HEALTH AND HYGIENE

'Radical shift' needed to reduce risks during pit emptying for workers, households

New ways must be found to reduce the risks emptying pits poses to sanitation workers and households in the communities they work in. This is the conclusion from a recently completed project funded by the Water Research Commission (WRC).
Article by Jorisna Bonthuys.

The approach followed during pit emptying needs a radical shift from a "public works" attitude to an understanding of faecal sludge being a hazardous material that poses serious health risks to communities. This is the view of Bobbie Louton, lead author on the recent study.

Research on this topic was conducted by Partners in Development, in collaboration with the University of KwaZulu-Natal, on behalf of the WRC. The study titled ***Understanding and addressing the exposure of workers, the public and the environment to pathogens during pit emptying*** looked at ways pathogen contamination happens during pit emptying.

The researchers also considered practical ways to reduce contamination risks during this process. Louton's collaborators in this project were David Still, Lorika Beukes and Danica Naidoo.

The study is relevant anywhere an on-site sanitation system (that requires a pit for sludge) is used.

The research included a detailed case study of pit emptying at ten homes, interviews with household members and sanitation workers, as well as an analysis of samples collected from surfaces and pits. Workers involved in desludging of dry pit latrines in the eThekwini Metro Municipality (in KwaZulu-Natal).

The researchers also gathered data about helminthic (intestinal worm) infections amongst 96 adult volunteers in the Eastern Cape. The team focused on people infected (and reinfected) with ***Ascaris lumbricoides*** (roundworm), ***Trichuris trichiura*** (whipworm) and ***Taenia spp*** (tapeworm). These species are "indicator organisms" used to determine the presence of faecal pathogens in risk assessments. They are also the most common helminths found in the chosen study area.

In addition, the researchers tested some household cleaning agents to determine if they can deactivate helminth eggs.

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Changing the sanitation game

"The danger we face from our own excreta is a problem as old as the human race," the report states. "Despite our remarkable achievements as a species on many fronts, the problem of how to safely manage our excreta is far from solved: Nearly one in four of the world's population still defecates in the open. And 'the open' – empty lots or undeveloped land where people may choose to defecate if they don't have access to a toilet – is rapidly giving way to population growth, increasing the risk of exposure to disease."

Worldwide, it is being acknowledged that sanitation efforts need a game change to provide safe, more hygienic and appropriate options to people in the developing world. This is also true in many parts of South Africa where people still rely on on-site sanitation approaches (including pit latrines).

Since 1994, large-scale infrastructure programmes have been underway to build ventilated improved pit (VIP) latrines (among others) to achieve national service delivery goals. Current estimates show that around a third (30%) of the entire South African population rely on VIP toilets and related systems. On-site and off-site sanitation create different challenges and risks for workers who empty pits, maintain sewers or operate treatment works.

"Much of the effort around improving health through improving sanitation currently focuses on the provision of adequate toilets to all," Louton states. "However, if during the process of removing excreta from on-site sanitation systems workers are exposed to pathogens or the household environment becomes contaminated, the gains made through the provision of sanitation will be compromised."

With over 2 million VIPs and other on-site sanitation systems being implemented in South Africa since 1994, many thousands of these systems are now also reaching capacity. When toilets fill up, householders are, effectively, left without sanitation – increasing the likelihood of open defecation. The big question is: What to do next? What happens when the pit is full?

Due to water scarcity, dry on-site sanitation is also likely to remain a permanent part of our national sanitation reality. And while global initiatives to end open defecation have often made the assumption that where basic sanitation is provided open defecation is eradicated, this appeared to not be the case in the local context. Another WRC-funded research project Louton worked on found that open defecation is still a huge problem in many communities, one of the reasons being the perception that VIP toilets are not safe to use. The lack of basic municipal services, as well as a lack of adequate knowledge of disease transmission, contribute to more ways in which faecal contamination spread. The practice of geophagia (the intentional eating of soil) may also contribute to the spread of pathogens (including helminth) from contaminated soil.

Risks faced by sanitation workers

All workers (involved in pit emptying) should be considered to be potentially infected with helminths, and all pits should be assumed to contain helminth eggs.

Extensive contamination of household surfaces and exposure of workers to sludge occurred during pit emptying activities observed in this study. Pathogens were found in pit sludge, on household surfaces in the pit emptying environment and on workers' clothing and skin.

This pit sludge can contain a range of bacteria, worms, protozoans and viruses that could be harmful to the people who come into contact with it – and some of these can survive for many years outside of a host. The consequences of infection by some of the organisms can be dire: diarrhoeal diseases remain the second leading cause of death among children under five years globally, killing more young children than AIDS, malaria and measles combined.

In South Africa, diarrhoea is a leading cause of morbidity and mortality among children and is responsible for approximately 20% of deaths among children under the age of five. Children from low-income families are nearly ten times more likely to die from diarrhoea than children from more privileged homes. Persistent diarrhoea is associated with an 11-fold increase in mortality for children with HIV compared to uninfected children.

In the South African context, where rates of infection with HIV and TB are high, the consequences of diarrhoeal diseases or loss of nutrients due to parasites like these can be dire. Children are particularly at risk of worm infections, and their stools tend to carry a higher pathogen load than do those of adults. People with compromised immune systems, as well as the elderly, are especially vulnerable to the risks of pathogen contamination during pit emptying.

The research results are therefore particularly worrying, Louton believes. Visual observations of pit emptying revealed extensive and repetitive contamination of household environments. This happens when workers' protective gear (boots and gloves)

comes in contact sludge. Repeated contact with contaminated surfaces (e.g. tools and bins) and household surfaces, as well as between contaminated surfaces or equipment and workers' bodies, also occur.

Diseases from sludge can get into the human body in different ways. "If there is dry, dusty sludge, workers could breathe some of bacteria and viruses, or worm eggs, contained in it into their lungs," Louton explains. "If it splashes, these could get into their eyes or noses. If something sharp in the sludge cuts them, germs could get into their bloodstream." Most commonly, ingestion occurs after dermal contact – when contaminated hands touch the mouth. Hands may transfer contamination to the mouth during eating, smoking, drinking or when a worker wipes his or her face, the study shows.

The rate of helminth contamination linked to pit emptying is high. Helminth eggs were found in nine of the ten pits and at all ten households studied in eThekwini. These eggs were found on the walkway at all the sites studied and on the cover and lip of the pit at 80% and 70% sites respectively. The eggs were also found on the gloves and bottom of the boots of 80% of the pit emptiers sampled, on the hands of 70% and inside the masks of 20% of pit emptiers tested.

Stool samples from residents and sludge samples from pit latrines studied also show helminth infections are present in the study population. The research showed 15% of the 96 adults study participants from the rural Eastern Cape had at least one type of helminth in their gut.

"These worms can be very dangerous for children because it can cause nutritional deficiencies as well as impaired physical and cognitive development among children," Louton explains. "Some worms can even find their way into your brain and cause problems or even death."

Because of the high incidence of helminth infections and other diseases, sludge in South Africa must be assumed to be highly pathogenic, says Louton. "Removing sludge is a hazard not only to those removing it but to the householders, whose environment can become contaminated." Helminth eggs and other pathogens in sludge have been found to survive for many years – over 15 years, in some cases - in the pit.

Education, management needed

It appears the understanding of most people interviewed was very poor when it comes to how intestinal worms and diseases linked with sludge contamination are spread.

Some logistical challenges were also identified which, if not resolved, can compromise the safety of workers and the communities they work in. This includes the need for personal protective equipment, site conditions, transport and workers' welfare needs, for instance. Workers need specific equipment on site to ensure their safety and to help break the cycle of contamination during pit emptying.

While protocols and the necessary equipment to protect workers and the environment often were not in place, the workers also did not always take the steps available to them to protect themselves. This indicates a lack of adequate knowledge about the hazards contained in sludge and how to contain them, a lack of commitment or the motivation to apply what

Lani van Vuuren

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Courtesy Susana

Above and bottom right: Visual observations of pit emptying revealed extensive and repetitive contamination of household environments.

they knew. Also, enforcement of health and safety protocols on the job was not adequate to ensure safe work practices, the report shows.

Proper inspections and also areas or regional depots where workers can wash themselves and their gear can be disinfected are needed. "If local government lacks the resources – or fails to manage the resources properly – to train, equip and supervise its sanitation workers – the process of servicing sanitation systems may itself open up new routes of exposure," the report states. This means employers must provide training, appropriate safety equipment, supplies and facilities, safety protocols and enforce best practices on the job.

Authorities are responsible for a pit emptying programme to ensure that the health and safety budget provides for the training, equipment and supervision necessary to minimise the exposure of workers, the public and the environment to sludge during pit emptying activities. Engineering and administrative controls must according to the researchers also be put in place by the municipality and the contractor to ensure that risks of exposure are eliminated and reduced wherever possible.

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Contractors must equip workers adequately with the equipment and supplies they need to protect their health, the health of the public and the environment. Furthermore, workers must be trained in a basic understanding of routes of disease transmission, hygiene and work practices and protocols that minimise exposure.

While every measure should be taken to prevent the contamination of surfaces during pit emptying, provisions are needed for decontaminating surfaces should contamination occur. For site work, disinfectants which can be used on skin, household surfaces, protective wear, and soil are essential. Also, disinfectants are required for cleaning skin, clothing, boots, masks, tools, sheets, bins and vehicles after work.

Wiping contaminated surfaces with cloths soaked with water, Jik, Domestos or Pine Gel was found to remove eggs manually but did not deactivate ***A. lumbricoides*** eggs. Soaking with Domestos or Jik for at least an hour at a dilution of at least 50% was required to achieve deactivation of at least 95% of the eggs. Disinfectants may be poured directly onto sludge spills; however, they may be quickly deactivated by the presence of organic material and cannot be assumed to sanitise the spilled sludge.

"The elephant in the room is the funds to deal with this silent cycle of contamination and its impacts", says Louton. "Given that pressure on water resources is only going to increase, we need to understand that onsite sanitation is here to stay. Government needs to commit the resources to ensure that those with onsite sanitation are not exposed to greater health risks than those with sewered sanitation through the pit emptying process."

Lani van Vuuren