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Challenges for Ecological Sanitation Systems in Urban Areas: The Case of Victoria Ranch Residential Area, City of Masvingo

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Abstract
This study sought to evaluate the effectiveness of the ecological sanitation toilets in Victoria Ranch high density suburb in the city of Masvingo. The research was done so as to understand the challenges faced by residents in the adoption of ecological sanitation toilet systems in urban high density areas. The specific objectives of the study were to determine respondents' understanding of the link between sanitation, hygiene and health; investigate the characteristics of ecological sanitation toilet systems in Victoria Ranch residential area; identify the challenges of adopting ecological sanitation toilet systems in Victoria Ranch; and examine the appropriateness of ecological sanitation toilet systems in Victoria Ranch residential area. Sixty of the five hundred residents of Victoria Ranch were sampled as questionnaire respondents. Five of the sixty respondents were further sampled for follow-up interviews. Case study and descriptive survey were used as the main research methods. The study established that residents of Victoria Ranch were aware that poor sanitation and poor hygiene lead to poor health and diseases. Nonetheless, this was not put into practice. There were faeces and urine smell in open spaces and the surrounding bushes. The toilets were dirty and there was no water and soap in the toilet to wash hands after use. Culture was found to be a major hurdle in the adoption of ecological sanitation toilets in the Victoria Ranch residential area. At household level, investment costs of an ecological sanitation toilet were found to be higher than those of a flush toilet room. The study recommends intensive awareness campaigns and advocacy to remove negative attitudes towards ecological sanitation toilets; training in ecological sanitation toilets operation; regular reviews and check-ups by authorities; and further studies in other big cities like Harare.
Keywords: ecological sanitation, toilets, challenges, Victoria Ranch, Masvingo, hygiene, health, residents.

1. Background to the Study

Access to water and sanitation services is a basic requirement for everyone's wellbeing. It is therefore vital that every country provides clean water and proper sanitation to its residents. According to Duflo et al (2012), inadequate access to safe water and exposure to pathogens through poor treatment of solid waste may result in adverse health consequences such as diarrhoea. They added that the problem of inadequate access to water and sanitation is particularly persistent in developing countries due to urban population growth.

For the past decade population growth in urban areas has accelerated. In most countries, there are more people living in cities than in rural areas. This rapid urban population growth rate has brought about urban poverty and food insecurity. Additionally, severe environmental and hygienic problems are also now rampant in developing countries cities as a result of the growing population. This growing population exerts pressure on the existing obsolete water and sanitation infrastructure resulting in poor urban waste management.

Access to clean water and sanitation is becoming a serious challenge in Zimbabwe (World Bank, 2014). As noted by Musingafi (2012), more than 4000 people lost their lives during the cholera outbreak of 2008-2009. During this period most households did not have access to clean water and regular sanitation services. In some instances, raw sewage entered into residential homes and potable water sources. Water shortages and lack of functioning indoor toilets or community latrines makes residents to use the nearby bushes.

Some of the residents in the City of Masvingo, for example in the case of Victoria Ranch, live in conditions characterised by over-crowding, insecure residential status, inadequate access to safe water and sanitation and poor health care.

Victoria Ranch is a new high density residential area in the city of Masvingo, located 10km from the central business district. In its initial stages it was a National Housing Project imposed on Masvingo Rural District Council by the then Ministry of National Housing. The project came into effect in 2007 as one of the Zimbabwe African National Union Patriotic Front (ZANU PF) campaigning tools for the 2008 harmonised elections in Zimbabwe. Effective construction of houses, however, started in 2010 during the government of national unity era. Since the project was a political gimmick mainly run and supervised by ex-combatants and political activists, it was not well planned.

In 2012 Masvingo District Rural Council surrendered the project to the city of Masvingo. Up to now (2015) the residential area has no piped water, let alone the sewer system. Thus, the major challenge in the Victoria Ranch residential area is access to safe water and proper sanitation.

Access to safe sanitation is defined in terms of both availability and type or method. The conventional view of the flush toilet being the ideal solution to faecal disposal has been challenged in recent years as unsuitable for households in poor communities and where water is scarce (Duflo et al 2012). The municipality of Masvingo has found it difficult to connect the Victoria Ranch residential area to its main reticulation and sewage system pipes. This has triggered the experiment with ecological sanitation toilets. However, some proponents are cautious about the introduction of ecological sanitation toilets as they require a certain level of knowledge for effective use, and because some need enough space which is mainly found in rural areas.

The ecological sanitation toilet is a closed system that does not require water. This toilet system is used as an alternative to pit toilets and is found in places where there is water shortage and high water table and this makes it prone to groundwater contamination. The ecological sanitation toilet is based on the principle of recovery and recycling of nutrients from excreta to create manure and fertilizer for agriculture. When the pit of an ecological sanitation toilet fills up it is closed and sealed. After about eight to nine months, the faeces are composted to organic manure and can be used on farms.

The main advantage of ecological sanitation toilets lies in the recovery of nutrients by converting human excreta into rich agriculture fertilizer. However, ecological sanitation toilets' major challenge is that they require educational awareness and technical knowhow for their usage and operation. This implies that problems that are related to operation and maintenance must be addressed.

2. Statement of the Problem

The above background information shows that ecological sanitation toilets are a new technological innovation in urban areas. This is because they are different from the conventional ones. Therefore, they require more operational awareness. Improper use of toilets results in health threats, environmental pollution and difficulties in maintenance. The ecological sanitation toilet system places more responsibility on the user making it vital for the user to have a wide knowledge of how they operate. This makes the introduction of ecological sanitation toilets in the Victoria Ranch residential area a fertile ground area of research.

3. Research Objectives

The specific objectives of the study were to:

- determine respondents' understanding of the link between sanitation, hygiene and health;
- investigate the characteristics of ecological sanitation toilet systems in the Victoria Ranch residential area;
- identify challenges to the adoption of ecological sanitation toilet systems in Victoria Ranch; and
- examine the appropriateness of ecological sanitation toilet systems in the Victoria Ranch residential area.

4. Significance of the Study

This study will be of great significance to both government and local authorities in deciding and planning the introduction of new sanitation technologies to new urban residential areas. The study informs future standards and guideline developments for the safe management of ecological sanitation in Zimbabwe. The study will also serve as reference point for academics and other researchers.

5. Literature review

5.1 Understanding Sanitation

According to UNICEF (2000), access to sanitation facilities is a fundamental human right that safeguards health and human dignity. Every human being deserves to be protected from the many health problems such as dysentery, cholera and other serious infections that are caused by poor disposal of excreta. There is need to take immediate action is as it is reported that the number of people without adequate sanitation will rise to more than 4.5 billion in just 20 years (Akrama, 2012). The marginalized poor living in densely populated cities will be affected most (UNICEF, 2000).

The concept of sanitation has been defined in a number of ways. Mensah (2002) defines sanitation as the state of cleanliness of a place, community or people particularly relating to those aspects of human health including the quality of life determined by physical, biological, social and psychological factors in the environment. Schertenleib et al (2002) define sanitation as interventions to reduce people's exposure to diseases by providing a clean environment in which to live and with measures to break the cycle of disease. This usually includes hygienic management of human and animal excreta, refuse and wastewater, the control of disease vectors and the provision of washing facilities for personal and domestic hygiene. It also involves both behaviours and facilities which work together to form a hygienic environment (World Bank, 2002). Nyamwaya (1994) also defines sanitation as the proper disposal of human waste. It includes keeping the human environment free of harmful substances which can cause diseases.

According to Akrama (2012), sanitation refers to principles, practices, provisions, or services related to cleanliness and hygiene in personal and public life for the protection and promotion of human health and well-being and breaking the cycle of disease or illness. Akrama (2012) further observes that, sanitation is related to the principles and practices relating to the collection, treatment, removal or disposal of human excreta, household waste water and other pollutants. The World Health Organization (WHO) (1987) understands sanitation as the provision of facilities and services for the safe disposal of human urine and faeces. The word 'sanitation' also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal (Mmom and Mmom, 2011). They believe that environmental sanitation comprises disposal and treatment of human excreta, solid waste and waste water, control of disease vectors, and provision of washing facilities for personal and domestic hygiene. Sanitation aims at improving the quality of life of the individuals and contributing to social development (Ibid).

World Health Organization (1987) reports that wherever humans gather, their waste also accumulates. They believe that progress in sanitation and improved hygiene has greatly improved health, but many people still have no adequate means of appropriately disposing of their waste. This is a growing nuisance for heavily populated areas, carrying the risk of infectious disease, particularly to vulnerable groups such as the very young, the elderly and people suffering from diseases that lower their resistance (Ibid). Poorly controlled waste also means daily exposure to an unpleasant environment.

Sanitation is therefore a concept explaining activities to ensure safe disposal of excreta, solid waste and other liquid waste and the prevention of disease vectors to ensure a hygienic environment. In fact, the definition of basic sanitation should include critical components of what sanitation aims for: privacy, safety, dignity, cleanliness and a healthy environment (Conradin, 2007). Because these aspects are very difficult to measure, a set of indicators to determine the number of people with access to basic sanitation was developed. Access to improved sanitation facilities refers to the percentage of the total population using non-shared and non-public facilities connected to a public sewer or a septic system; pour-flush latrines; simple pit latrines; and ventilated improved pit latrines (UNICEF, 2000: 77). Open pit latrines (without any kind of superstructure) and bucket latrines or open defecation are considered unimproved and considered inadequate for the high risk of disease transmission.

Conradin (2007) define a sanitation system as comprising the users of the system, the infrastructure, the collection, transportation, treatment, and management of end products (human excreta, solid waste, grey water, storm water and industrial wastewater). A sanitation system considers all components required for the adequate management of wastes produced by humans including the users of the system.

Apart from terming open pit latrines and bucket latrines unsuitable, the official UNICEF (2007) definition remains highly questionable: On-site sanitation systems such as simple pit latrines and pour-flush latrines can lead to a severe pollution of groundwater resources and can consequently endanger public health. Even facilities connected to a public sewer or a septic tank system can have severe drawbacks, especially when considering the fact that only about 10% of the wastewater generated worldwide actually undergoes some kind of treatment (Briscoe and Steer, 1997 as captured in Esrey and Anderson, 2001: 36). Also the enormous water and energy use of centralised systems, the resulting pollution of the environment, eutrophication of watercourses and a general waste of resources are not considered (Conradin, 2007). Thus, Conradin (2007) concluded that these indicators are highly doubtful. She argues that most of the systems termed improved by the WHO and UNICEF actually lead to a deterioration in environmental quality, impede the quality of life of those further downstream and endanger drinking water sources. As such, few can be termed safe in a hygienic way.

5.2 Ecological Sanitation

According to Conradin (2007), ecological sanitation emerged as a response to the problems with current wastewater management practices outlined above. She argues that the principal idea behind adopting ecological sanitation is that human excreta are no longer regarded as waste, but a valuable resource. The idea of ecological sanitation emerged in the 1960s in Sweden, but became widely known in the 1990s (Conradin, 2007). It was recognized that there are some fundamental flaws in current wastewater management concepts. As a result, new approaches that deal with wastewater were needed so as to prevent the water pollution and to improve on recycling methods. These new approaches must take into account that developing countries are faced with challenges such as lack of funding, poor infrastructure, and technological advancement. It is argued that these new approaches improve waste water and environmental management (Johansson, 2004).

Ecological sanitation is an approach based on three fundamental principles: preventing pollution rather than attempting to control it after pollution occurs; sanitising excreta and greywater; and using the safe products for agricultural purposes (Winblad et al. 2004). Hence, it is a loop-based principle that moves away from linear solutions of waste disposal towards a circular flow of nutrients (Esrey and Anderson, 2001). In principle, any system that is founded on this understanding, respecting the following three basic principles, can be called an ecological sanitation system:

- do not mix/contain;
- sanitise;
- re-use (Conradin, 2007).

5.3 Advantages of Ecological Sanitation

Due to their closed-loop and modular, decentralised approach, ecological sanitation systems have several advantages over conventional approaches, and can help to overcome the drawbacks of conventional sanitation (Conradin, 2007).

Ecological sanitation collects and contains excreta, and sanitises them before they are recycled into the environment. This approach prevents not only the spreading and transmission of diseases, but also protects waterbodies from being polluted. Nutrients are recycled to the soils, where they actually come from, and not into waterbodies. This minimises their eutrophication. Eutrophication is a process where water bodies receive excess nutrients that stimulate excessive plant growth like in the case of the hyacinth plant along Mucheke River in the city of Masvingo. Although the risk that micropollutants get into the environment is not eliminated with ecological sanitation systems, source separation and the reuse of nutrients may have important advantages (Conradin, 2007).

One of the fundamental principles of any sanitation system is that it forms a barrier between excreta and people and thus prevents the spread of diseases (Jenssen et al, 2004). This is of course also the core aim of conventional flush systems, but instead of sanitising the excreta themselves, they often just shift the problem spatially. By not introducing human waste into the water cycle, the contamination of superficial and ground waterbodies can be avoided. As well, if adequate treatment methods are used, the spreading of pathogens on agricultural areas can be prevented. With most ecological sanitation systems, especially with the dry handling of the faeces, the primary treatment is moved to the household installation instead of being part of a centralised system. International research indeed shows that dry ecological sanitation systems may give an equal or higher reduction of pathogens than conventional systems and a high reduction in the subsequent risk of exposure (Stenström, 2001).

Recycling is a major element of ecological sanitation systems. Nutrients and organic matter that are taken from the soil are reused. This improves fertilization of the soil. Sanitised urine and faeces contain all of the trace elements that are ingested. Additionally, also organic material that has been removed from the soil in the form of plant fibres is restored. This improves the soil structure and its water holding capacity (Jönsson et al, 2004). Ecological sanitation enables 70 to 90% of the nitrogen, phosphorus and potassium in excreta and wastewater to be reused for agricultural purposes (Vinnerås, 2002). In addition, ecological sanitation systems decrease the amount of water needed for sanitation in general and can help to restore depleting groundwater reserves. “This is of key importance since water is a major limiting factor for development in many countries” (Jenssen et al, 2004: 7). This approach conserves resources, not only by lowering the water consumption and restoring nutrients to the soil, but also through the fact that less artificial fertilizer has to be produced and applied. Ecological sanitation systems can furthermore help to produce sustainable energy (biogas production), thus lowering the need for non-renewable energy sources.

Ecological sanitation reduces the cost of wastewater treatment (Conradin, 2007). In ecological sanitation, systems can be incorporated into already existing settlements with limited resources. By investing the same amounts of money, municipalities could serve more people than if they apply conventional systems (Conradin, 2007). Though it is difficult to give exact costs, figures suggest that annual costs for ecological sanitation systems are lower than for most conventional systems (UNEP, 2004). In addition, ecological sanitation systems include lots of external benefits that are difficult to estimate – such as for instance increased soil fertility or improved food security – and many that cannot be measured in monetary ways at all (e.g. improved health, more dignity, and higher quality of life) (Conradin, 2007). If human excreta are no longer regarded as waste products, they are inherently attributed an economic value. Ecological sanitation can consequently create local business opportunities for construction, operation and maintenance of sanitary facilities and sale of fertilizer and fertilized produce (Jenssen et al, 2004), further creating financial incentives.

Conradin (2007) argues that by recycling nutrients, ecological sanitation helps to preserve soil fertility and consequently food security on a large scale. She observes that in many small-scale ecological sanitation systems, the fertilizer families get from their ecological sanitation toilets is an important resource for household gardens also in urban areas. Urban agriculture can improve the access to nutritious food. Treated excreta and greywater could help families save money by growing their own fruit and vegetables and/or selling some of the produce. The loss of vitamins and nutrients during long transports and storage times on the market can be minimised (Conradin, 2007).

According to Conradin (2007), many of the conventionally used sanitation systems include tasks that bring with them not only a high health risk, but are repugnant and severely impair the dignity of human beings. Such tasks include the manual cleaning of dry toilets (manual scavenging), emptying of pit toilets, or the manual

unclogging of sewage pipes. In developing countries, the necessary technical equipment to carry out these tasks is often not available, forcing the lower strata of society to perform these extremely unpleasant tasks. In ecological sanitation systems, human dignity is a core criterion. Well-developed two-vault urine-diversion dehydration toilets for instance are very easy to operate and include only the handling of safe and sanitised excreta (Conradin, 2007).

5.4 Challenges for Ecological Sanitation

According to Conradin (2007) ecological sanitation is still a relatively new approach in urban waste management. As a result the system faces challenges which have to be dealt with for the adoption of the new system. Some of the difficulties include technical aspects such as design, initial construction material costs, maintenance and institutional challenges (Conradin, 2007).

Most countries lack regulations that deal with sanitation problems. In 2007 WHO published an article entitled *Guidelines on the Safe Use of Wastewater, Excreta and Greywater* which stresses the need for sustainable policy and regulations on sanitation. Although this publication may serve as a regulatory guideline, it is inadequate for it to influence national laws. It has been established that in most cases inconsistent laws and regulations concerning recycling impede the development and implementation of new ecological sanitation systems (Conradin, 2007). While very lax regulations are applied to conventional sewerage, and while the direct discharge of untreated sewage, its infiltration into the groundwater, or the eutrophication of waterbodies with its adverse effects are often not considered to be a problem at all, stringent regulations apply to new ecological sanitation systems (Conradin, 2007).

A challenge inherently connected to the institutional aspects is the one of changing mindsets (Conradin, 2007). Not only is it a fact that governing bodies often lack the knowledge about the negative side effects of conventional water-based sanitation, but they are generally ill-informed about possible alternatives (Ibid). Likewise, sanitation and water supply are frequently located in the same departments; and water supply is much more often given priority over sanitation. In order to overcome these institutional challenges, specific training and information on decision making would be vital. Though the success of certain sanitation approaches depend on the end users, authorities and governing bodies often have more means at hand to induce changes in the ways sanitation is being dealt with (Conradin, 2007).

Faeces are regarded as disgusting by many people; the thought of using them for food production is repulsive (Stenström, 2001). Many cultures have strongly-held beliefs and taboos regarding faeces that make ecological sanitation adoption difficult. People generally prefer toilets where faeces cannot be seen and where no further handling by the users is required. With a water closet the only necessary further user action is the pulling of a handle; out of sight out of mind. With eco-sanitation there is always some form of secondary handling of the faeces and user reluctance to do this could be high. Even if an individual is willing to adopt eco-sanitation, they may be put off from doing so by the fear of being ridiculed by the rest of the community.

Changing mindsets about sanitation is difficult at any level of society, and motives for a change in sanitation system may differ widely. Essentially – and this is true both for developed and developing countries – ecological sanitation systems will only be accepted on a wider scale if the system does not bring about any loss in comfort (which can also include more maintenance work), or alternatively, if the surplus in maintenance is not made up with other advantages (Conradin, 2007). The direct reuse of fertilizer on site (as in family gardens) is a favourable solution in some places, but the acceptance of ecological sanitation will inevitably be greater if the operation and maintenance tasks are outsourced to a professional service provider (Conradin, 2007). Specialized companies should take care not only of the direct operation and maintenance tasks of the sanitation system, (as in emptying the urine collection containers), but too of the subsequent hygienisation and reuse. This would ensure the professional handling and treatment of human excreta and could lead to standardised end products with high and consistent quality (Conradin, 2007).

According to (Conradin, 2007), in order to tackle the challenges of the adoption of ecological sanitation systems, there is an urgent need for more education at all levels of decision making. This does not only include official institutional bodies such as national and local authorities, planning agencies and decision makers, but also community based groups, NGOs, and persons who have an influence on decision making and the formation of opinions in individual households (this could also include students and school children). It is a matter of course that the ecological sanitation system education material be culturally adapted and tailored to the local needs. Only if there is a more thorough understanding of the problems caused by current sanitation practices and the existing alternatives at all levels of society can the fundamental shift in the sanitation paradigm needed to make ecological sanitation the sanitation option of choice take place (Conradin, 2007).

7. Research Participants and Instruments

In this study the term research participants refers to both the population and the selected sample of the population. Population can be defined as the universe of people, places, or things to be investigated. A sample is

a subset of the population (Tull and Hawkins, 1993).

An estimated target population of 500 people residing in Victoria Ranch residential area was used in this study.

The research participants were distributed as in Table 1 below.

Table 1: Research Participants
(Source: Primary data)

Population	Questionnaire sample	Interview sample	Total Sample
500	60	5	65

Sampling was done randomly using a simple probability approach. The random sampling was based on whether a household adult (aged 18 years and above) was present on Saturday 21 February 2015 when the researcher distributed her questionnaires to residents for completion. Only adults who were present on this day were sampled for the study. Thus, all adults had an equal chance of participating in the study provided they were at their residential house on 21 February 2015. This approach was cost-effective for the researcher as she wanted to distribute and collect the questionnaires the same day.

In this study the researcher used questionnaires and interviews. This combination of research instruments and triangulation (use of several approaches and instruments) ensured the reliability and validity of the collected data. It is however important to note that in spite of all the efforts to reduce bias "the researcher cannot avoid having his data contaminated by bias of one sort or another" (Leedy, 1980: 26)

Response rate was 100%; all sixty distributed questionnaires were collected back. Table 2 below shows that female respondents were more than male respondents. Saturday was a working day for most of the low paid residents of Victoria Ranch residential area. In most low income families in Zimbabwe the bread winner is male (the husband, boyfriend or son). The study was thus carried out when most of the male members of Victoria Ranch households had gone out for work.

Table 2: Distribution of questionnaire respondents
(Source: Primary data)

Sex		Participants and their age group				Total
		20-29 years	30-39 years	40-49 years	50 plus years	
Female	Married	06	05	04	04	19
	Single	10	02	01	00	13
	Widow	02	03	03	00	08
Male	Married	01	02	03	06	12
	Single	03	01	01	00	05
	Widow	00	00	01	02	03
Total		**22**	**13**	**13**	**12**	**60**

Respondents' education levels are represented in Table 3. The table shows that all respondents had secondary school education. The fact that all respondents had gone to school up to at least secondary school level shows that they were highly literate and therefore had less problems in reading and interpreting questions in the questionnaire. Respondents were thus assumed to be qualified to answer the questionnaire.

Table 3: Respondents' Educational Qualifications
Source: Questionnaire/Primary Data

Sex	Primary	Secondary	Tertiary	Total
Male	00	15	05	**20**
Female	00	30	10	**40**
Total	**00**	**45**	**15**	**60**

8. Findings

8.1 Residence Awareness of the Relationship between Sanitation, Hygiene and Health

Most residents were aware that proper sanitation practices were the pillar to a healthy and presentable community. Table 4 was used to measure respondents' understanding of the link between sanitation, hygiene and health.

Table 4: Measuring Respondents Understanding of Link between Sanitation, Hygiene and Health (SA - Strongly Agree, A - Agree, D - Disagree, SD -Strongly)

Variables	A	SA	D	SD
1. Good sanitation improves health of residents.				
2. Sanitation involves interventions that reduce residents' exposure to diseases by providing a clean environment.				
3. Improper waste disposal leads to poor sanitation causing pollution and disease				
4. Proper maintenance of toilets improves sanitation and health of residents.				
5. Public enlightenment and education improves sanitation				
6. The attitude of the people either positive or negative affects the value of our sanitation and health				

Fig 3 shows residents' responses to the six statements in Table 4 that sought to measure their understanding of the link between sanitation, hygiene and health. Although some respondents thought there was no clear link between proper sanitation, hygiene and health, the majority of the respondents said the three concepts have a close relationship.

Nonetheless, even though most residents demonstrated that they understood the importance of proper sanitation practice, this was not put into practice.

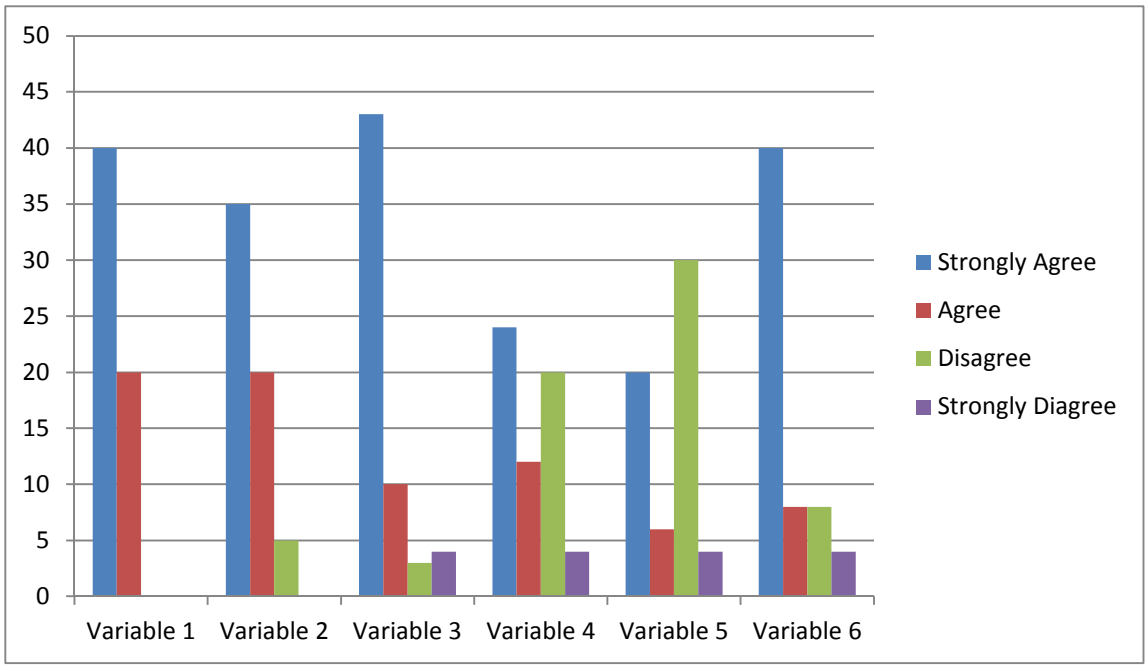

Fig. 1: Respondents Understanding of Link between Sanitation, Hygiene and Health
(Source: Primary Data)

8.2 Ecological Sanitation Toilet Systems in the Victoria Ranch Residential Area

Fig 2: Ecological Sanitation Toilet Separate from House in Victoria Ranch

Picture taken by one of the researchers, 21 February 2015

Ecological sanitation toilets in the Victoria Ranch residential area are built of cement bricks and asbestos roof. Their distance from the main house ranges from one metre to 3 metres away from the main house depending on the size of the yard and the house.

Major characteristics of ecological toilets in the Victoria Ranch residential area were largely addressed by the observation schedule as shown in Table 5 below.

Table 5: Observation schedule

Source: Primary Data

Ecological sanitation toilet condition	**Guide criteria**
Hygienic	Toilet with 3 or fewer flies, no evidence of faeces outside the toilet. No smell.
In use	Evidence that it had been cleaned recently, had been swept, has a path and was in good condition.
Poor	Smelling or soiled.
Very poor	Feaces visible from a distance, smelling, wet of urine, flies, mice, cockroaches.

More than half houses in the Victoria Ranch residential area have no toilets (see Table 6). This means that they use the nearby bushes and open spaces for relieving themselves.

`Fig 3: Open/Grass Space Used as Defecation Area in Victoria Ranch

Picture taken by one of the researchers, 21 February 2015

There are dry and fresh human faeces and urine in the grass and open space in Fig 5. Table 6 shows the availability, maintenance and utilisation of ecological sanitation toilets in the Victoria Ranch residential area.

Table 6: Availability, Maintenance and Utilisation of Ecological Sanitation Toilets

Source: Primary Data

Condition of toilet	**Yes**	**No**	**N/A**
Do you have an ecological sanitation toilet?	25	35	0
Is it used?	15	10	35
Is it clean?	10	15	35
Is it in good condition?	10	15	35
Is it free from smell?	15	10	35
Is there trash around it?	25	00	35
Are there vectors inside of it (flies, cockroaches)?	25	00	35
Did the authorities train you in using the toilet?	05	20	35

Although residents used ash to neutralise smell from the toilets a significant number of respondents said the toilets were not free from smell.

Fig 4: Outside/Backside of an Ecological Sanitation Toilet in Victoria Ranch

Picture taken by one of the researchers, 21 February 2015

The researchers also observed that even those toilets which were said to be free from smell were not free from the big blue flies. The availability of these flies implied that there was smell that attracted the flies.

One of the respondents said, 'The toilets do not smell anymore. Our only worry is these big flies. Perhaps we are so used to the smell that we cannot sense it anymore'. Thus, most of the toilets attracted a lot of flies, especially at houses where there were more than one household. The situation was worse where there were children. Most of the toilets could be described as poor (see Table 5). Also the cleanliness of both the inside and outside of the toilets was an issue of concern. Because of the smell issue and poor maintenance of the ecological sanitation toilets some people opted for open defecation in the nearby bushes as already observed above. This made the vicinity and the surrounding bushes unfriendly as there were faeces and urine all over.

Figure 5: Separate Faeces and Urine Ways of the Ecological Sanitation Toilets
Picture taken by one of the researchers, 21 February 2015

The toilets are classified as dry toilets because they do not use water. Faeces and urine are channelled to different directions as shown in Fig 5.

Most respondents said they were not trained on how to use and maintain the toilets.

Respondents said that they were instructed to empty the toilets and dump the waste in their gardens as manure after six months of use. None of the residents had done this by the time of the study. Nonetheless, most of them did not visualise themselves using human waste as manure for the vegetables they would consume. Some felt that their gardens were too small to use all the waste from the toilet as manure.

Residents seem not to be happy with the ecological sanitation toilets. Most of them demonstrated their disapproval of these toilets by continuing to help themselves in the nearby bushes even when they already have an ecological sanitation toilet in their yard.

8.3 Challenges to the adoption of Ecological Sanitation Toilet Systems in Victoria Ranch

From the discussion with the five respondents who were sampled for the interview, culture appeared to be a central issue in the adoption of ecological sanitation toilets in the Victoria Ranch residential area. From a socio-cultural point of view, implementing ecological sanitation systems in Zimbabwe is a very challenging task. Both rural and urban residents prefer water based latrines and refuse contact with faeces. All the five respondents felt that it was taboo to touch faeces or to use them as manure. One of them said:

> *People vomit when they see or even smell human waste. If they accidentally touch it they become sick. Asking people to stay with this waste in their homes I think is as good as killing them. Worse still encouraging them to use it as manure for their vegetables! This is disgusting. This is why even puffing is*

not done in public. When people relieve themselves, they go to the bush where such things are done without anyone questioning them.

Secondly, there is the issue of construction material affordability. On average, at the level of the household, investment costs of an ecological sanitation toilet are higher than those of a flush toilet room. This is one of the major reasons why at the time of the study more than half of the residents have not yet constructed ecological sanitation toilets, implying that these people were using the open space and nearby bushes for relief.

Thirdly, most houses in Victoria Ranch were occupied by tenants, sometimes three to four families per house. In these cases the high number of people who used the same ecological sanitation toilet implied high frequency of pit emptying. As a precaution to this anticipated laborious task, inhabitants have tacitly encouraged each other to use the nearby bushes and open spaces for defecation purposes.

Correct usage and cleanliness was one of the major concerns. Ecological sanitation toilet systems are highly demanding, incorrect usage can cause anything from a minor inconvenience to a major system failure and/or health hazard.

Ecological sanitation toilets place high responsibility on the user as they require more attention than pour-flush or pit toilets and therefore they are more complex to maintain. As a result, thorough user understanding and commitment is vital. To help in the maintenance of ecological sanitation toilets, regular monitoring is required.

The big green and blue flies which were common in all the observed toilets, was one of the major complaints among respondents. One of the respondents said, 'In the 2008-2009 cholera outbreak, the city of Masvingo was spared because it was a clean city. If cholera was to come again this year, I tell you we will all die'. ---. The flies made people feel uncomfortable in their homes.

Also prominent in the discussion with the five interviewees was the fact that residents were not consulted on the introduction of ecological sanitation toilets in Victoria Ranch. Consultation implies awareness campaigns and workshops where residents would be trained and prepared for the new innovation. Such workshops would have given residents platform to air their views from an informed point of view. The main challenges associated with ecological sanitation toilets can be overcome with effective training, user understanding and maintenance.

8.4 The Appropriateness of Ecological Sanitation Toilet Systems in Victoria Ranch

Respondents felt that ecological sanitation toilets would be more appropriate for rural areas where homesteads are a bit far away from each other and toilets are located a distant from the homestead. They argue that even the use of human waste as manure is most likely to be beneficial to communal farmers. In urban areas residents have limited access to agriculture because land is scarce. Also the fact that residents are congested in most high density suburbs makes it very difficult to live with faeces in their yards, especially when they are not properly trained on how to operate and maintain the new systems.

9. Conclusion and Recommendations

It can therefore be concluded that, according to the findings of this study, there were a lot of challenges in the implementation, operation and management of ecological sanitation toilets in Victoria Ranch. These challenges have to be addressed first for the ecological sanitation project to meet the desired goals.

Based on the findings and conclusions discussed in this paper the study came up with the following recommendations:

- **Advocacy and training:** There is an urgent need for communicating the advantages and importance of ecological sanitation toilet systems to residents. They also need to be trained in the rationale and context of the new system so that they understand and actively participate in the implementation of the system. Formal training sessions on operation and management of ecological sanitation toilets are thus recommended. The study also recommends prior and intensive awareness campaigns and advocacy to remove negative attitudes towards ecological sanitation toilets.
- **Undertake regular reviews and check-ups:** Authorities should undertake follow-ups, monitoring and performance evaluation. Such follow-ups ensure that residents use their toilets properly.
- **Further studies are required:** The research project used a case study approach. It is therefore recommended that more broad studies be carried out in high density areas in large cities like Harare.

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