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Prejudices and attitudes toward reuse of nutrients from urine diversion toilets in South Africa

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More than 60 000 urine diversion toilets have been built in South Africa in the last decade, but the use of human excreta for food production is not generally being promoted. This paper discusses the study conducted by The Council For Scientific and Industrial Research (CSIR), investigating users' perceptions and attitudes towards urine diversion sanitation (UDS) in South Africa for the past seven years. The research method focused on semi-structured household interviews while validating and cross-checking the responses with physical observation and small focus group discussions. The main findings of this research were that people were aware of the fertiliser value of human faeces but not of human urine and that only some users were willing to use only human faeces in their gardens. In South Africa, many communities rely on subsistence agriculture, often in poor soils. Therefore, it is important to change people's views and attitudes (how they think about and act) towards human excreta in order to achieve ecological sanitation solutions for food production.

Introduction

In nature, excreta from humans and animals play an essential role in building healthy soils and providing valuable nutrients for plants (Austin and Duncker, 2002). Use of human excreta in agriculture for food production internationally, especially in China, is an old and well-known practice (Duncker *et al.*, 2007). The use of sanitised human excreta as a fertiliser stimulates crop growth and, as a result, increases nutrition for those who depend on subsistence farming, or helps to generate or supplement income for those who sell the products they grow. Human excreta are a rich source of nitrogen and other nutrients essential for plant growth (Reed & Shaw, 2003 cited in Duncker *et al.*, 2007).

A recycling society must switch from linear solutions to circular approaches, protecting ecosystems and harmonising with natural systems. Ecological sanitation, an alternative to conventional approaches, considers excreta a resource. Excreta are rendered safe at the source prior to reuse. The ecosystem approach helps restore soil fertility, and ultimately enhances food security (Esrey, 2001). Key features of ecological sanitation are prevention of pollution and disease caused by human excreta (faeces and urine), treatment of human excreta as a resource rather than waste, and recovery and recycling of the nutrients (Austin and Duncker, 2002).

The Bill of Rights of the South African Constitution (Chapter 2, Section 27.1b) entrenches every citizen's right of access to sufficient food and water (South Africa, 1996). Although food security has become a government priority and South Africa is considered to be self-sufficient in food production, an estimated 1, 5 million children suffer from malnutrition and 14 million people are vulnerable to food insecurity (National Treasury, 2003; de Klerk *et al.*, 2004 cited in Duncker *et al.*, 2007). Food security is not only dependent on the ability of agriculture to produce sufficient food at a national level; food insecurity also results from the failure of communities to guarantee access to sufficient food at the household level (Clover, 2003 cited in Duncker *et al.*, 2007). Analysts believe that Africa's current food emergencies have resulted from a combination of problems and that no single factor is uniquely responsible. South Africa is characterised by high levels of poverty, especially in rural areas where approximately 70% of South Africa's poor people reside. Their incomes are constrained because the rural economy is not sufficiently vibrant to provide them with remunerative jobs or self-employment opportunities. Therefore, they have to rely on subsistence farming and food production, often in poor soils. Despite the poor people's need to grow food, the high cost of standard compost production and chemical fertilisers remain major constraints in fulfilling their need for

food production (Duncker *et al.*, 2007). To counteract this situation, the international trends suggest low-cost, ecologically suitable alternative fertilisers, such as human excreta.

More than 60 000 UD toilets have been supplied as basic sanitation facilities in South Africa in the last decade, but the use of human excreta for maintaining soil resources is not generally being promoted (Duncker *et al.*, 2007). This ecological sanitation approach links sanitation with agriculture and food production. Although South Africans generally regard human excreta as a waste product, biophysical concerns such as land degradation, declining soil fertility and limited phosphorus reserves have made it necessary to determine means of changing this perception to one that views excreta as a valuable and useful resource (Rosemarin, 2005 cited in Duncker *et al.*, 2007). The direct benefits associated with the use of human excreta for agricultural purposes include protection and improvement of natural resources such as water and soil. In turn, this enables households to increase food crops, but also have indirect benefit of improved food security, resulting in improved health of the individual, greater productivity, increased economic output and opportunities, and a decreasing burden on social services. Therefore, it is of great significance to change people's views and attitudes (how they think about and act) towards human excreta in order to achieve ecological sanitation solutions for food production (Duncker *et al.*, 2007).

This paper will discuss outcomes of the study on the users' perceptions and attitudes towards urine diversion sanitation in relation to agricultural benefits in South Africa and the research process followed.

Project background

The CSIR has conducted a scoping study to investigate the use of human excreta in South Africa and to determine, through primary research, the attitudes and perceptions of people in rural settlements towards the acceptability of using human excreta in agriculture for food production in four rural settlements in South Africa (in four provinces, namely, Kwazulu-Natal (KZN), Eastern Cape (EC), Northern Cape (NC) and Limpopo) (Fig. 1) in 2006. This research was funded by The Water Research Commission.

Research methodology

The research methodology focused on data collection in a way that reflected the true situation in the community as closely as possible, without reducing the research to the level of "count 'em" mechanics. It was decided to conduct qualitative research through the use of semi-structured household interviews while

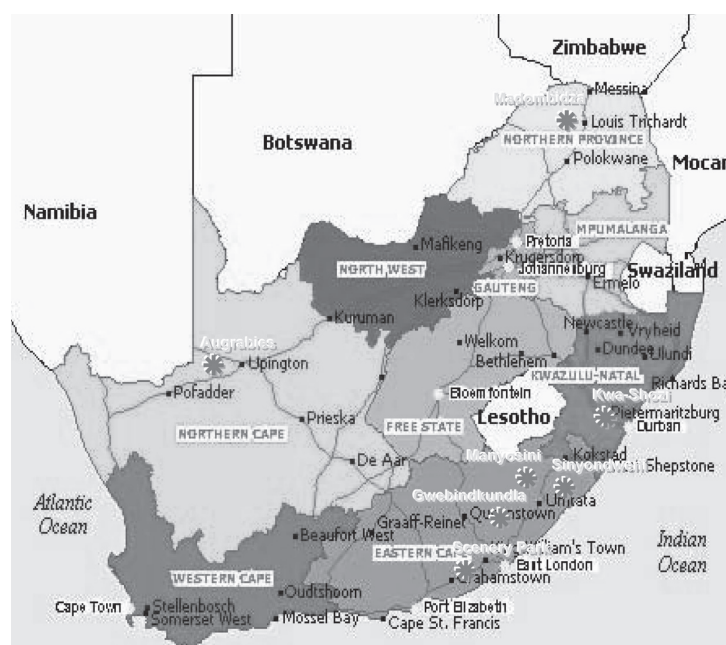


Figure 1. Case study areas (marked with a flower)

Source: Duncker *et al.*, 2007

validating and cross-checking the responses with physical observation and small focus group discussions. This proved to be the most successful and unbiased method of collecting information about a sensitive issue such as household sanitation practice. The method for the research focused on participatory data gathering in the target communities (Duncker *et. al.*, 2007).

The data was ranked according to the number of times a response was mentioned, then listed and grouped according to the responses. The lists and groupings were entered into MS Access and analysed in MS Excel.

The nature of the qualitative data is subjective and can be meant and interpreted in many ways. Therefore, processes for checking and validating the understanding, meaning and trustworthiness of the information obtained, were put in place before the start of the information gathering and occurred throughout the implementation of the research. Responses from the spokespersons were discussed with the spokespersons by the interviewers to ensure a common understanding of what the exact meaning of a response was.

Research findings

In South Africa the subsidy system supports two options for dry sanitation: that is, UD and VIP, of which only UD is an ecosan option. At this point in time UD as part of ecosan is the most beneficial in the South African subsidy context. In future, other ecosan options might become available. The research findings from identified factors (such as taboos, quality of construction of the UD toilet, expectations and aspirations, gender issues, health and hygiene, affordability and acceptability) that impact on the perceptions and attitudes of the people in South Africa towards ecological sanitation (urine diversion in particular) and the use of human excreta for food production are presented below (Duncker, *et. al.*, 2007):

Taboos

In South Africa the perceptions and attitudes, more than beliefs, of the people present a major stumbling block to the use of products from UD toilets as food and human faeces are not supposed to be even mentioned in the same breath. Urine is also perceived as harmful to plants, even though babies' urine is used for medicinal purposes, for example treating eye infections. A person could also be infected by handling human faeces and by inhaling the smell of it. A number of chest infections, such as influenza and colds, were said to have been caused by the smell of human faeces. However, in most cases the users were not aware of the transmission routes of excreta-related diseases and, for example, focused on keeping the floors clean in the UD toilet as a prevention method for diseases, instead of keeping the pedestal clean and washing hands.

Quality of construction of the UD toilets

Respondents in the Northern Cape were concerned about the quality of construction of the UD toilets. It seems that there were no standard designs and norms according to which these toilets were supposed to be constructed. Many of the UD toilets had been constructed by unskilled contractors, using inferior and cheap materials in order to boost their profits. This had a major impact on the sustainability of these toilets. The households in the Northern Cape had been using the UD toilets for more than three years. They said that they no longer liked the UD toilet because these toilets had been badly constructed; the superstructure, toilet pedestal and doors had started falling apart and breaking. The pipes used for the diversion of the urine were also too small, which resulted in blocked pipes leaking into the vault and creating a smelly cesspit full of flies and cockroaches, instead of a dry chamber. The covers over the vaults were also sealed with mortar, which made them very difficult to remove and reseal when the vault had to be emptied.

The households in Mthatha in the Eastern Cape had been using their UD toilets since 1998 and still liked them. These toilets were well constructed and still in very good condition.

Gender

The gender split of the respondents in the field research was 75% female and 25% male. This was due to the fact that, when the research was conducted, the female household members were more readily available during the day (being at home, not having a day job) while the male household members were away at work. Also, 28% of the households were headed by women (female-headed households). Generally, the female respondents had a higher level of knowledge regarding the fertiliser value of human excreta and the medicinal value of human urine. However, the traditional gender roles in the communities were still observed and sanitation was regarded as a women's issue. Men, therefore, did not have much of an opinion regarding the use of human excreta. Most of the male respondents did reply that they would not be willing to eat food that was grown in human excreta because it was "unhealthy" and "unhygienic". Despite the fact that most men are the gardeners in the household, they still do not know much about human excreta as fertiliser, they prefer to use commercial/chemical fertilisers.

Expectations and aspirations

All the households that were interviewed wanted to have flush toilets (water-borne sanitation), as it is considered superior to all sanitation technologies. Flush toilets are perceived as a rich man's choice. This mindset may be due to the fact that flush toilets were not provided to the majority of black communities during the apartheid era, with only a few households in some townships had the privilege. The basic provision of VIP does not meet the aspirations and expectations of users, they also felt they had no input or choice in the matter. Some politicians (premiers and councillors) in some provinces raised people's expectations by promising them flush toilets and then the people were surprised to receive technologies such as UD, which is considered to be inferior and mainly provided to poor people in rural areas. This resulted in a negative attitude towards the technology and, in some cases, the toilets were vandalised to prove that they were not appropriate to their situation and culture. For a water scarce country such as South Africa, UD is more beneficial than the flush toilets that are currently in demand. UD technology affords the users an opportunity to practice agriculture on rich fertilised soil which in turn gives forth fresh produce allowing the user a healthy diet and an opportunity to earn an income from selling the produce, which is not possible in the cases of VIP and flush toilets.

Use of human excreta

The responses from the households interviewed regarding their willingness to use human urine and faeces in their vegetable gardens differed from province to province as a result of the extent of exposure to the concept of urine diversion sanitation. The main findings of this research were that people were aware of the fertiliser value of human faeces but not of human urine, and that some households were using only human faeces in their gardens. Urine is not used in vegetable gardens or maize fields, as the urine pipe goes into the soak pit. Only the households interviewed in the villages around Mthatha in the Eastern Cape said that they used human excreta as fertiliser for their vegetable gardens and maize fields. These households have been using urine diversion sanitation for eight years and accepted the technology completely. (Photograph 1 & 2).

The main reason provided by those who did not want to use human excreta in their vegetable gardens was that using human excreta was considered "unhealthy" as well as "smelly".

None of the other households interviewed in the provinces, apart from NC and EC, used human excreta as fertiliser or to make compost for their gardens.



Photograph 1. Human excreta being removed from vault in Mthatha (EC)



Photograph 2. Human excreta being mixed with ash and soil in Mthatha (EC)

Health and hygiene

The health and hygiene issues were prominently mentioned by the respondents mainly because of national and international hygiene campaigns, such as Water, Sanitation and Hygiene for all (WASH) that had been run in most rural areas due to the outbreak of cholera. The messages of these hygiene campaigns were in opposition to the purpose and objectives of the 'closed-loop' ecological and urine diversion sanitation technology and strategies.

Acceptability and affordability

Community participation in the implementation of urine diversion sanitation projects also had a major impact on the views and perceptions of the respondents. In KwaZulu-Natal, a municipality decided to implement

a dry sanitation strategy but not to advocate the use of human excreta. The respondents felt that they had no input or choice in the matter, which also had a negative effect on the acceptance of the technology. In the Northern Cape the respondents were acutely aware of the water scarcity in the area and understood the necessity for dry sanitation and therefore accepted the technology. In the Eastern Cape, urine diversion sanitation projects had also been implemented with the participation and involvement of the households and acceptance was high.

Many of the households interviewed during the research were poor with a very low and sporadic income. Any sanitation technology needs to be affordable to all people from all levels of income. Information provided by eThekweni Municipality highlighted that the cost of building a double vault UD toilet ranges from R4500 to R5000 (approximately \$653 – \$726 US) on an easily accessible site. In areas with poor access, or where the terrain is rough or steep, this cost can increase to R6500 (\$943 US). The cost of a single vault UD or VIP toilet is similar, approximately R4000 (\$581 US), but the advantage of the UD toilet is the possible added income from fertiliser and/or garden produce. The cost of a flush toilet (including materials and labour) is in excess of R10 000 (\$1,474 US). Both VIP and UD sanitation technologies are highly subsidised by the government, but can also be sustainable in the absence of a subsidy because of similar costs (R4000/\$581 US). In contrast, a flush toilet is in most cases an inappropriate technology due to factors such as high capital costs, expensive operation and maintenance, water scarcity and limited subsidy (only for some people living in government subsidised houses – not all housing schemes). The costs and practicality of changing people's behaviours, as opposed to devising sanitation solutions that address existing behaviours have not been researched as yet, and will be discussed once the research has been conducted.

Conclusion

In South Africa the handling of human excreta and its use for food production are still very foreign ideas and generally not acceptable. Human excreta are seen as waste products, unhealthy, unhygienic and detrimental to humans. Even though some of the respondents said that they would use human excreta in their gardens and eat the food produced, it remains to be seen whether they will in actual fact do so. In general the female respondents had a higher level of knowledge regarding the fertiliser value of human excreta and the medicinal value of human urine. However, the traditional gender roles in the communities were still observed and sanitation was regarded as a women's issue.

The fact that the use of human excreta for agricultural purposes is widely practiced (internationally and in Africa) shows that it is logical and acceptable from the users' point of view. This can benefit South African communities relying on subsistence agriculture, often in poor soils.

Recommendations

It is of great significance to change societal or human perceptions in order to ensure the success of urine diversion sanitation technology.

- Part of the solution includes educating each other – involving all the stakeholders to participate in a project. Positive attitudes towards the use of excreta need to be reinforced with awareness programmes and practical demonstrations on the safe use of human manure. Production of human manure should be associated with the safe use of animal manure. Leading by example should be the best way; therefore councillors and highly respected people in the communities (politicians) should install UD toilets in their houses and start using human excreta in their gardens, and the rest would follow. Demonstration toilets, peer education and peer pressure were reported to bring about attitude change in other countries. Demonstration creates awareness and visual aids improve and enhance understanding. Achieving or marketing ecological sanitation solutions for food production requires a change in how people think about, and act towards, human excreta
- Government should play a major role in widely promoting the technology through various media. People promoting the technology should have extensive knowledge of the subject to ensure that users of this sanitation system understand it well, prior to implementing a project. Designing programmes that allow people to explore their realities more effectively (with participatory methodologies) combined with a social marketing approach that uses different mediums of communication (radio, drama, and visits to demonstration latrines) to reinforce knowledge would enhance the programme considerably. Targeting middle- and high-income earners to promote the technology through the eco-village concept will also create “status” for the technology.
- The health and hygiene education should emphasise safe use of human excreta on food production from

the start to reinforce householders' choice of reuse of nutrients. The full concept of ecological sanitation and its potential benefits should be advocated rather than just the toilet function. An adequate education and hygiene awareness campaigns in communities receiving ecosan toilets should be a prerequisite for the maintenance of public health.

- Follow-up and support after implementation of the project, to iron out misunderstandings and problems, and retraining in operation and maintenance, should be conducted to ensure the sustainability of the toilets.
- A study on the factors that are important in changing the perceptions and views of people regarding the use of human excreta for food production will be of great value, as the research has shown that scope does exist, and that people are willing to change their minds. Such a study should focus on the areas where urine diversion sanitation projects were successfully and sustainably implemented and where households are actively using human excreta in their vegetable gardens.

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