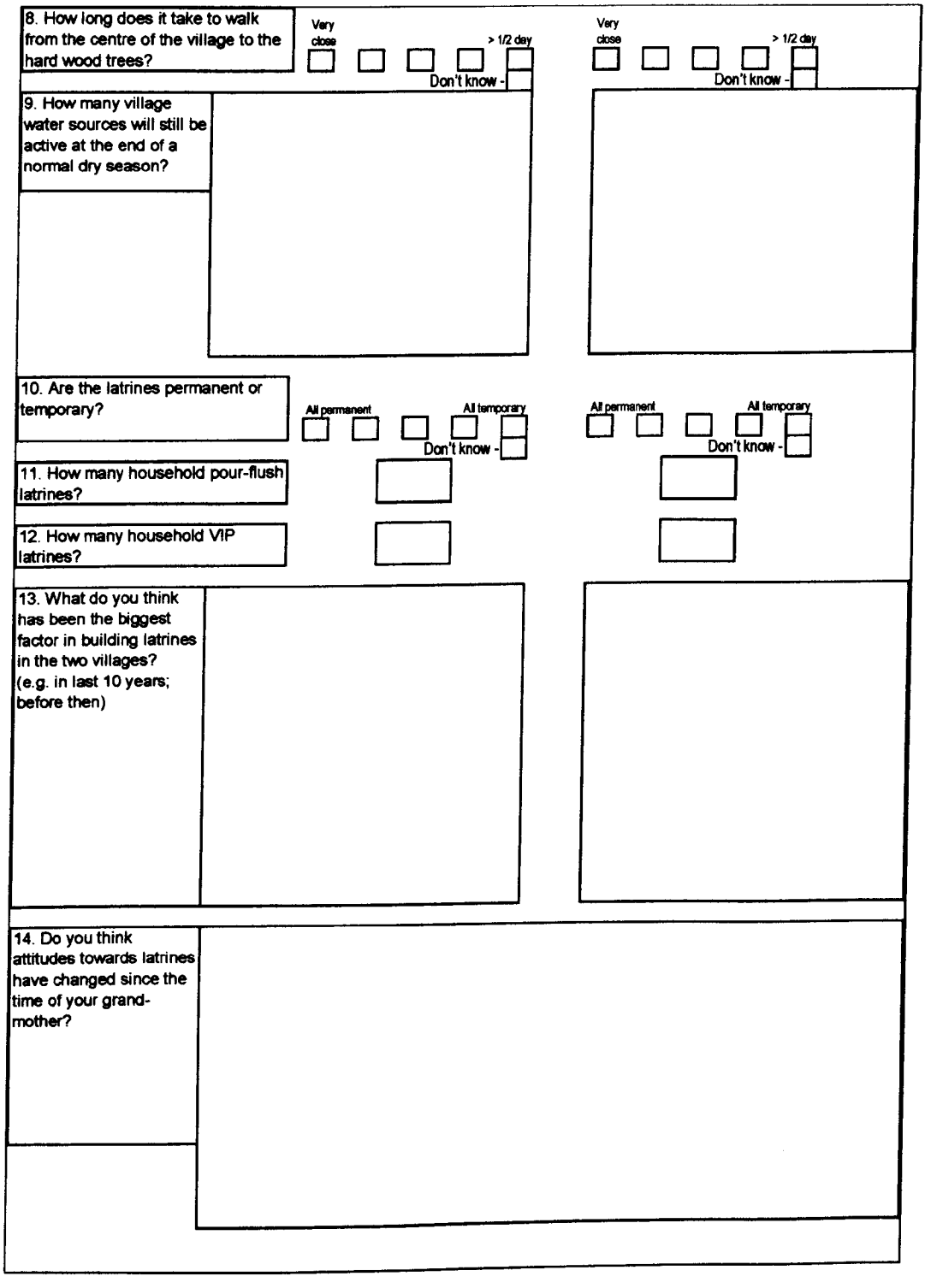
The following pages are copies of the data capture tool used during Phase 2.These pages were used to record the interview responses during the key-informant interviews.

Interviewee:	How you know villages:
Ward:	
Village:	Date:
Recorder:	Start time: / End time:
Village 1	Village 2

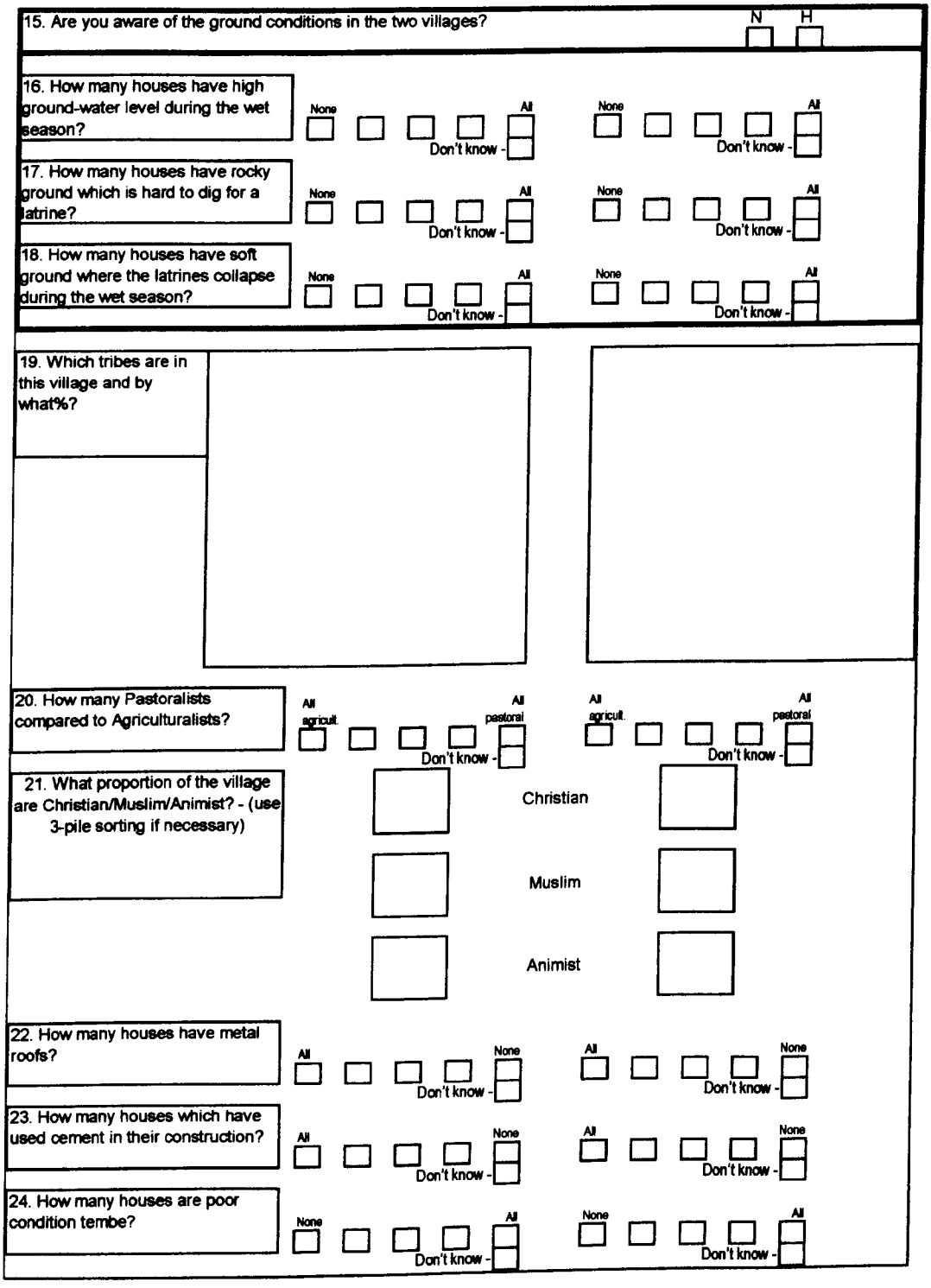
1. Review Graphs & ask for brief comparison of the selected villages to explain possible differences		
2. What are the most important sources of restriction to development in these villages:		

	Village 1	Village 2
3. How good is the leadership in each village?	Very Good ☐ ☐ ☐ ☐ Very Poor ☐ Don't know - ☐	Very Good ☐ ☐ ☐ ☐ Very Poor ☐ Don't know - ☐
4. How open is the village to new ideas or developments?	Very Open ☐ ☐ ☐ ☐ Very Closed ☐ Don't know - ☐	Very Open ☐ ☐ ☐ ☐ Very Closed ☐ Don't know - ☐
5. How much "bush" is in the village?	None ☐ ☐ ☐ ☐ All ☐ Don't know - ☐	None ☐ ☐ ☐ ☐ All ☐ Don't know - ☐
6. How many houses are close together?	All close ☐ ☐ ☐ ☐ All spread ☐ Don't know - ☐	All close ☐ ☐ ☐ ☐ All spread ☐ Don't know - ☐
7. How remote is the village?	It is a centre ☐ ☐ ☐ ☐ Very remote ☐ Don't know - ☐	It is a centre ☐ ☐ ☐ ☐ Very remote ☐ Don't know - ☐

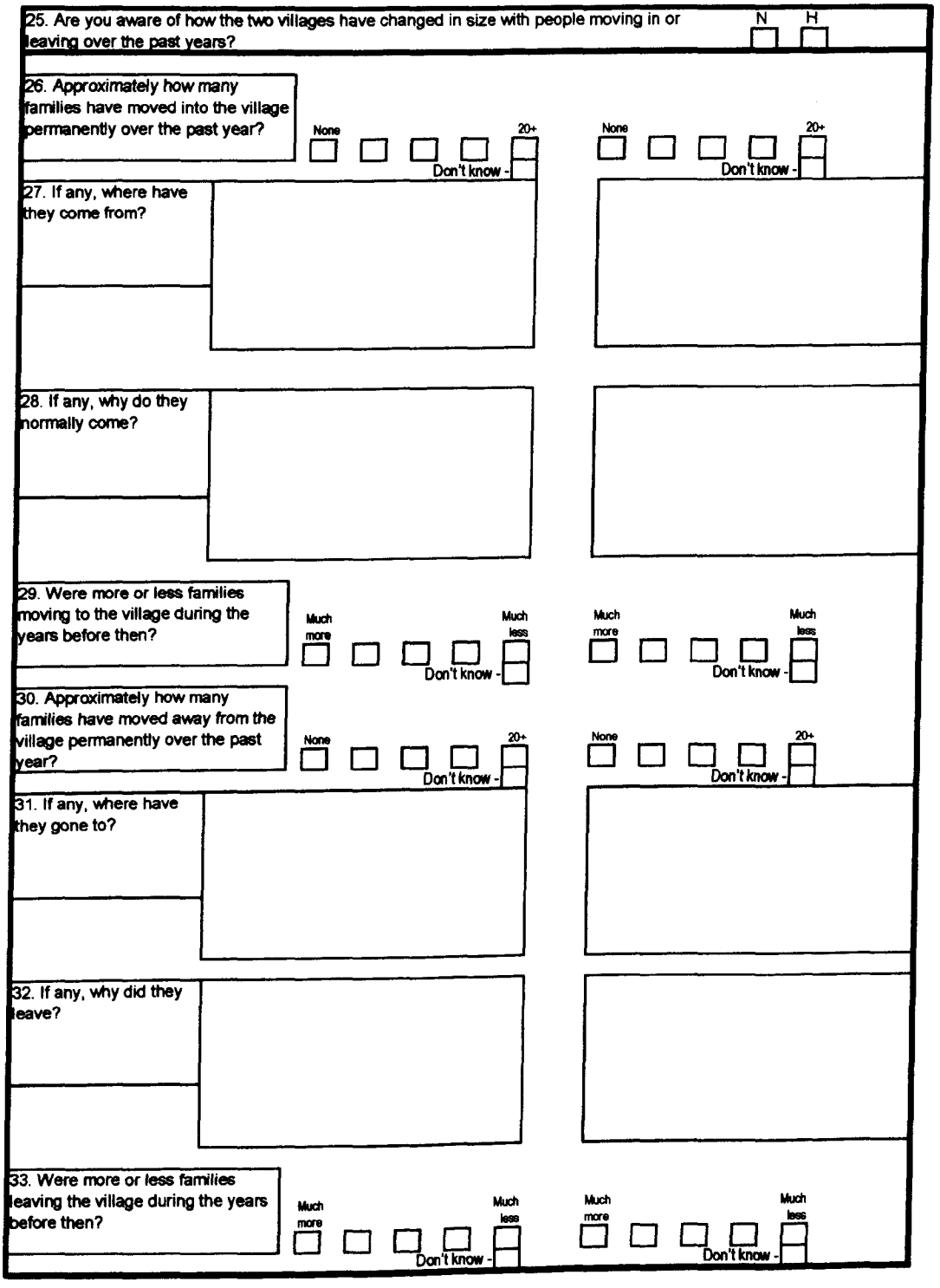
Phase 2 data capture tool continued:



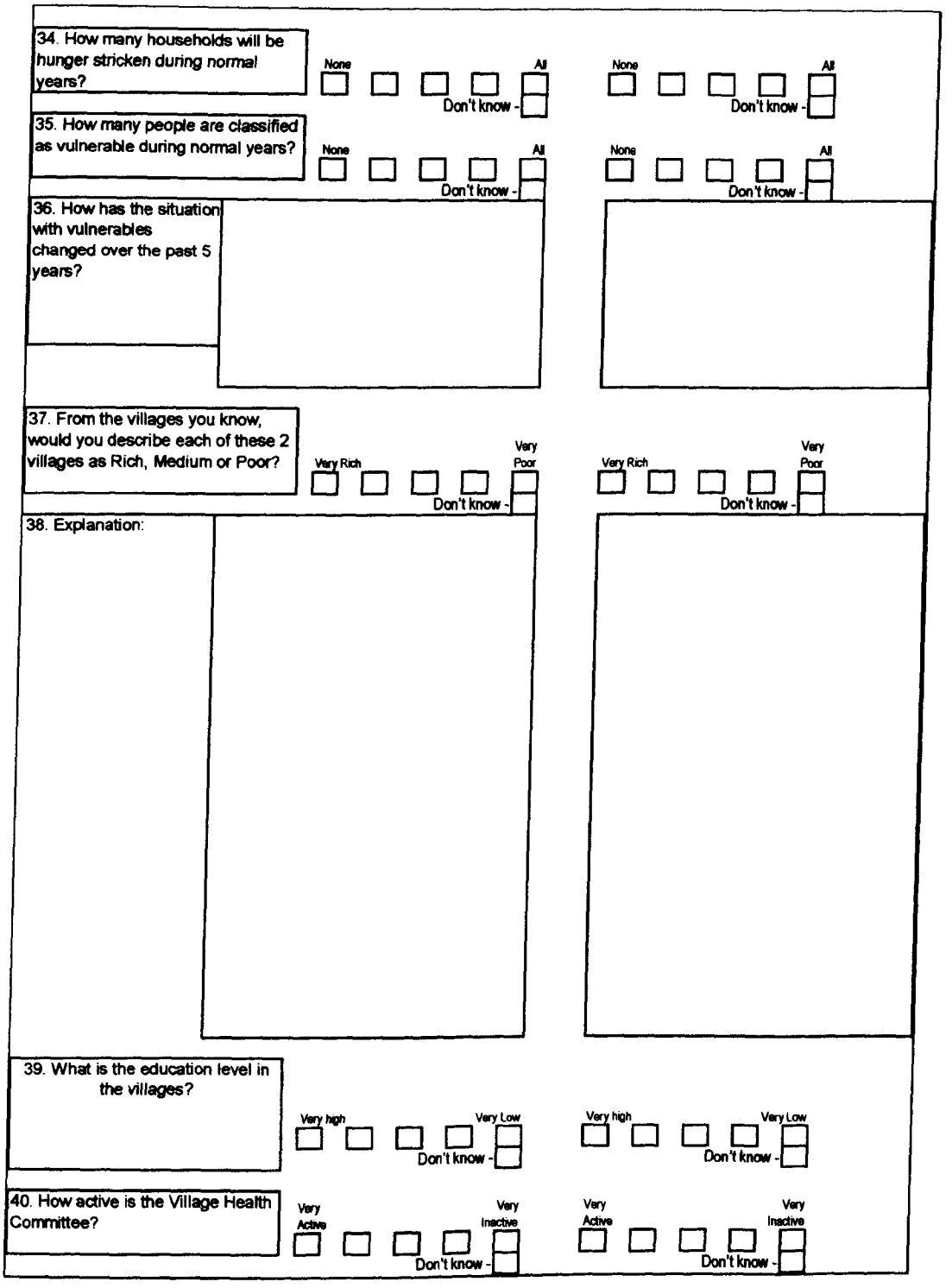
Phase 2 data capture tool continued:



Phase 2 data capture tool continued:



Phase 2 data capture tool continued:



Phase 2 data capture tool continued:

41. What is the total amount of money raised from fines (all sources) last year?		
42. Approximately what proportion of this relates to toilets?		
43. In what ways is this different to the situation 5 years ago?		
44. How many livestock were in the village last year?	Cattle	Cattle
	Goats	Goats
	Sheep	Sheep
	Pigs	Pigs
45. In what ways is this different to the situation 5 years ago?		
46. What is the agricultural production in the villages during a normal year?		
47. Is this agricultural production generally increasing or decreasing year by year?		

Phase 2 data capture tool continued:

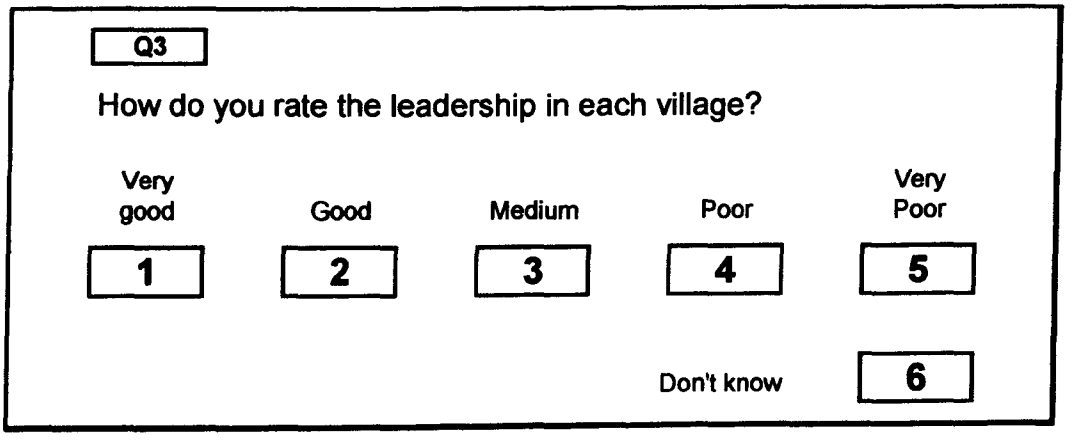
:

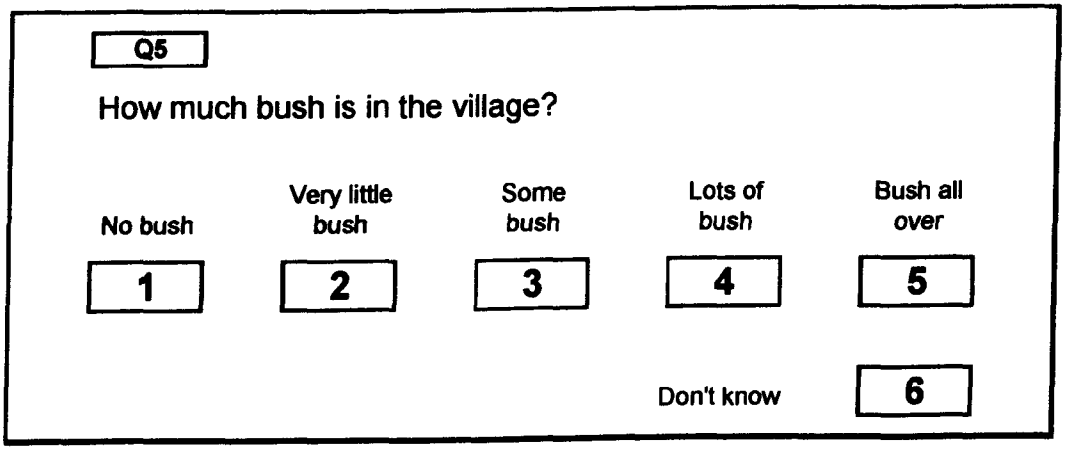
48. What percentage of adults in the village are illiterate / not schooled?		
49. How does this compare to the situation 5 years ago?		
50. What percentage of children in the village are currently not attending school?		
51. How does this compare to the situation 5 years ago?		
52. How many children passed the entrance exam for secondary school last year?		
53. Of those children, how many are currently attending secondary school?		
54. How does this compare to the situation 5 years ago?		

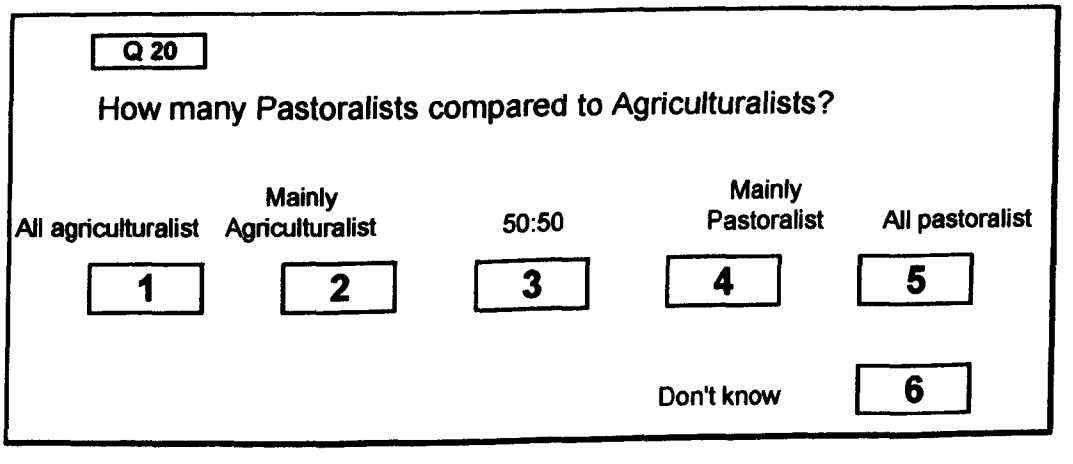
Appendix 9

Examples of the rated response options offered to interviewees

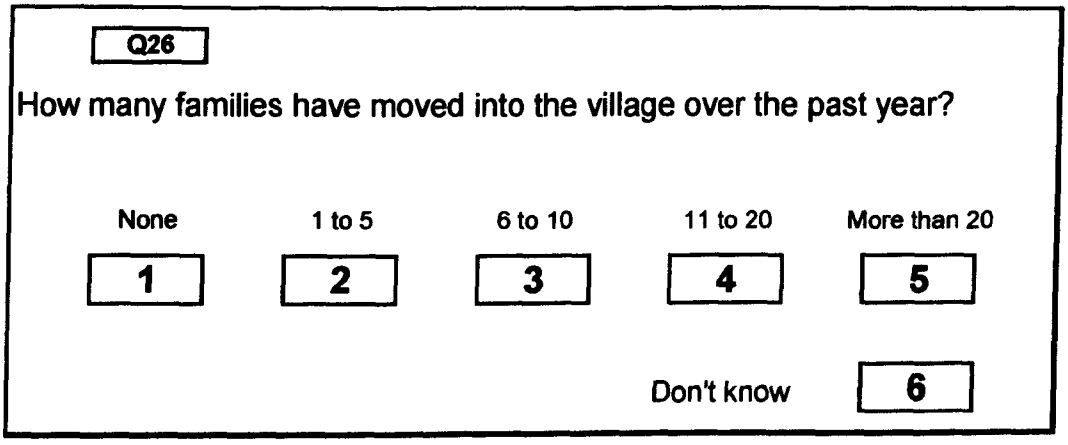
The following are sample English versions of a few of the response options offered during the Phase 2 interviews.

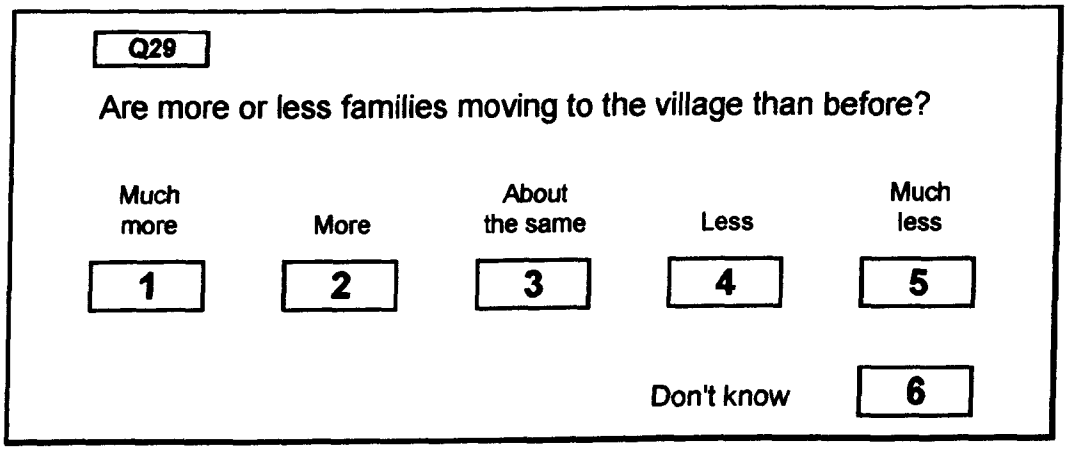






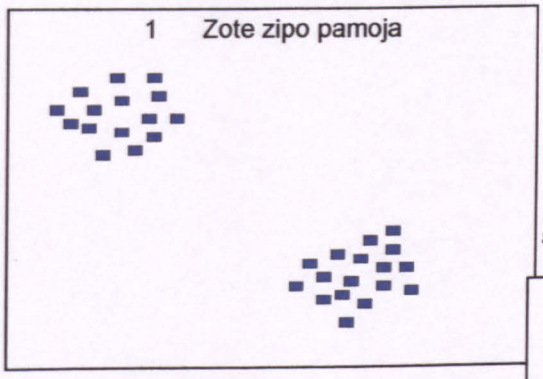
Examples of the rated response options continued:





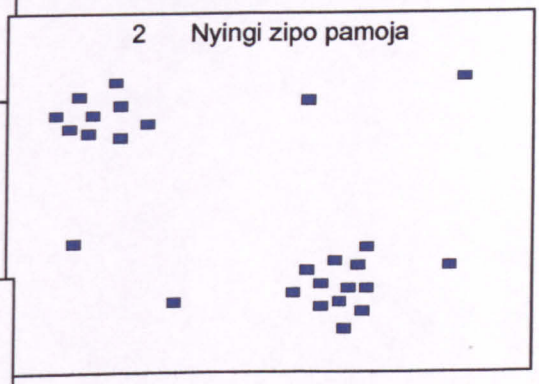
Examples of the rated response options continued:

Question 6 required some addional guidance to maintain understanding across villages, so the following diagrams were used in consideration of the spread of houses within the village. Each diagram was A4 size and on separate pages which were laid out for easy comparison.



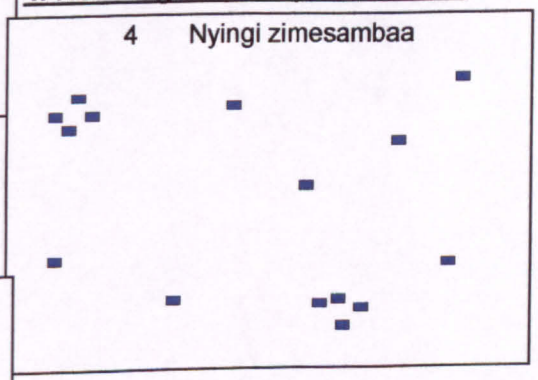
1. Housing is all close together

2. Housing is mostly close together



3. Housing is half close/half spread

4. Housing is mostly spread out



5. Housing is all spread out

Appendix 10

Dodoma Rural District village characteristics

The following pages contain tabulated data collected during Phase 1 on each of the 118 villages. Blanks in the table represent missing data.

Listing of village characteristics as recorded during Phase 1

Village ID	Admin Level Ward = 1 Divn = 2	Accepted estimate of number of houses	Number of houses with non-ag. income	Inter-ventions before 2004	Shared toilets reported in 2004	TBAs	Trad. Healers	Mosques	Churches	Clinic/ Dispensary	Community Centre	Organised Market	Police Post	Primary School	Secondry School
1		321	11	1	20.6%	2	2	0	5	0	0	0	0	1	0
2	1	446	18	0	27.8%	8	9	1	8	1	0	0	0	1	0
3		648	176	0	16.8%	2	4	0	3	0	0	0	0	1	0
4	2	1654			19.1%										
5		299	7	0	11.4%	3	4	0	4	1	0	0	0	1	0
6	1	1083	197	2	28.0%	3	2	0	9	1	0	1	0	3	0
7	1	399	95	2	29.3%	2	4	1	3	0	0	0	0	1	0
8		585	104	2	22.7%	1	1	0	6	0	0	0	0	1	0
9		775		3	42.7%	10	10	0	9	1	0	0	0	2	0
10		1183		3	17.5%	8	7	1	11	1	1	0	1	3	1
11		271	5	1	42.4%	2	3	0	4	0	0	0	0	1	2
12		523	19	2	30.5%					1					0
13	1	960	6	3	43.0%			0			0	0	0	1	
14		786	20	0	78.8%					1					0
15		322	10	0	15.5%	3	2	0	5	0	0	0	0	1	0
16		301	25	1	33.6%	4	4	0	4	0	0	0	0	1	0
17		1170	149	0	40.8%	2	6	0	4	1	0	0	0	1	0
18		678	215	1	5.2%	4	2	0	5	0	0	0	0	2	0
19	1	473	18	2	15.9%	3	3	0	3	1	0	0	0	1	0
20		332			32.9%										
21		1159	25	2	5.5%	7	6	1	3	1	0	0	0	1	0
22		704	51	1	47.2%	5	7	0	6	0	0	0	0	2	0
23		563	38	0	43.5%	6	4	0	10	1	0	0	0	1	0
24		402	8	3	31.1%	5	1	0	5	0	0	0	0	1	0
25	1	635			12.8%										
26	2	684	265	3	44.5%	4	3	0	5	1	1	1	1	1	0
27		269	150	1	8.4%	6	5	0	5	0	0	0	0	1	0
28		227	12	1	20.7%	20	5	1	3	1	0	0	0	1	0
29		518	20	3	4.5%	7	3	0	4	0	0	0	0	1	0
30	1	1204	42	1	40.0%	50	6	1	12	1	1	1	1	2	1
31	1	273	30	0	57.5%	12	3	1	3	1	0	1	0	1	0
32		524	31	2	28.3%	9	3	2	6	0	0	0	0	1	0
33	1	651	20	1	50.9%	8	4	1	9	1	0	1	0	1	1

Listing of village characteristics as recorded during Phase 1 continued:

Village ID	Admin Level Ward = 1 Divn = 2	Accepted estimate of number of houses	Number of houses with non-ag. income	Inter-ventions before 2004	Shared toilets reported in 2004	TBAs	Trad. Healers	Mosques	Churches	Clinic/ Disp'nsary	Commnity Centre	Organised Market	Police Post	Primary School	Second'ry School
34	1	823	43	2	12.5%	3	6	1		1	0	1	1	1	1
35		230	14	1	42.6%	1	6	1	5	1	0	0	0	1	0
36	1	907	32	1	34.0%	5	11	0	7	1	1	1	0	2	0
37	1	1580			39.1%										
38	1	323	16	2	26.5%	2	3	0	3	0	0	0	0	1	0
39	1	789	14	2	48.1%	6	4	0	9	1	1	0	0	2	0
40		573		2	60.0%	8		1	3	0	0	0	0	1	0
41	1	1388	20	0	31.4%	12	12	0	10	1	0	0	0	1	0
42		717	18	0	23.9%			0		0	0	0	0	1	0
43	1	654	50	0	44.2%	4	5	0	11	1	0	0	0	1	0
44		301	26	0	33.9%	4	15	0	3	0	0	0	0	2	0
45		295	8	2	28.1%	3	4	0	2	0	0	1	0	1	0
46	1	1157			16.0%										
47		740	54	2	19.2%	10	8	0	8	0	0	0	0	3	0
48	1	1596		1	24.2%	6	3	1	4	1	0	1	0	2	0
49		1017			39.7%										
50	2	1734	320	1	21.7%	0		1		1	0	0	0	3	0
51		962	23	0	41.0%	20	4	3	8	1	0	1	0	3	0
52		812	180	0	30.5%			0		1	1	0	0	1	0
53	1	1572	70	0	27.4%			1	6	1	0	1	1	3	1
54		617	17	1	16.7%	4	12	1	5	0	0	0	0	2	0
55	1	632	9	1	15.2%										
56		1182	5	1	52.7%	6	4	0	3	0	0	0	0	1	0
57		348	5	1	28.2%	5	5	0	2	0	0	0	0	1	0
58		209		1	9.9%	0	0	0	2	0	0	0	0	1	0
59		771	30	0	23.6%	2	1	1	7	0	0	0	0	1	1
60	1	489	16	0	41.4%	7	4	1	9	1	0	0	0	2	0
61	1	978		3	34.2%	3	7	1	4	1	0	1	0	1	0
62	2	1573			11.9%										
63		403	62	0	40.9%			0	10	0	0	0	0	1	0
64	1	1113	27	1	73.3%	10	10	0	11	1	1	0	0	2	0
65	1	754	46	0	16.8%	5	6	1	5	0	0	0	0	1	0
66		414		2	40.8%	13	8	1	6	1	0	0	0	1	0

Listing of village characteristics as recorded during Phase 1 continued:

Village ID	Admin Level Ward = 1 Divn = 2	Accepted estimate of number of houses	Number of houses with non-ag. income	Inter-ventions before 2004	Shared toilets reported in 2004	TBAs	Trad. Healers	Mosques	Churches	Clinic/ Disp'nsary	Community Centre	Organised Market	Police Post	Primary School	Second'ry School
67	1	924	77	1	49.4%	5	1	0	4	0	0	0	0	2	0
68		296	0	0	41.1%	0	2	1	6	0	0	0	0	1	0
69	1	766	19	2	40.8%	10	2	1	11	1	0	0	0	1	0
70		1117	21	0	21.4%	12	7	0	12	1	0	0	0	2	0
71		774			47.1%										
72		496	19	0	24.6%	13	4	0	6	0	0	0	0	1	0
73		653	24	0	44.4%	14	6	0	4	0	0	0	0	1	0
74		712	52	0	40.5%	8	0	0	5	0	0	0	0	1	0
75		1052	79	1	79.5%	8	6	0	2	1	0	0	0	1	0
76		1493	15	1	5.2%	9	3	1	5	1	1	0	0	2	1
77	1	926	134	0	33.2%	9	8	0	4	1	0	1	0	1	0
78	1	658	18	0	11.8%	0	0	0	6	0	0	1	0	1	0
79		559	132	1	9.7%	0	0	0	3	1	0	0	0	1	0
80	1	937		0	24.4%	0	0	0	6	1	0	0	0	1	0
81	1	913	8	2	43.4%	17	4	0	4	0	0	0	0	1	0
82		637		2	64.2%			0		1	0	0	0	1	0
83	1	1269		3	46.3%			0	6	1	0	1	0	3	0
84	1	921	141	0	28.6%	3	4	1	10	1	0	3	0	1	0
85	1	534	28	1	16.5%	18	6	0	4	1	0	0	0	1	0
86	1	569	12	3	27.0%	5	6	0	3	1	1	1	1	1	0
87	2	459	62	2	10.9%	6	3	1	8	1	0	1	0	1	1
88	2	2117	86	0	35.6%	3	2	0	10	1	1	1	0	2	0
89	1	2031	1075	1	20.2%		5	1	12	1	0	1	1	3	1
90	2	664		2	18.6%					1	0	1	0	1	1
91		894	10	1	40.2%	4	2	0	6	1	0	0	0	1	0
92		426	5	1	47.8%	7	2	0	3	0	0	0	0	1	0
93		1145	26	1	23.3%	5	6	1	3	0	0	0	0	1	0
94		567		3	30.7%	5	3	0	3	0	0	0	0	1	0
95		625	12	3	21.9%	8	1	0	9	0	0	0	0	1	0
96		588		1	34.0%			0	3	0	0	0	0	2	0
97		1156	27	0	29.3%	10	10	0	11	1	0	1	0	1	0
98		1078	16	2	13.4%	10	3	0		0	0	0	0	1	0
99		425	6	1	28.7%										

Listing of village characteristics as recorded during Phase 1:

Village ID	Admin Level Ward = 1 Divn = 2	Accepted estimate of number of houses	Number of houses with non-ag. income	Inter-ventions before 2004	Shared toilets reported in 2004	TBAs	Trad. Healers	Mosques	Churches	Clinic/ Disp'nsary	Comm'nity Centre	Organised Market	Police Post	Primary School	Second'ry School
100		850		0	33.8%	10	5	0	8	1	0	1	0	1	0
101		348	3	0	16.2%	4	1	0	1	0	0	0	0	1	0
102		350	20	3	43.1%	4	3	0	3	0	0	0	0	1	0
103	1	456		1	48.0%	5	2	0	2	1	0	0	0	1	0
104		1229		1	35.8%			0		1	0	1	0	2	0
105		343		0	0.0%	7	5	0	10	0	0	0	0	1	0
106	1	336	5	1	20.2%	3	5	0	3	1	0	0	0	1	0
107		537	23	1	19.9%	4	3	0	4	1	0	0	0	1	0
108		582	0	1	50.1%				4	1	0	0	0	1	0
109	1	770	50	2	9.9%	12	4	2	12	1	0	1	0	3	0
110		278	35	0	15.5%	15	5	1	3	0	0	0	0	1	0
111		195	3	0	78.8%	9	2	0	2	0	0	0	0	1	0
112		153	20	1	13.1%	4	3	0	3	0	0	0	0	1	0
113		532	3	2	26.8%	3	2	0	2	0	0	0	0	1	0
114		340	40	0	0.0%	3	2	0	2	0	0	0	0	1	0
115		474			31.3%										
116		835	23	1	9.2%	5	2	1	5	0	0	1	0	1	0
117	1	406		2	19.6%			1	4	1	0	0	0	1	0
118		695		1	33.7%	8	5	1	5	0	0	0	0	1	0

Appendix 11

Phase 2 results

The individual responses to each of the various quantative questions were tabulated by village and sustainability category. The responses have been listed below in the same order used in chapter 7.

Physical factor : Village soil/ground conditions *(ref. section 7.3.2)*

Hard/rocky ground

The five-point scale attached to this question gave the options:

1. No rocky areas
2. Some rocky areas
3. About half rocky
4. Mostly rocky
5. All rocky ground

The results of the three interviews (for each ward) were recorded by the two data recorders, and were later checked against each other. Each interview produced a value for each of two villages within the same ward, and the median value was taken to represent the most likely value for each village. Thus, the following were the results for each of the villages with blanks representing the "don't know" response from respective interviewees:

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5		1		**1**	7	1	1	1	**1**
8	1	2	1	**1**	29	1	1	1	**1**
45	1	1	1	**1**	30	2	2	1	**2**
50	1	1	2	**1**	34	1	1	1	**1**
54	1	1	2	**1**	40	2	2	1	**2**
56		1		**1**	61	1	2	1	**1**
70	2	2	1	**2**	74	2	2	1	**2**
110	1	1	2	**1**	108	1	1	1	**1**
Median				***1***	***Median***				***1***

Comparison with bonus villages					
Unsustained	*1*	*Intermediate*	*1*	*Sustained*	*1*

Soft/unstable ground 1= no soft ground; 5= soft ground everywhere

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	2	2	2	**2**	7	2	2	2	**2**
8	2	1	1	**1**	29	1	2	1	**1**
45	1	1	1	**1**	30	1	1	1	**1**
50	2	2	1	**2**	34	1	1	2	**1**
54	1	1	2	**1**	40	1	1	1	**1**
56	2	2	2	**2**	61	1	1	1	**1**
70	2	1	1	**1**	74	2	1	1	**1**
110	2	2	1	**2**	108	1	1	1	**1**
Median				***1.5***	***Median***				***1***
Comparison with bonus villages									
Unsustained	*1*		*Intermediate*	*2*		*Sustained*		*1*	

High GWT 1= none; 5= all over village

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	1	1	1	**1**	7	1	2	1	**1**
8	1	1	1	**1**	29	1	1	1	**1**
45	1	1	1	**1**	30	1	1	1	**1**
50	1	1	1	**1**	34	1	1	1	**1**
54	1	1	1	**1**	40	1	1	1	**1**
56	1	1		**1**	61	1	1	1	**1**
70	1	1	1	**1**	74	1	1	1	**1**
110	1	1	1	**1**	108	1	1	1	**1**
Median				***1***	***Median***				***1***
Comparison with bonus villages									
Unsustained	*1*		*Intermediate*	*1*		*Sustained*		*1*	

Physical factor : Village settlement pattern *(ref. 7.3.3)*

Proximity of housing 1= all houses close; 5= all houses spread out

This question was accompanied with a series of five drawings detailing the range of housing layouts to be considered (see appendix 9). The results obtained were as follows:

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	2	3	2	**2**	7	2	1	1	**1**
8	3	3	2	**3**	29	2	2	3	**2**
45	4	5	4	**4**	30	2	3	2	**2**
50	3	3	3	**3**	34	3	2	2	**2**
54	4	5	3	**4**	40	3	2	3	**3**
56	3	3	4	**3**	61	4	3	4	**4**
70	4	2	3	**3**	74	2	2	2	**2**
110	4	4	4	**4**	108	2	3	3	**3**
Median				***3***	***Median***				***2***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*5*	*Sustained*	*1*				

Level of bush coverage 1= no bush; 5= bush everywhere

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	3	3	1	**3**	7	3	1	3	**3**
8	4	3	3	**3**	29	3	3	2	**3**
45	4	2	4	**4**	30	3	3	3	**3**
50	3	4	3	**3**	34	4	3	3	**3**
54	2	2	4	**2**	40	3	3	3	**3**
56	3	4	5	**4**	61	4	2	3	**3**
70	3	4	3	**3**	74	1	3	2	**2**
110	4	5	4	**4**	108	3	4	3	**3**
Median				***3***	***Median***				***3***
Comparison with bonus villages									
Unsustained	*2*	*Intermediate*	*5*	*Sustained*	*3*				

Remoteness 1= village is a centre; 5= village is remote

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	2	3	1	**2**	7	2	1	1	**1**
8	3	3	2	**3**	29	2	2	1	**2**
45	4	5	3	**4**	30	1	1	1	**1**
50	1	2	1	**1**	34	1	1	1	**1**
54	4	4	4	**4**	40	2	2	2	**2**
56	1	3	2	**2**	61	1	1	1	**1**
70	1	2	3	**2**	74	1	3	1	**1**
110	3	3	3	**3**	108	3	4	2	**3**
Median				***2.5***	***Median***				***1***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*5*	*Sustained*	*1*				

Physical factor : Access to materials and technologies *(ref. 7.3.5)*

Number of functioning improved water sources at the end of the dry season

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	0	0	0	**0**	7	0	0	0	**0**
8	0	0	0	**0**	29	3	1	0	**1**
45	0	0	0	**0**	30	5	6	2	**5**
50	7	1	2	**2**	34	2	1	1	**1**
54	0	0	0	**0**	40	1	3	2	**2**
56	2	4	1	**2**	61	2	0	1	**1**
70	2	2	6	**2**	74	1	1	3	**1**
110	2	1	1	**1**	108	1	1	1	**1**
Median				***0.5***	***Median***				***1***
Comparison with bonus villages									
Unsustained	*1*	*Intermediate*	*1*	*Sustained*	*1*				

VIP latrines

Unsustained sanitation villages					Sustained sanitation villages				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	0	1.0%		**0.5%**	7	0.3%		2.5%	**1.4%**
8	0		0	**0**	29	0	0	0	**0**
45	0	0	0	**0**	30	0	5.0%	0	**0**
50	3.5%	3.0%	4.5%	**3.5%**	34	0	5.0%		**2.5%**
54	0	0	0	**0**	40	0	1.0%	0	**0**
56	0	3.0%		**1.5%**	61	0	2%	0	**0**
70	0	0	0	**0**	74	0	0	0	**0**
110	0.5%	1.0%	1.4%	**1.0%**	108	0	0	1.7%	**0**
Median				**0.25%**	**Median**				**0**
Comparison with bonus villages									
Unsustained	*0*	*Intermediate*	*0*	*Sustained*	*0.6%*				

Pour-flush toilets

Unsustained sanitation villages					Sustained sanitation villages				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	0.3%	2.0%		**0.7%**	7	0	0	2.5%	**0**
8	0	0	0	**0**	29	20.0%	0.19%	0	**0.19%**
45	0	0	0	**0**	30	12.5%	20.0%		**16.3%**
50	10.0%	0.5%	40.0%	**10%**	34	2.4%	10.0%	0.2%	**2.4%**
54	0	0		**0**	40	5.0%	3.0%		**4.0%**
56	0.4%	2.0%		**1.2%**	61	15.0%	5.0%	0.5%	**5.0%**
70	0	0	10%	**0**	74	0	0	25.0%	**0**
110	1.5%	0	0.7%	**0.7%**	108	0	0	0	**0**
Median				**0.35%**	**Median**				**1.3%**
Comparison with bonus villages									
Unsustained	*0*	*Intermediate*	*0*	*Sustained*	*0.9%*				

It should also be noted that there was quite a range of results reported within some of the villages e.g. *village 50* values ranged from 0.5% to 40%. This could imply that the concept was awkward for the interviewees to grasp with any degree of assuredness, or that some were more familiar with the villages than others.

Distance to hard-wood 1= very close; 5= more than half a days walk

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	3	1	4	**3**	7	2	3	3	**3**
8	1	1	4	**1**	29	3	3	1	**3**
45	1	1	2	**1**	30	2	3	4	**3**
50	4	4	4	**4**	34	3	4	4	**4**
54	3	2	3	**3**	40	2	2	4	**2**
56	2	1	4	**2**	61	3	2	1	**2**
70	4	5	3	**4**	74	4	3	3	**3**
110	3	4	3	**3**	108	3	1	3	**3**
Median				***3***	***Median***				***3***
Comparison with bonus villages									
Unsustained	*1*	*Intermediate*	*1*	*Sustained*	*4*				

Houses with metal roofs 1= all; 5=none

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	4	4	4	**4**	7	3	2	3	**3**
8	4	3	4	**4**	29	4	4	4	**4**
45	4	4	4	**4**	30	2	2		**2**
50	4	4	4	**4**	34	2	2	2	**2**
54	4	3	4	**4**	40	4	4		**4**
56	4	4	4	**4**	61	4	4	4	**4**
70	2	2	4	**2**	74	2	3	4	**3**
110	4	4	4	**4**	108	3	3	4	**3**
Median				***4***	***Median***				***3***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*4*	*Sustained*	*2*				

Houses using cement 1= all; 5= none

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village**	Int. 1	Int. 2	Int. 3	**Median**
5	4	4	4	**4**	7	3	3	3	**3**
8	4	4	4	**4**	29	4	4	4	**4**
45	5	5	5	**5**	30	4	4		**4**
50	4	4	4	**4**	34	2	2	4	**2**
54	4	4		**4**	40	4	4		**4**
56	4	4	4	**4**	61	4	4	4	**4**
70	4	4	4	**4**	74	4	4	4	**4**
110	4	4	4	**4**	108	4	5	5	**5**
Median				***4***	***Median***				***4***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*4*	*Sustained*	*2*				

Social factor : Good village leadership *(ref 7.3.6)*

Leadership quality 1= very good; 5= very poor

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	Median	Village	Int. 1	Int. 2	Int. 3	Median
5	3	4	4	**4**	7	3	1	2	**2**
8	4	3	4	**4**	29	2	2	2	**2**
45	2	4	4	**4**	30	3	3	4	**3**
50	2	3	3	**3**	34	4	2	3	**3**
54	5	3	2	**3**	40	3	3	4	**3**
56	4	4	3	**4**	61	2	2	2	**2**
70	3	3	3	**3**	74	2	2	3	**2**
110	4	3	2	**3**	108	3	3	3	**3**
Median				***3.5***	***Median***				***2.5***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*3*	*Sustained*	*3*				

The concept of leadership quality was well recognised during the interviews and it was hoped that recording the median values for each village would minimise any personal biases on the part of those interviewed.

Open-ness of people to new ideas 1= very open; 5= very closed

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	Median	**Village ID**	Int. 1	Int. 2	Int. 3	Median
5	3	4	3	**3**	7	2	1	2	**2**
8	3	3	3	**3**	29	2	2	2	**2**
45	3	4	3	**3**	30	2	2	2	**2**
50	3	2	4	**3**	34	3	2	2	**2**
54	3	3	2	**3**	40	3	3	2	**3**
56	3	4	4	**4**	61	3	2	3	**3**
70	2	2	3	**2**	74	2	3	3	**3**
110	4	3	3	**3**	108	3	3	2	**3**
Median				***3***	***Median***				***2.5***
Comparison with bonus villages									
Unsustained	*3*	*Intermediate*	*3*	*Sustained*	*2*				

VHC activity level 1= very active; 5= very inactive

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	4	4	3	**4**	7	3	1	2	**2**
8	2	2	3	**2**	29	3	2	2	**2**
45	3	4	5	**4**	30	3	4	3	**3**
50	4	3	3	**3**	34	3	1	3	**3**
54	4	4	4	**4**	40	3	4	3	**3**
56	4	4	3	**4**	61	3	2	2	**2**
70	2	2	4	**2**	74	3	3	1	**3**
110	4	4	3	**4**	108	2	1	2	**2**
Median				***4***	***Median***				***2.5***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*3*	*Sustained*	*2*				

Total revenue from fines

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID			Toilet fines	All fines	**Village ID**			Toilet fines	All fines
5					7				
8					29				
45			120,000	300,000	30			50,000	500,000
50			18,000	23,000	34				
54			39,000		40			45,000	450,000
56			14,000		61				
70			175,000	250,000	74			363,500	700,000
110				180,000	108			200,000	400,000
Median			***39,000***	***215,000***	***Median***			***125,000***	***475,000***

Social factor : Village diversity *(ref. 7.3.7)*

Tribes and proportions

Unsustained sanitation villages				***Sustained sanitation villages***			
Village ID	*Total # tribes*	*# tribes with ≥10% pop. (mean)*	*Max % (mean) of any tribe*	**Village ID**	*Total # tribes*	*# tribes with ≥10% pop. (mean)*	*Max % (mean) of any tribe*
5	2	1	95.3%	7	4	1	94.3%
8	5	2	90.0%	29	3	1	98.0%
45	3	1	98.3%	30	6	1	64.9%
50	9	1	85.0%	34	5	4	41.6%
54	5	3	63.9%	40	6	2	53.3%
56	6	1	90.3%	61	4	1	81.7%
70	1	1	100%	74	1	1	100%
110	6	1	94.3%	108	1	1	100%
Medians:	***5***	***1***	***92.3%***	***Medians:***	***4***	***1***	***88.0%***

Religious diversity:

Christians

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	70.0%	81.0%	35.0%	**70.0%**	7	60.9%	63.0%	70.0%	**63.0%**
8	60.9%	73.9%	60.0%	**60.9%**	29	80.0%	75.0%	70.0%	**75.0%**
45	75.0%	10.0%	5.0%	**10.0%**	30	70.0%	75.0%	51.0%	**70.0%**
50	80.0%	65.0%	50.0%	**65.0%**	34	45.0%	49.0%	30.0%	**45.0%**
54	60.0%	70.0%	70.0%	**70.0%**	40	60.0%	40.0%	51.0%	**51.0%**
56	65.0%	71.0%	45.0%	**65.0%**	61	70.0%	80.0%	95.0%	**80.0%**
70	65.1%	73.9%	80.0%	**73.9%**	74	60.5%	60.9%	70.0%	**60.9%**
110	95.0%	75.0%	75.0%	**75.0%**	108	90.0%	30.0%	25.0%	**30.0%**
Median				***67.5%***	***Median***				***62.0%***

Comparison with bonus villages					
Unsustained	*70%*	*Intermediate*	*50%*	*Sustained*	*60%*

Moslems

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	**Village ID**	**Village ID**	**Village ID**	**Village ID**
5	10.0%	10.0%	15.0%	**10.0%**	7	7	7	7	7
8	8.7%	4.3%	10.0%	**8.7%**	29	29	29	29	29
45	0	0	0	**0**	30	30	30	30	30
50	15.0%	15.0%	30.0%	**15.0%**	34	34	34	34	34
54	10.0%	28.0%	19.0%	**19.0%**	40	40	40	40	40
56	1.0%	4.0%	12.5%	**4.0%**	61	61	61	61	61
70	0	2.2%	0.2%	**0.2%**	74	74	74	74	74
110	3.0%	10.0%	15.0%	**10.0%**	108	108	108	108	108
Median				***9.4%***	***Median***				***9.0%***

Comparison with bonus villages					
Unsustained	*0*	*Intermediate*	*0*	*Sustained*	*40%*

Animists (traditional religion)

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	29.0%	18.0%	50.0%	**29.0%**	7	23.9%	28.3%	17.0%	**23.9%**
8	30.4%	21.7%	30.0%	**30.0%**	29	5.0%	23.0%	30.0%	**23.0%**
45	25.0%	90.0%	95.0%	**90.0%**	30	10.0%	10.0%	21.0%	**10.0%**
50	5.0%	20.0%	20.0%	**20.0%**	34	10.0%	2.0%	15.0%	**10.0%**
54	30.0%	2.0%	11.0%	**11.0%**	40	10.0%	10.0%	17.0%	**10.0%**
56	34.0%	25.0%	42.5%	**34.0%**	61	20.0%	15.0%	4.0%	**15.0%**
70	34.9%	23.9%	19.8%	**23.9%**	74	39.5%	37.0%	30.0%	**37.0%**
110	2.0%	15.0%	10.0%	**10.0%**	108	10.0%	70.0%	75.0%	**70.0%**
Median				***26.5%***	***Median***				***19.0%***

Comparison with bonus villages					
Unsustained	*30%*	*Intermediate*	*50%*	*Sustained*	*0*

Overall, the religious diversity results are not dissimilar, with the possible exception of the Animists and even then the median values differ by only 7.5%.

Proportion of pastoralists 1= all agriculturalist; 5= all pastoralist

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	2	2	2	**2**	7	2	2	2	**2**
8	2	2	2	**2**	29	2	2	2	**2**
45	4	2	4	**4**	30	2	2	2	**2**
50	2	2	2	**2**	34	2	3	2	**2**
54	2	2	2	**2**	40	2	2	2	**2**
56	2	2	2	**2**	61	2	2	2	**2**
70	3	2	2	**2**	74	2	2	2	**2**
110	2	2	2	**2**	108	2	2	2	**2**
Median				***2***	***Median***				***2***

Comparison with bonus villages					
Unsustained	*4*	*Intermediate*	*2*	*Sustained*	*2*

Despite the frequency that this factor was reported, the results of this question show almost no variability.

Social factor category : Village education level *(ref. 7.3.8)*

Literacy and school attendance

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Adult illiteracy now	Adult illiteracy 5yrs ago	Children not in school now	Children not in school 5yrs ago	**Village ID**	Adult illiteracy now	Adult illiteracy 5yrs ago	Children not in school now	Children not in school 5yrs ago
5	20%	25%	20%	30%	7	15%	40%	3%	25%
8	20%	40%	5%	30%	29	40%	50%	5%	15%
45	35%	unknown	3%	7%	30	25%	30%	15%	25%
50	45%	50%	15%	25%	34	50%	>50%	40%	>40%
54	60%	>60%	50%	>50%	40	25%	30%	15%	25%
56	25%	30%	15%	20%	61	35%	45%	8%	10%
70	20%	25%	5%	10%	74	35%	30%	5%	10%
110	45%	50%	10%	25%	108	45%	50%	2%	4%
Medians:	***30%***	***40%***	***12.5%***	***30%***	***Medians:***	***35%***	***42.5%***	***6.5%***	***20%***

Only a few WECs/head teachers were able to provide information on the numbers completing primary school and going on to secondary as follows:

Primary vs secondary education

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	# completed primary school last year	# passed 2ndry entrance exam	# attending 2ndry school now	% of primary graduates attending 2ndry	**Village ID**	# completed primary school last year	# passed 2ndry entrance exam	# actually attending 2ndry school now	% of primary graduates attending 2ndry
5	18	16	12	66.7%	7		35		
8		12%			29	17	9	9	52.9%
45		13			30	31	30	28	90.3%
50	20	19	11	55.0%	34		13	13	
54		18	9		40	17	15	12	70.6%
56	11	11	8	72.7%	61	10	3	3	30.0%
70		0			74		11		
110	16	5	2	12.5%	108		18		
Median				***60.9%***	***Median***				***61.8%***

village education level 1= very high; 5= very low

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	4	3	3	**3**	7	3	2	3	**3**
8	4	3	3	**3**	29	3	2	2	**2**
45	4	5	4	**4**	30	3	3	2	**3**
50	4	4	3	**4**	34	4	2	3	**3**
54	5	3	4	**4**	40	3	3	2	**3**
56	4	3	3	**3**	61	3	2	3	**3**
70	3	3	3	**3**	74	3	3	3	**3**
110	4	5	4	**4**	108	3	3	3	**3**
Median				***3.5***	***Median***				***3***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*5*	*Sustained*	*3*				

Social factor : Village wealth level *(ref. 7.3.9)*

VIP latrines

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	0	1.0%		**0.5%**	7	0.3%		2.5%	**1.4%**
8	0		0	**0**	29	0	0	0	**0**
45	0	0	0	**0**	30	0	5.0%	0	**0**
50	3.5%	3.0%	4.5%	**3.5%**	34	0	5.0%		**2.5%**
54	0	0	0	**0**	40	0	1.0%	0	**0**
56	0	3.0%		**1.5%**	61	0	2%	0	**0**
70	0	0	0	**0**	74	0	0	0	**0**
110	0.5%	1.0%	1.4%	**1.0%**	108	0	0	1.7%	**0**
Median				***0.25%***	***Median***				***0***
Comparison with bonus villages									
Unsustained	*0*	*Intermediate*	*0*	*Sustained*	*0.6%*				

Pour-flush toilets

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	0.3%	2.0%		**0.7%**	7	0	0	2.5%	**0**
8	0	0	0	**0**	29	20.0%	0.19%	0	**0.19%**
45	0	0	0	**0**	30	12.5%	20.0%		**16.3%**
50	10.0%	0.5%	40.0%	**10%**	34	2.4%	10.0%	0.2%	**2.4%**
54	0	0		**0**	40	5.0%	3.0%		**4.0%**
56	0.4%	2.0%		**1.2%**	61	15.0%	5.0%	0.5%	**5.0%**
70	0	0	10%	**0**	74	0	0	25.0%	**0**
110	1.5%	0	0.7%	**0.7%**	108	0	0	0	**0**
Median				***0.35%***	***Median***				***1.3%***

Comparison with bonus villages					
Unsustained	*0*	*Intermediate*	*0*	*Sustained*	*0.9%*

Livestock & agricultural produce

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	# Cattle	Combined sheep & goats	# Pigs	Agricultural produce (tonnes)	**Village ID**	# Cattle	Combined sheep & goats	# Pigs	Agricultural produce (tonnes)
5	3100	2200	10	-	7	-	-	-	-
8	-	-	-	-	29	1228	1855	0	-
45	-	-	-	-	30	3000	2300	80	150
50	5435	7200	85	3750	34	2850	3600	4	1646
54	3100	2400	-	726	40	2800	2470	15	100
56	3912	2670	5	-	61	4052	3488	0	-
70	-	-	-	-	74	-	-	-	-
110	695	4550	45	2145	108	-	-	-	-
Medians:	***3100***	***2670***	***27.5***	***2145***	***Medians:***	***2850***	***2470***	***4***	***150***

Village wealth ranking 1= very rich; 5= very poor

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	3	3	3	**3**	7	2	3	3	**3**
8	3	2	3	**3**	29	3	3	3	**3**
45	3	4	3	**3**	30	3	3		**3**
50	3	4	3	**3**	34	3	3	3	**3**
54	3	3	3	**3**	40	3	3		**3**
56	3	3	3	**3**	61	3	3	3	**3**
70	3	3	3	**3**	74	3	3	3	**3**
110	4	4	3	**4**	108	3	3	2	**3**
Median				***3***	***Median***				***3***
Comparison with bonus villages									
Unsustained	*2*	*Intermediate*	*3*	*Sustained*	*2*				

Food insecurity level 1= none; 5= everyone

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	2	2	2	**2**	7	1	2	2	**2**
8	1	2	2	**2**	29	2	2	2	**2**
45	2	2	1	**2**	30	2	2		**2**
50	2	2	2	**2**	34	2		2	**2**
54	2		2	**2**	40	2	2		**2**
56	2	2	2	**2**	61	2	2	2	**2**
70	2	2	2	**2**	74	2	2	2	**2**
110	2	2	2	**2**	108	1	2	1	**1**
Median				***2***	***Median***				***2***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*2*	*Sustained*	*2*				

Number of vulnerables 1= none; 5= all

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	Median	**Village ID**	Int. 1	Int. 2	Int. 3	Median
5	1	2	2	**2**	7	2	2	2	**2**
8	2	2	2	**2**	29	2	2	2	**2**
45	2	2	2	**2**	30	2	2		**2**
50	2	2	2	**2**	34	2		2	**2**
54	2		2	**2**	40	2	2		**2**
56	1	2	2	**2**	61	2	2	2	**2**
70	2	2	2	**2**	74	2	2	2	**2**
110	2	2	2	**2**	108	2	2	2	**2**
Median				**2**	***Median***				**2**

Comparison with bonus villages					
Unsustained	*2*	*Intermediate*	*4*	*Sustained*	*2*

Houses with metal roofs 1= all; 5=none

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	4	4	4	**4**	7	3	2	3	**3**
8	4	3	4	**4**	29	4	4	4	**4**
45	4	4	4	**4**	30	2	2		**2**
50	4	4	4	**4**	34	2	2	2	**2**
54	4	3	4	**4**	40	4	4		**4**
56	4	4	4	**4**	61	4	4	4	**4**
70	2	2	4	**2**	74	2	3	4	**3**
110	4	4	4	**4**	108	3	3	4	**3**
Median				**4**	***Median***				**3**

Comparison with bonus villages					
Unsustained	*4*	*Intermediate*	*4*	*Sustained*	*2*

Houses using cement 1= all; 5= none

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	4	4	4	**4**	7	3	3	3	**3**
8	4	4	4	**4**	29	4	4	4	**4**
45	5	5	5	**5**	30	4	4		**4**
50	4	4	4	**4**	34	2	2	4	**2**
54	4	4		**4**	40	4	4		**4**
56	4	4	4	**4**	61	4	4	4	**4**
70	4	4	4	**4**	74	4	4	4	**4**
110	4	4	4	**4**	108	4	5	5	**5**
Median				***4***	***Median***				***4***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*4*	*Sustained*	*2*				

Houses of poor quality 1= none; 5= all

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	3	4	4	**4**	7	2	2	2	**2**
8	2	2	2	**2**	29	4	3	2	**3**
45	2	4	2	**2**	30	2	2		**2**
50	2	4	2	**2**	34	2	2	2	**2**
54	2	4	2	**2**	40	2	2		**2**
56	2	4	4	**4**	61	4	3	2	**3**
70	1	2	2	**2**	74	1	2	2	**2**
110	2	4	2	**2**	108	1	2	2	**2**
Median				***2***	***Median***				***2***
Comparison with bonus villages									
Unsustained	*3*	*Intermediate*	*2*	*Sustained*	*2*				

Proportion of permanent latrines 1= all permanent; 5= all temporary

Unsustained sanitation villages					***Sustained sanitation villages***				
Village ID	Int. 1	Int. 2	Int. 3	**Median**	**Village ID**	Int. 1	Int. 2	Int. 3	**Median**
5	5	4	5	**5**	7	5	5	3	**5**
8	5	5	4	**5**	29	5	4	4	**4**
45	5	5	4	**5**	30	3	4	4	**4**
50	4	4	4	**4**	34	4	3	4	**4**
54	5	4	5	**5**	40	3	5	4	**4**
56	4	4	5	**4**	61	5	4	4	**4**
70	4	4	3	**4**	74	4	4	2	**4**
110	5	4	5	**5**	108	4	4	3	**4**
Median				***5***	***Median***				***4***
Comparison with bonus villages									
Unsustained	*4*	*Intermediate*	*5*	*Sustained*	*2*