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Can IKS Increase Acceptability of Human Excreta in Agriculture? Evidence from a Preliminary Study in KwaZulu-Natal Province

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ABSTRACT This was a qualitative study conducted in peri-urban and rural KwaZulu-Natal Province. It examined the social acceptility of reusing treated effluent from a Decentralized Wastewater Treatment System (DEWAT) system in agriculture. The study found that participants were open to growing and consuming food produced using treated effluent in agriculture and made references to indigenous practices that encourage recycling and reuse of human excreta. Given the high level of acceptability of effluent in agriculture, it can be concluded that the DEWAT system provides a viable option in addressing the challenges of sanitation backlog and food insecurity in a manner that is environmentally safe. The study recommends that the design of social housing as well as sanitation facilities should take into account how effluent can be harvested for agricultural use. Further research is required to map and document existing indigeneous beliefs and practices that could enhance acceptability of effluent in agriculture.

INTRODUCTION

Cofie et al. (2005) indicated that the use of organic materials, in Africa, to increase soil productivity tend to focus on crop-residue management, use of green and animal manures, and legume cover cropping. Very few studies have assessed the use of human waste for agriculture, even though this is practiced by farmers in various parts of the continent. Similarly, Timmer and Visker (1998) showed that as part of the ancient indigenous knowledge practices and systems, the majority of Asian countries have used human waste (faeces and urine) as fertiliser. It is against this backdrop, Owusu-Ansahan and Mji (2013: 1) argued that "knowledge or science, and its methods of investigation, cannot be separated from a people's history, cultural context and worldview" (Owusu-Ansahan and Mji 2013: 1). However, such knowledge is not limited to the community but has practical applications to other communities.

Barriers to the acceptance of human excreta reuse in agriculture has been researched in other African countries. Despite the benefits of reusing human excreta in agriculture, the design of sanitation systems have largely ignored incorporating the harvest of human excreta for agricultural purpose (Magid 2006; Muskolus 2008; Cofie et al. 2010; Benoit 2012; Hedden and Cilliers 2014). The study by Mariwah and Dranget (2011) on the acceptability of human excreta for agricultural use among farmers in Ghana revealed the following socio-cultural barriers to use of human excreta in agriculture: (i) Human excreta is a waste and suitable only for disposal; (ii) Handling excreta is great health risk; (iii) Human excreta should not be handled in any way; (iv) Human urine has no benefit to humans; (v) It is a taboo to handle urine; (vi) Human faeces have no benefit to humans; (vii) It is a taboo to touch faeces; (viii) It is a taboo to touch treated faeces.

Some researchers like Timmer and Visker (1998) have attributed the limited use of human excreta in nutrient reusage in Africa to land abundance, shifting cultivation and lack of population pressure. However, in sub-Sahara Africa, human excreta has great potential to improve soil fertility levels; its production is about 27 million tonnes annually. The sanitation sector benefits were also highlighted as human excreta has become a valuable nutrient resource, which could motivate people to empty, use, and maintain sanitary facilities. Cultural values and beliefs concerning the collection, disposal and use of human faeces are very diverse and can crucially affect the acceptance of collection, disposal and use (Timmer and Visker 1998). Akeredolu et al. (2006) showed that due to increas-

ing costs of chemical fertilisers local farmers who have a cultural experience of using human excreta continue to apply it to their fields for its nutrient value.

It is on the basis of the above that the paper draws on the experience of a large project titled "Integrating Agriculture in Designing Low Cost Sanitation Technologies in Social Housing Schemes." The primary aim of this project was to provide design data for the agricultural use of treated wastewater from a Decentralized Wastewater Treatment System (DEWATS) plant. The DEWATS plant uses the process of anaerobic digestion to treat waste. Human waste from households is channeled through a series of baffles in a reactor. The sludge accumulates and settles in the chambers and treated effluent is discharged from the system and passed through artificial wetlands. The treated effluent from the DEWATS plant poses a challenge with regard to disposal because it contains high concentrations of nitrogen and phosphorus which do not meet regulatory standards for discharge and can contaminate surface and ground waterbodies. However, using this effluent in agriculture could provide an innovative way of disposal in a manner that is environmentally safe and beneficial to society. Ongoing sanitation backlogs and food insecurity are among key development issues in contempoarty society. In recent years, there has been an increasing recognition of the linkage between sanitation and food security. This has resulted in calls for bridging the sanitation-food-security loop.

Table 1 compares the percentage of people with access to different sanitation options in South Africa in 1990 and 2012. Table 1 shows that access to improved and shared facilities has increased for both rural and urban dwellers.

The prevalence of sanitation backlog, associated environmental degradation and health risks varies significantly across different regions with Sub-Sahara Africa having the highest proportion (74%) of people without access to improved sanitation. This has been documented by numerous researchers and institutions (Haarhoff et al. 2007; Mbatha et al. 2008; Water Research Commission 2011; Graha and Polizzotto 2013; Bill and Melinda Gates Foundation 2014; United Nations Children Fund (UNICEF) 2014).

There have been proposals for the integration of agriculture into the design of sanitation facilities in recent years (United Nations Development Programme 2008). This view is often linked to the idea of ecological sanitation (EcoSan). EcoSan is "a sustainable, closed-loop system, which closes the gap between sanitation and agriculture. The underlying aim is to close (local) nutrient and water cycles with as less expenditure on material and energy as possible to contribute to a sustainable development." This approach is underpinned by a paradigm shift towards seeing human excreta as a resource and calls for exploring new ways to reuse human excreta instead of being discarded as waste. Researchers such as Cordell et al. (2009), Mariwah and Drangert (2011), Haq and Cambridge (2012) and Appiah-Effah et al. (2015) have debated around the reuse of human excreta in agriculture premised on the fact that human excreta is rich in macronutrients such as Nitrogen (N), Phosphorus (P) and Potassium (K).

METHODOLOGY

This study was grounded on the qualitative interpretivist paradigm within the broader framework of Afrocentric research paradigm. Afrocentric paradigm, according to Mkabela (2005: 180), "locates research from an African viewpoint and creates Africa's own intellectual perspective." It

Table 1: A comparison of the percentage of people with access to different sanitation options in South Africa in 1990 and 2012

Sanitation facilities	*Sanitation coverage (%)*				*Total*
	Urban		*Rural*		
	1990	*2012*	*1990*	*2012*	
Improved	75	82	40	62	74
Shared	13	14	12	10	13
Other improved	10	3	16	18	8
Open defecation	2	1	10	14	5

Source: WHO/UNICEF 2014

emphasis respect for elders and research participants. Furthermore, the afrocentric paradigm recognises the existence of multiple perspectives and encourages local views in answering research questions. Effectively, the afrocentric paradigm provides opportunities for "new insights and dimensions in the understanding of African indigenous culture, in a multicultural context" (Mkabela 2005: 180).

In line with the Afrocentric paradigm, primary data were collected through seven focus group discussions over a period of three non-consecutive days. Two of the discussions were in peri-urban areas while five were in rural areas. The choice of the locations was to understand whether perceptions about the use of effluent in agriculture is influenced by the rural-urban divide. Each focus group comprised a minimum of five participants while there were nine participants in the largest group. In total, there were 48 participants in all the focus groups that were predominantly female (N=39). The youngest participant in the focus group discussion was 19 years while the oldest was 77 years.

Each focus group discussion was preceded by a comprehensive introduction that explained the purpose of the focus group, an overview of the DEWAT system and its linkage to agriculture. The explanation was aided with pictures of the DEWATS plant and its integration into agriculture. After introduction, participants were invited to ask questions on issues that required clarifications. Further discussions only commenced once all participants confirmed that they had a clear understanding of the project. All focus group discussions were recorded with an audio recorder after obtaining permission of research participants. Recorded discussions were transcribed and coded with Nvivo. In the remaining part of this report, the researchers have presented findings from the primary research.

RESULTS AND DISCUSSION

One of the aims of the study was to understand if the study participants were open to using DEWATS effluent in agriculture. In all the focus group discussions, no participant was opposed to using the effluent in agriculture. Most respondents noted that it was a good idea to use effluent in agriculture even though none of them was aware of its potential benefit in agriculture prior to the focus groups. Some participants drew parallels between water recycling in urban centers and using effluent in agriculture. These participants noted that since recycled water is used in urban areas, there was no reason to object to using effluent in agriculture. The excerpts below from focus group discussions present some of the perspectives on the reuse of human excreta in agriculture

"I will use it. This sounds like a good idea and I don't think it will present any problem. I am not sure how we can access the water [effluent] *though."*

"In areas which are more urban, we have heard that they recycle domestic water for drinking water. So we would not be opposed to using the water."

Some of the interviewees from rural areas with experience of using grey water to irrigate farms compared the practice with the use of DEWAT effluent. These respondents were introduced to the use of grey water for irrigation by *Zimele* to address water scarcity. Given that water is a scarce resource in these communities, participants expressed willingness to accept options that will help alleviate water shortage. The following excerpts from focus groups buttress participants' stance on the use of effluent in agriculture:

"At the end of the day, we have to accept this kind of things. I have been taught that I can use grey water on my farm. I have used it and it works."

"Yes, we can. If it something that works, we can use it. We have problems of water here so we can use it."

"Yes, we will use it because we know that they are coming straight from the toilet. They will be treated first. We will know in our hearts where it is coming from but we will use it since it will be treated."

"Yes, I can use it. I have used grey water and I am eating the vegetable from that."

Besides accepting to grow food with treated effluent, the study also examined the willingness of participants to consume food gown using effluent. Analysis of focus group discussions showed that all participants were open to consuming food that have been cultivated using effluent. Some respondents alluded to the possibility that they could already be consuming food grown using effluent since they do not know how the food they buy are produced. A participant made this point in the following excerpt:

"I will eat the food grown in that way. Maybe we might be already eating this because the

cabbage we buy from the shop, we do not know what they are grown from but we eat that food."

A participant from another focus group raised a similar point noting that:

"The amaranth that we buy, those people that are selling it, where are they picking it? Those selling in Durban pick them at the dump site and people buy it from them. People won't go to pick these themselves but they will buy it knowing very well where it is picked from."

Two other participants observed that they consume food that they knew were contaminated with harmful chemicals. These participants noted that consuming food grown with treated effluent is not considered a problem since it does not contain harmful chemicals. A particiapont in a focus group discussion made this point in the following excerpt:

"Yes, I can eat it. For example, when I plant cabbage and it becomes infected, we take these TT chemicals and we spray. We don't know what these sprays contains but we still use it. I don't think this water is worse than those chemicals that I use."

Another participant raised similar view noting that effluent is a natural resource that should be reused in agriculture. The participant noted: *"We drink water from the tap and we are told the water is recycled but we still drink it. We leave our natural things and run to the tap water knowing that it is recycled."*

Indigenous Practices and Acceptability of Treated Effluent in Agriculture

Studies that have examined the social accpeptability of human excreta in agriculture often points to the notion that African beliefs and cultural practices oppose close human contact with excreta. These studies argue that cultural intolerance of close contact with human excreta is a key barrier to reusing human excreta in agriculture in Africa. Against this backdrop, the researchers asked their study participants if there were cultural/religious practices that could be barriers to using effluent in agriculture. Findings of this study showed that all participants were of the view that there was nothing in their culture/religion that forbids using effluent in agriculture. The excerpts below present the views of some of the study participants.

"I am not aware of any religious or cultural barrier."

"There is nothing that will prevent me from using it."

"There is nothing about the culture that prevents us from growing food from this treated waste water."

One participant compared human excreta to cow manure. According to the interviewee, it is a traditional practice to use cower dung as manure. The participant further pointed out that farmers need to be open to new farming practices that can improve yields. The following excerpt from a participant presents this view:

"There are lots of things we see as being dirty or unhealthy whereas if you live closer, you will continue to use them. The same thing works with cow dung that is used for fertilization. It is used and as more as things are being exposed to us that these things can work, we need to learn that these things can help us with our farm."

The traditional practice of harvesting and consuming vegetables from spots around the homestead where young men dispose of urine from the household is another practice that was used to justify acceptance of reusing human exreta in agriculture. According to a participant, this part of the homestead is *"usually very fertile area around the house. We get imbuya* [amaranth] *from there to cook."* The participant observed that this practice shows that cultural practices was not opposed to reusing human excreta in agriculture. According to the participants, the fact that people knew that the amaranth they harvested flourished because of the richness of urine but still consumed it is an indication that they are tolerant of reusing human excreta in agriculture.

Just like the above view, another participant cited the practice of open defecation and the growing and consumption of food from the same spot as a justification for the acceptance of the DEWAT effluent in agriculture. The participant noted that communities were aware that human exreta in such a location becomes manure that enhances plant growth. For the participant, such a practice demonstrates that traditional society was not opposed to using human exreta in agriculture.

Barriers to the Use of Treated Effluent in Agriculture

One of the goals of this study was to understand possible barriers to the adoption of efflu-

ent in agriculture. Although participants in the focus groups were of the view that there was nothing in their culture or religion that forbids using effluent in agriculture, there were observations about possible associated health risks. A number of participants were concerned about becoming from contacts with effluent in the process of irrigating their farms. Despite this concern, all respondents were open to using effluent in agriculture as long as there is a guarantee that there are no associated health risks.

CONCLUSION

The aim of this paper was to examine whether there are indigenous knowledge and practices that can be used to increase the social acceptability of reusing effluent in agriculture for sustainable food security. Existing literature showed that while there were limited studies on the use of human waste for agriculture, it was practiced by farmers in various parts of the continent as part of indigenous knowledge systems. In spite of the benefits of reusing human excreta in agriculture, the design of sanitation systems tends to ignore the use of human excreta and associated socio-cultural practices in agriculture. All respondents indicated that it was a good idea to use effluent in agriculture because of the following factors: (i) the effluent in the low cost sanitation scheme presented in this study undergoes series of treatments that makes the end product more appealing compared to handling raw wet or dry faecal matter and urine; (ii) the detailed explanation of the DEWAT system gave participants a clear understanding of how the system works thus clarifying their doubts and concerns. The use of effluent in agriculture could provide an innovative way of disposal in a manner that is environmentally safe and beneficial to society. Given the high level of acceptability of effluent in agriculture among the study participants, it can be concluded that the DEWAT system provides a viable option in simultaneously addressing the challenges of sanitation backlog and food insecurity.

RECOMMENDATIONS

The study recommends that the design of social housing as well as sanitation facilities need to take into account how effluent can be harvested for agricultural use. Further research should be made to map-out and document existing indigeneous beliefs and practices that could enhance acceptance of effluent in agricultre.

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