

# USERS' PERCEPTIONS OF URINE DIVERSION DRY TOILETS IN HULL STREET MEDIUM DENSITY MIXED HOUSING, KIMBERLEY, SOUTH AFRICA

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## Abstract

*The South African government provides a range of technical options for basic dry and wet sanitation. The urine diversion sanitation system seems to be a potentially sustainable solution for the water scarcity challenge facing South Africa. The urine diversion dry (UDD) technology uses relatively less water than the conventional flush system and has been widely implemented in rural settlements.*

*This paper presents the findings of a study that sought to understand the socio-cultural perceptions and practices of users of the UDD toilet in the Hull Street Medium Density Mixed Housing (MDMH) project in Kimberley, Northern Cape Province, and the extent to which users accepted or rejected these toilets. The study was qualitative in nature and employed a case study research design with purposive sampling. Semi-structured interviews were used to collect data, which was then subjected to content analysis in order to reveal salient themes regarding the use of UDD.*

*The findings of the study revealed a high degree of user dissatisfaction regarding the use of urine diversion dry toilets, which emanated primarily from poor design. The low acceptance of the UDD technology may also be attributed to a lack of institutional support from politicians and officials at the local municipality. Consequently, the Sol Plaatje Housing Company which manages the Hull Street project has taken a decision to convert the UDD system into the waterborne system.*

**Keywords:** Urine diversion dry UDD toilets, medium density mixed housing (MDMH), socio-cultural perceptions, and users/residents.

## INTRODUCTION

South Africa is a water-scarce country and this situation is likely to be exacerbated by the spectre of climate change, it is vital that wider sustainability concerns are tackled. The government has explored a range of sanitation technical options, which includes among others, waterborne, the Ventilated Improved Pit (VIP) toilet and composting/Urine Diversion Dry (UDD) toilet widely known as ecosan (Matsebe, 2011). Of these, UDD sanitation technology seems to be a potentially sustainable solution to address this major challenge. This technology does not use water for flushing, separates collection of human excreta with less damage to the environment (EcosanRes, 2008). In South Africa, this technology has been implemented mostly in some rural and peri-urban residential settings (Duncker *et al.*, 2007).

Since the sanitation function (previously with the Department of Water Affairs and Forestry) has become an integral part of the Department of Human Settlements in 2010 (Matsebe, 2011), it was therefore, deemed necessary to explore the integration of the UDD toilets in medium density mixed housing (MDMH).

## BACKGROUND

This paper presents the findings of a research study conducted, with an aim to understand the socio-cultural perceptions and practices of the users of the UDD toilets in Hull Street medium density mixed housing (MDMH) project in Kimberley, Northern Cape Province, and the extent to which users accepted or rejected this technology.



**Figure 1:** UDD toilet in Hull Street **Figure 2:** UDD toilet (Source: EcoSanRes, 2008) (Source, 2001).

MDMH refers to a housing development that has a minimum of 50 dwelling units per hectare (du/ha) and a maximum of 125 du/ha (Landman *et al.*, 2007 and Osman, 2010). These various densities have different spatial and physical manifestations. MDMH is generally characterised by ground level entry, private external space for each dwelling unit, close proximity to secure parking and ground related – thus these developments are rarely over 3-4 stories above ground. These characteristics promote integration and facilitate some social and spatial mix within a housing development (*ibid*). The building typologies are varied and may include stand-alone houses.

According to the Department of Housing (2004), such a housing typology is advocated in the South African Department of Human Settlements's plan known as "Breaking New Ground" (BNG). The objective of BNG is to ensure that this housing typology has a greater mix, as well as a higher density, than is current the case. Part of the significant aspect of MDMH is its ability to accommodate a large number of people in a small place with easy access to services and facilities (Landman *et al.*, 2007 and Osman, 2010).



*Figure 3: Single and double storey units in Hull Street (Source: Landman et al., 2009)*

## **RESEARCH METHODS**

The study was qualitative in nature, i.e. the focus was on providing explanation and description rather measurement, with an intention of gathering as many diverse options as possible (Matsebe, 2011). The rationale behind this method was mainly to understand the participants' feelings, experiences, social situations, or phenomena in their natural setting.

The research used a case study research design, defined by Yin (1984:23) as an "empirical inquiry that investigates a contemporary phenomenon within a real life context, when the boundaries between phenomenon and context are not clearly evident, and in which multiple scores of evidence are used". Furthermore, a phenomenological research design was used and is concerned with understanding social and psychological phenomena being studied (Welman *et al.*, 2005).

Purposive sampling, also referred as judgemental, selective or subjective sampling is a non-sampling technique used in the study to select the participants involved in the study (Matsebe, 2011). That is, the researcher selected participants with specific purpose in mind (Neuman, 2003). Characteristics for selected participants included among other: race, gender, position in the household, age, language, duration of stay at Hull Street, preference for the UDD toilet and unit size. The study was conducted from 29 to 31 August 2011, with all racial groups of South Africa represented, namely, coloureds on the majority, followed by blacks, whites and only one Indian household. Both males and females participants, who have been staying in Hull Street from the inception of the project (more than eight years) and new ones (less than two years). The sample size comprised 16 participants, 13 of whom were residents

of the Hull Street housing projects and three were employees of the Sol Plaatjie Housing Company, which oversees operation and maintenance of Hull Street.

Semi-structured interviews and a Dictaphone recorder were used to collect data, which was then subjected to content analysis in order to reveal salient themes regarding the use of UDD toilets (Matsebe, 2011). These interviews were conducted with the use of an open-ended questionnaire. One of the benefits of semi-structured interviews is that an interviewer is free to stray from the interview guide, and allow him/her to elicit information through probing, in order to get clarity and in-depth information on the subject (RWJF, 2008; Welman *et al.*, 2005). In addition, semi-structured interviews were suitable for this study as the topic of discussion was very sensitive for some users. Conversely, semi-structured interviews have a number of limitations, including the fact that they are costly and time consuming. Moreover, participants may not trust the researcher, and therefore, withhold relevant information and responding less frankly (Cargan, 2007).

## **FINDINGS**

The findings of the study revealed a high degree of user dissatisfaction regarding the use of the UDD toilet, which emanated primarily from poor design of the toilet facility. Overall perceptions of users of the UDD toilets were summarised into four categories (Matsebe, 2011):

### **Design, use and functionality**

Some users perceived the toilet to be smelly, unhygienic, backward and of an inferior standard (referred to it as a bucket toilet/system) unsuitable for an urban modern housing development like Hull Street. According to Matsebe. (2011), the obtained findings revealed that some users of UDD toilets did not find it easy to use it due to its design, especially in terms of sitting positions as one has to aim properly when sitting depending on the purpose of using the toilet (urinating or defecating). Furthermore, it was highlighted that some women users (particularly large body size) experienced discomfort in terms of the seating position that is, moving forward when urinating and backward when defecating.

The study further revealed that the design of the toilet poses health risk as some female users felt uncomfortable using the toilet, particularly when the wind blows into the pedestal from outside (lid of the vault not properly sealed). This led to an assumption that the wind was responsible for the contracting of diseases such as infections (suffering pains from womb). Some users complained of inhaling lime when sprinkled on top of faeces. Snakes were also reported to be found in the toilet entering from the lid of the vault.

### **Operation and maintenance**

All the participants were knowledgeable on how the UDD toilet functions as per policy of the Sol Plaatjie Housing Company (SPHC) to educate potential residents when viewing the units. This was also reinforced by the maintenance staff members when emptying faeces' vaults on a weekly basis.

Despite the fact that maintenance measures to address odour have been put in place such as the installation of fans and use of lime to cover faeces, participants still find the odour disturbing, especially when cleaning the toilet. The cost to operate and maintain the toilet was perceived to be higher than a conventional flush toilets as users or residents spend lot of

money to buy a range of detergents and disinfectants to keep the UDD toilet clean and alleviate the smell. The respondents also indicated that since the maintenance people from the SPHC collect bags of faeces once a week, they (the participants) had to pay R10 for extra collection in that week (two or three times) as they felt that collection once in a week was not enough because the vault was small and smelled when faeces was stored for a longer period. Participants paid an extra cost to run an extraction fan that consumes lot of electricity. However, to counter these costs, there is a free basic water service of 6000l available to every household per month. The UDD toilet has a positive spin-off in that users save on water that is flushed away in a waterborne system, which contributes towards increasing the water bill.

Some users found it a daunting task and an embarrassment to explain to visitors how the toilet functions. This ultimately resulted in the correct use of the toilet and some avoided hosting visitors in their homes. However, a large number of informants mentioned that they found it easy to clean the toilet.

The residents' level of commitment towards the operation and maintenance of UDD toilets is low, particularly as they were not owners of the housing units yet (all residents are tenants since the rent-to-buy tenure status is not yet applicable in practice).

### **Users' perceptions and attitudes**

The findings of the study revealed that most of the users preferred a flush toilet to the UDD toilet and would not recommend it to other people. They were also willing to pay extra for flushing water.

Despite the fact that one of the benefits of installing the UDD toilet is the production of fertiliser from nutrients in human excreta, participants did not buy into this idea as most of them felt that they did not need or use it in the garden. They considered it waste, and hence would rather have a flush toilet. Moreover, participants perceived the UDD toilets to be unpleasant and unhealthy due to offensive odours (Duncker *et. al.*, 2006). All these resulted in low acceptance of the toilet.

Although most participants had knowledge of the fertilizer value of human faeces as compost from various sources, they still regarded it as waste and as unhealthy. Most of them had gardens (lawn, plants, flowers and fruit trees), but only a few of them were using dry faeces as compost on non-edible plants or lawn. Non-acceptance of the UDD toilets ultimately resulted in conversion of the system into a waterborne system.

### **Socio-cultural influences/impact**

The obtained results revealed that Muslim participants felt that some of the principles of the UDD toilet conflict with their culture of using water for anal cleansing, thus influencing their reluctance towards a UDD toilet. The Islamic religion requires cleaning of all body openings, including anal cleansing as a common practice for purification rituals prior to praying. However, one of the principles of the UDD toilet was to avoid water inside the faeces' vault as it aggravates the smell. It is therefore necessary to ensure that the design of the toilet is appropriate and suitable to use by all targeted users.

The results of the the study showed gender bias in terms of cleaning the toilet. Most participants cleaning the toilets were females who were responsible for the upkeep of the entire household. Although they did not like cleaning the UDD toilet, they felt obliged to do so since it was part of general cleaning of the household.

## RECOMMENDATIONS

Given the above challenges, a number of recommendations were highlighted:

Planning is political. There is a strong need to get a buy-in from politicians and government officials for the success of developmental projects. Despite efforts put by the SPHC to promote and provide training on the UDD systems, the project could not succeed owing to lack of institutional support (for the project).

Since South Africa is a water-scarce country, there is a need for government to invest in continuously raising awareness to the general public on the wider benefits of the UDD sanitation technology and environmental sustainability aspects, notwithstanding that surveys have revealed that UDD obviously requires institutional and technical modification. The target group should include among others: politicians and government officials responsible for making and implementing decisions, as well as policy makers. The UDD sanitation system is in this regard one of the possible solutions towards addressing this challenge as it is a waterless system.

The orientation of the UDD toilet in a house should be such that the vault is exposed to the northern sun to enhance fecal drying. The window should face the opposite end of the vault to allow ventilation of the unit.

It is important to first establish if there is a real demand for an organic best fertilizer (human excreta) from a sanitation system and then design the sanitation system accordingly taking into account the needs and cultural norms and values of the targeted users.

The UDD sanitation system should be made available to everyone, particularly those with an interest in environmental aspects or who will derive some benefits from them (e.g. farming communities).

To counter the low acceptance of the technology, it is of great significance to ensure that innovative technology is firstly introduced at the upper level of the market (celebrities, elites etc.)

It is essential to pilot the UDD sanitation projects in well-frequented places (e.g. community centres). For instance, a practical approach was followed by France whereby the UDD toilets were introduced to communities through events and users were then requested to share their opinions on the system. This is significant in identifying a system that meets the needs of the users. This approach is also appropriate in creating public awareness.

An integrative approach to housing and UDD sanitation supply is recommended, where both fields are viewed as equally important issues in delivery of sustainable human settlements. It is therefore, necessary to ensure that potential users are thoroughly engaged throughout the process in order to be well informed about the UDD sanitation system.

## CONCLUSION

Overall, the UDD toilets appeared not to have been accepted by the users, primary due to design aspects. The project lacked institutional support from politicians and officials at the local municipality. This could have also attributed to low acceptance of the technology. The Sol Plaatje Housing Company then decided to convert the UDD system into the waterborne system. Therefore, it is of great significance for future research to explore the UDD system addressing the key challenges that are design-related.

Operation and maintenance costs of the UDD toilets were higher than the flush toilet, thus defeating the purpose of water saving. In addition, there is a strong need for implementation of sanitation technologies that are environmentally-friendly, such as UDD toilets. Other strategies need to be explored that focus on ensuring that technical innovation should emerge from the context and not be forced onto the community. Emphasis should be put on continuous education of the public at large to the sustainability aspects of the UDD technology, so as to change perceptions about it.

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