Safer sanitation in slums and emergency settings with Peepoo bags

In most of the urban slums of countries like Kenya and Bangladesh there is a huge lack of sanitation facilities like toilets, and this leads to problems of the safe disposal of faeces and hence major public health problems. Public toilets are a long term solution but not always feasible in the short term and may be closed or too dangerous at night time. Recently, a novel idea has been tried - the use of a self-sanitising, single-use, biodegradable 'toilet bag'. Researchers have conducted two field tests in Kenya and Bangladesh and the results are reported here.

The toilet bag, known as 'Peepoo' from the Swedish company Peepoople, is made from biodegradable plastic and each bag contains a small amount of urea granules. Users defecate into the bag and then close it tightly with a knot. Hand washing with soap is recommended after using the bag. The used bags are placed in buckets for daily collection by a collection service and then disposed by being composted or buried directly in the soil for use as a complete fertiliser with high nitrogen value.

The bags work like a "micro-treatment plant" that kills pathogens in faeces within two to four weeks via the toxicity of ammonia produced from the urea granules. Normally the used bags do not smell for 24 hours unless many of them are accumulated in a big pile and left in the sun for too long.

Field tests

The trial in Kenya was conducted with 53 families in the Silanga village slum in Kibera (Nairobi) which is the second largest slum in Africa. Land adjacent to the village was set aside for disposal of the used bags. Over a four week period the selected families used over 3000 Peepoo bags which were collected by members of a youth group.

The trial in Bangladesh lasted ten days and was carried out in three slums in the city of Mymensingh in May 2009. Nearly 100 participants took part in the tests and used over 700 bags. Used bags were collected by two employees in buckets, transferred to a vehicle supplied by the municipality and taken to a field for burial. Agricultural trials with lemon trees are now being undertaken by the Bangladesh Agricultural University.

In Kenya, women used the bags the most, followed by children and then

A child in Mymensingh holds a peepoo bag.

Credit Ashley Wheaton

men. The children found the bags easy to use as they placed them in small containers and used them like a potty. In Bangladesh, women, again, used the bags more than men. In both locations, adults preferred placing the bag in a readily available container, such as a tin can of 15cm diameter, and squatting over it or sitting on top. Holding the bag in one hand while using it proved difficult but is preferred by some users.

Users in both locations found the bags easy to use though there was concern about the bag's size. It was felt that a larger bag would allow women to urinate and defecate simultaneously, though there might be the temptation to use the bag more than once. This would upset the sanitisation process to kill pathogens as the amount of urea placed in each bag is balanced to the size of the peepoo bag.

Benefits

In both locations, users felt the bag was safe and easy to use, and better and more hygienic than their normal sanitation practices. They would recommend it to others. Mymensingh users liked the bag because it could be used anytime and in the home. They particularly liked the Peepoo bags because it meant they could "go more frequently": Female and male slum dwellers very often have to hold back the urge to go to the toilet because there are no toilets available. This is particularly serious for women who are subject to health problems when withholding urine and faeces. Women also benefit because using Peepoos in the home overcomes the danger they face at nightfall when they are subject to physical and sexual abuse on their way to a public toilet or area for open defecation.

Kibera residents said the bag saved them time because they often have to queue for long periods at the few public or pay toilets. Elderly and handicapped individuals are often unable to get to a toilet or are unable to stand in a queue, forcing them to resort to even less hygienic options such as open defecation.

Users in Kibera were quite happy about using their Peepoo bags as

A young boy sits on a tin as he defecates into a peepoo bag.

Credit Ashley Wheaton

Used peepoo bags being buried in a trench.

Credit Ashley Wheaton

fertiliser. In Mymensingh, users said that they would consider selling their bags as fertiliser. There are trials underway at both locations to see how effective the used bags are as fertiliser.

Cost

The actual cost of the Peepoo bag itself (without considering costs of collection and transport of filled bags) is expected to be 0.04 (US$ 0.06) when produced on a large scale, and they will have to be competitive with pay toilets and other sanitation systems. It is expected that, initially, government subsidies will be necessary to make the collection system affordable and popular for the slum dwellers.

At the trial in Silanga village, users of the bags said that the cost should be less than 0.04 (Ksh 5) per bag, though a minority thought they could be sold at a higher price. In Mymensingh, only one third of the participants in the trials said that they would be willing to pay for the bags. Most of the toilet facilities in their communities can be used for free. When pressed about the price, however, users suggested prices ranging from 0.007 (Tk 0.65) to 0.011 (Tk 1).

Conclusions

At the end of the trials, there was a clear approval for the bags from the users. In Silanga village over 90 per cent of the users said that they would recommend the Peepoo as the system to immediately improve their sanitation situation significantly. The users in Mymensingh were of a like mind, and emphasised what they considered the main advantage of the bag - the ability to be able to go to the toilet more frequently.

There are problems to be overcome with the bag. One difficulty, especially for women, is in using the bag when defecation is accompanied by urination. Other problems are closing the bag with a knot (without getting one's hands dirty), odour when many filled bags are stored together during collection and transport, and making the price of the bag and of the collection system affordable to all users.

The researchers and consultants feel

Decomposed used peepoo bags

Credit Ashley Wheaton

A lemon tree being planted on a trench where used peepoo bags have been buried.

Credit Ashley Wheaton

that further large scale trials are needed using mass produced, and therefore cheaper, Peepoo bags so that all aspects of the system (collection, reuse and sustainability) can be studied in depth. Government subsidies may be necessary so that everyone, including the poorest, can use the bags and enjoy the benefits, including public health benefits, which would benefit society at large.

With larger scale trials, say the researchers, "It will be possible to measure the Peepoo bag's impact on environmental sanitation, diarrheal disease prevalence, quality of water bodies and drinking water sources, and quality of life improvements. The Peepoo bag system can be an immediate solution for urgently needed sanitation improvements in urban slums in Africa and Asia, whilst the more time-consuming processes for urban slum upgrading should also be pursued by all stakeholders."

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