

Sanitation and health

Study aims to break the cycle of disease

A newly-completed study, funded by the Water Research Commission (WRC), has made important discoveries around the practice of open defecation, and the ingesting of soil, with potentially serious implications for the transmission of disease in South Africa.

Article compiled by Lani van Vuuren.



Every year, on World Toilet Day (19 November), we are reminded of the plight of the estimated 2.4 billion people worldwide who do not have access to a safe toilet. Safe sanitation is not only an issue of dignity; it is also of crucial importance to the preservation of human health and well-being, especially among children.

There is an urgency to serve the remaining communities – without toilets, people defecate in the open and the faecal contamination of the environment that results is responsible for tragic and preventable death and disease. While the diarrhoeal disease responsible for a high number of deaths among young children and vulnerable persons are often in the spotlight, open defecation is also a virtually sure route for the spread of helminthic (parasitic worm) infections.

Infections with intestinal worms are widespread in South Africa, especially among children. Studies have shown as many as 90%

of children are infected with one or more type of worm in South Africa.

When infected individuals defecate in the open helminth eggs are passed into the soil. While helminthic infections often occur through accidental consumption of eggs from soil on dirty hands, a factor which makes the presence of this 'egg bank' in the soil even more hazardous is the practice of intentionally eating soil – scientifically known as geophagia.

Researchers, Bobbie Louton and Director, David Still, at Pietermaritzburg-based, Partners in Development (PID), became aware of the potential relationship between these three factors, i.e. open defecation, helminthic infections and geophagia, during previous WRC-funded research. The latter phenomenon, especially, has received little attention in South Africa from a research point of view. This prompted the current study, which was completed earlier this year.



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The main objective of the study was to increase understanding of the beliefs, knowledge, attitudes and practices and consequences associated with these three phenomena and explore the role that open defecation and geophagia may play in the transmission of helminthic infections and diarrhoeal diseases.

The study was conducted across 11 local municipalities in the provinces of Limpopo, KwaZulu-Natal and the Eastern Cape. Structured interviews were conducted with 376 householders from four language groups and 32 focus groups were conducted with children aged 8 to 14.

Open defecation in the presence of a toilet

Over the last two decades, the South African government has

made considerable progress in rolling out sanitation services to previously unserved communities. Nationally, access to safe sanitation has increased from 62% (in 2002) to 80% (in 2015). This compares well to the global figure of 68% of people who are using an improved sanitation facility.

While, in the past, the provision of a toilet alone was considered a sure way to end open defecation, research is increasingly showing that this is not necessarily the case. While studies on the matter are increasingly emerging in countries such as India, Pakistan, and Peru, the preference of choosing open defecation above using a toilet remains wholly under-reported in South Africa.

In a survey conducted for the WRC in three communities in KwaZulu-Natal, published in 2012, PID found that open defecation was practiced by a significant number of children, and occasionally adults, in communities provided with indoor low flush latrines. The percentage of households which reported that open defecation was practiced ranged from 26% to 35% across the three communities.

In addition, disposal of greywater, which may include faeces in water used for washing nappies or bottoms, into the household environment ranged between 55% and 88% across the three communities. This represents another hidden form of open defecation.

Why would people with access to a toilet not use it? The practice of open defecation in the presence of available sanitation shows that the mere provision of infrastructure does not automatically equate to service delivery, notes Dr Sudhir Pillay, WRC Research Manager. "There are many other factors to take into account, such as social behaviours and preferences, as well as regular operation and maintenance that need to be looked at more carefully for the long-term sustainability of any toilet solution provided."

In the current study, households interviewed painted a vivid picture of open defecation occurring routinely in the presence of government-built ventilated improved pit (VIP) toilets. Nearly half (43%) of householders interviewed did not consider their VIP toilet safe for children for fear of, for example, the child falling into the pit or the pedestal collapsing into the pit.

Roughly a quarter of householders interviewed at least one member of the household who was denied access to the toilet for this reason, while 21% had at least one member who elected not to use the toilet sometimes or always. Other problems and safety issues associated with VIP toilets which were found to contribute to open defecation (particularly at night) were the dangers inherent in having the toilet located far from the house and the tendency of snakes to be attracted to the toilets.

These results underpin the importance of not only involving community members in sanitation interventions – such as the design and choice of sanitation technologies provided – but also measuring the effectiveness of the sanitation intervention. "Without this decision-makers – most of whom probably don't have VIP toilets themselves – don't realise that the pit toilet potentially represents a sanitation solution for only some members of the household, but not for others," says Louton.

Alternative sanitation technologies, such as the pour flush toilets which has been developed by PID with WRC funding, may offer

a solution, as it offsets the pedestal from the pit. This eliminates the risk of falling into the pit while using the toilet. "The commercialised product developed from the WRC pour flush toilet also incorporates a child-friendly seat," explains Dr Pillay. "During our extensive demonstration programmes to introduce the technology the pour flush became known simply as the 'safe toilet' among households."

He encourages designers of sanitation technologies to consider designing the pit off-set rather than under the toilet seat – even for VIP latrines.

Because pour flush toilets significantly reduce offensive smells they can also be built inside the house or attached to the house, notes Louton. "This can address some of the other reasons people defecate outside, such as the fears or inconvenience associated with going to an isolated pit toilet, particularly at night or in inclement weather."

The practice of geophagia

Geophagia has been practiced for thousands of years all over the world. In this study, almost a third (29%) of respondents reported that someone in their household practiced geophagia. This is an interesting finding, since 80% of people interviewed said that eating soil can cause health problems. People reported all kinds of reasons for ingesting soil from satisfying a craving, attraction to its smell, taste or texture, or because of the pleasurable feeling the person experienced during or after eating it.

In general, the practice was perceived as potentially dangerous and viewed with mild disapproval but tolerance. It was not found to be sustained on any cultural basis, but rather was initiated in response to observing others practice it or by experiencing a direct craving in response to the smell of soil, possibly linked to nutrient deficiencies.



About a third of respondents buy their soil from street vendors. Here Ibovu (red) and umnchako (white) soils are sold together in Pietermaritzburg.



77% of interviewed households indicated that they felt their toilet was safe.



Only 53% of interviewed households thought their toilet was safe for children to use.

Where do people get the soil from? Roughly a third of soils were reported to be collected from the immediate household environment and roadsides, where the risk of faecal contamination may be particularly high. A quarter of soils reported were purchased from a vendor, where the buyer had no knowledge of the source of the soil.

The remainder of soils were reported to be collected from the natural environment, where faecal contamination of the soil by humans may not be a serious concern. Natural water bodies were a significant source for geophagic soils in the Eastern Cape, while ant and termite soils accounted for a significant percentage of soils mentioned in Limpopo. Soils were also collected from the nearby bush, forests or hills, while some people described collecting soil from the house structure itself.

Interviewees told many stories of health crises, operations and even deaths caused by eating soil. The data identified an important gap between the knowledge and perceptions of patients and those of healthcare professionals around geophagia, where patients may believe that doctors have operated on them because of a blockage caused by soil while the doctor involved may be unaware that the practice of geophagia even exists.

Knowledge of the transmission of helminthic and diarrhoeal infections

While experiences with helminthic infections were common, the study showed that people generally had little knowledge of routes of transmission of helminthic infections or the epidemiology of different worms. When people were asked about the route of transmission of helminthic infections (how one gets infected and how one can prevent getting infected) knowledge was very limited.

This is a serious knowledge gap that needs to be addressed. "When families don't understand how diseases are spread they are helpless to protect themselves and their children," Louton points out. "We found that respondents typically had some understanding of how diseases caused by bacteria and viruses

are spread, but many had completely inaccurate ideas about how intestinal worm infections are spread. Training specifically dealing with worm infections needs to be incorporated into the training of healthcare professionals and community health workers as well as community and school health education programmes."

This study demonstrated that both open defecation and geophagia are common practices within the household environment in South Africa, and may contribute to the high incidence of intestinal worm infections, as well as diarrhoeal disease.

The research team has started sharing information on the study, particularly through the National Institute of Communicable Diseases, and plans are afoot to engage with government departments, such as the Department of Health to encourage the incorporation of the findings into training on diarrhoeal diseases in the curriculum of nurses, doctors, environmental health practitioners, and community health workers.

It is hoped that, in this way, the message will spread that while geophagia is not necessarily detrimental to a person's health if practiced carefully, the public needs to be armed with an accurate understanding of how diseases are transmitted and an awareness of the risks of eating soil where there may be faecal contamination.

To order the report,

Investigating the practice of open defecation post-sanitation provision and the practice and implications of ingesting soil which may be contaminated (Report No. 2379/1/16), contact Publications at Tel: (012) 761 9300, Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.