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**Sustainable EcoSan – Fossa alterna:
the case of Menge, Ethiopia**

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This study is a cross-sectional community-based study aimed at identifying factors affecting sustainability of Fossa alterna adoption among rural households in Menge Woreda in Benishangul-Gumuz Region, Ethiopia. A sample of 216 was considered from 547 households that use Fossa alterna latrines, since they were introduced by WaterAid in Ethiopia project. The study used both qualitative and quantitative research to capture data. The study in the area has found that Ecological Sanitation (EcoSan) type-Fossa alterna technology has not been adopted as a way to sustainably manage human excreta in rural communities. Out of the sample of 216 households who had previously constructed Fossa alterna latrines only 25% are currently functional, 45% have replaced them with traditional pit latrines and very few households started linking Fossa alterna latrines with farming. There were several major technical design problems that hindered sustainability of household Fossa alterna in the study area. During the design, the family size and their water use practices were not considered and partition of pits and basements were not made of waterproof materials. Other factors included lack of awareness about operation and management, capital costs, the high management burden on women and girls, absence of coordinated effort among stakeholders, and lack of attention to sanitation by local community-based organisations.

Background

The importance of sanitation is undeniable and access to sanitation lies at the very core of poverty reduction. An improved sanitation facility is crucial stepping stone to better health and improves quality of life of dignity, especially for women. Yet, the sanitation sector suffers from severe lack of technological options and it is questionable whether conventional systems alone can solve the present problems. The Fossa alterna concept could be part of the solution.

Definition, concepts of Fossa alterna and sustainability

Ecological Sanitation applies an ecosystem view to what other forms of sanitation perceive as 'waste' and redefines them as resources. Fossa alterna is a system of EcoSan latrine that enables a complete recovery of nutrients in human waste and their reuse in agriculture. This study refers to a type of EcoSan called Fossa alterna/'mix then drain', where urine and faeces are mixed in a shallow pit. Sustainability of sanitation has many dimensions. This research focused on five different but interrelated dimensions of sustainability: technical, social, institutional, financial and environmental. For the purpose of this research, sustainable Fossa alterna sanitation facilities means, for a period that covers the design life of the technologies used, each member of all households in the project area always practices safe disposal of waste in a health-promoting and environmentally sound manner.

Aims and objectives

To explore factors affecting the sustainability of Fossa alterna adoption by generating evidence from users in rural households in Menge Woreda/District, Benishangul-Gumuz Region, including acceptability of Fossa alterna latrines and their perceived benefits and barriers among the community, knowledge and practices towards Fossa alterna among local professionals and institutions.

Methodology

This study is a cross-sectional community based study among rural households in Menge Woreda, Benishangul-Gumuz Region. Out of 547 households in the Woreda, 216 were considered as a sample, distributed proportionally across four Kebeles (smallest administrative unit of the government) using conversion factor. Random sampling was employed to select the households using the lottery method. The study used both qualitative and quantitative methods to capture data from two sources. Primary data sources consisted of household survey questionnaires, focus group discussions, observations and key informant interviews, coded, filtered and analysed using SPSS and Excel. Secondary data sources from different levels were also reviewed.

Key findings

Respondents were aged between 20 and 88 years, with two thirds between 20 and 40. Out of 216 respondents, 75% were male. This was because during the interview session, if the husband was available at home, women were not willing to be interviewed due to cultural barrier; therefore the husband would take part. Thus, out of the total 216 respondents, 93% were married. Family size ranged between 3 and 18 people, with an average family size of 7 people. This is far greater than the national and regional average family size. The majority – 58% - were polygamous. 89% respondents and all 53 focus group participants confirmed that they knew about Fossa alterna, with over two thirds (68%) saying their source of information was health workers and community hygiene promoters. Respondents between 20 and 40 years old were more knowledgeable about Fossa alterna.

All 216 respondents confirmed that they had Fossa alterna in the past. 35% of respondents reported the reason they own Fossa alterna was because they are aged and selected by the community; 28% said because they were poor; 19% due to chronic disease; 13% because of willingness and 6% said they observed its use in neighbouring Country Sudan and constructed for themselves. ***However, only a quarter of the Fossa alterna latrines were functional.*** The survey result show 47% of the total respondents said that women are responsible for cleaning the household Fossa alterna, 32% by girl children, 16% by boy children and the remaining 5% by men. Out of the total respondents, 55% said they have no ability to pay for the capital cost of Fossa alterna. The minimum and the maximum estimated capital costs ranged from US\$10 – 800 (March 2009), with a mean estimate of US\$100 for a Fossa alterna unit. Minimum and maximum household earnings in the area are US\$80 – 868, with a mean of US\$443.

Among households whose Fossa alterna latrines were not functional, 63% had built traditional pit latrines, 33% use open defecation and 3% share communal latrines with neighbours, with 19% respondents confirming that some family members are not using latrines. Total sanitation facility coverage for the study area was 70%, including both Fossa alterna and traditional pit latrines. As 86% correctly stated the difference between Fossa alterna and traditional pit latrines, it is possible to conclude that respondents understand the benefit of latrines but have not successfully adopted Fossa alterna sanitation technology. The majority 78% of respondents misunderstood the length of time needed for the human excreta to be composted (10-12 months) before using it on farmland.

Out of the total 151 functional latrines only 23% had hand washing facilities nearby. However, the study area is a Muslim community where hand washing is practised at least five times a day using ‘Alberic’ (a small plastic container), having hand washing facilities near latrines might not be the sole solution. Moreover, respondents' knowledge about hand washing was good: 81% mentioned at least two of the four critical times (after latrine use, after cleaning a child's bottom, before meals, and before food handling). The majority 53% of respondents use ash and soil for hand washing and 10% respondents use ground tree bark called ‘Abetsetse’. Only 21% respondents reported that they are satisfied with their experience of Fossa alterna, although 57% rated it as very important and 27% as important. Satisfaction was affected by maintenance costs, shallow pit depth, infiltration that hinders the complete recovery of the content and lack of technical demonstration on how to use the contents on farm land.

The existing volume of a single pit in the study area is only 0.8 m^3 . However, according to calculations by the author, the recommended Fossa alterna dimension for this particular study area is 4.33 m^3 based on factors; average number of family size, production rate of excreta and urine, volume of other wastes (ash or soil) and water used for anal cleansing, evaporation rate, margin of safety and reduction volume of waste. Calculations according to literature result in a figure of $0.63 \text{ m}^3/\text{year}$, which is a significant difference from requirements in the study area. This shows that technology design without local knowledge is often inappropriate.

Respondents reported the following main problems with Fossa alterna management: infiltration of human excreta to an unused pit 46%; collapse of partition between two pits 26%; foul smells 17%; and poor quality construction materials 61%. All 216 respondents reported problems with construction. Therefore, the problems of technical design and construction material quality have hindered the adoption of Fossa alterna. Out of the total respondents, nearly all 97% use water for anal cleansing, which directly entered into the Fossa alterna pit. The amount of water used for a single latrine visit was between 0.5 – 4 litres per person, with a mean of 1.5 litres. This facilitates an infiltration of faeces and urine into the unused Fossa alterna pit and hinders the complete composting of the waste within the given time range.

Only 28% of respondents practised emptying and the same percentage had observed faeces on latrine floors. However it was observed 32% latrines had faeces on the floor and 33% households had human waste in the compound. Out of the total observed household latrines 36% emit bad smell, 45% did not have pit-hole cover, and 60% had ash or soil inside the latrine superstructure for use as a deodorant. The probability of ground water contamination by human waste from the Fossa alterna was insignificant, as nearly all were observed as being more than 300 cm from water source. Presently, 13% of respondents use chemical fertiliser on their farm land. According to key informant interviews, the District Rural Development Office was promoting the use of chemical fertiliser and so far had distributed around 50 quintals of Urea and 50 quintals of DAP per year. However, its increased cost was discouraging farmers from using it. This indicates a potential for the promotion of large scale use of human waste and other organic waste compost for increased farm production.

A quarter of respondents said they require technical assistance with the management of Fossa alterna, but there are no formal or informal organisations that provide technical support. The majority of respondents 65% were trained about how to construct their household Fossa alterna, but 51% and 48% said they need technical training and financial support, respectively. Regarding the construction cost of the household Fossa alterna, respondent's survey shows that 79% covered the capital cost themselves in terms of labour, 12% had costs covered by an NGO and for the remaining 9% and costs were covered by community hygiene promoters and sanitation clubs. This indicates that external influences in terms of capital investment in facilities should not be a problem for sustaining Fossa alterna.

According to a key informant interview with the community WASH Board Chairperson, men and women were equally represented in the composition of the management. However, men were in decision-making positions, while women are mostly assigned to be cashiers, auditors or ordinary members. The community organisation has legal recognition, with clear guidelines that identify the role and responsibilities of each position. On the other hand, sanitation has no focal person in the community board. Regarding external support to the WASH Board, except yearly auditing by the Woreda Finance and Economic Development and Water Desk Office, there was no support from any governmental or non-governmental organisations. The capital (revenue) of the community management WASH Board was about US\$2,880, collected solely from water fees, with a yearly expenditure of around US\$95 for water supply. There was no expenditure on sanitation so far and sanitation was not included in the annual plan, even though it was clearly shown in the guidelines.

Most of the key informants interviewed did not have any idea about Fossa alterna, although it is included as an option in the Ministry of Health's training package to Health Extension Workers, were promoting traditional pit latrines to households. Assumed reasons for this by experts were, low community income, they are cheaper and better known, and psychologically people may not accept use of human waste for crop production. Also, sanitation coverage in the region was considered as being at 'zero' level, so they feel that it is better to start with minimum known technology. On the other hand, in a few cases the Rural Development Office promotes household organic waste compost for agricultural production to selected model farmers. Although at national level politicians consider Fossa alterna as an option to assist in meeting the MDG and recommend it as a sanitation option, as stated in the memorandum of understanding (MoU) signed by the Ministries of Water Resources, Health and Education, it is not practically applied at the grassroots level by local politicians. In order to see large-scale skill and knowledge transfer, stakeholder ownership and a leading role for community based organisations are important, to sustain the intended technology adoption.

Recommendations

- Women are generally responsible for the operation and management of Fossa alterna. Therefore, the promotion programme should target women and further research should focus more on them.

- After the initial demonstration of Fossa alterna and awareness raising by community hygiene promoters, users need to be continue to be shown the full implementation process. This could be done by the Community WASH Board and Health Extension Workers, who can promote hygiene and the use of human waste compost for growing food for consumption and sale.
- Practical demonstration would help with the sustainable adoption of Fossa alterna, especially in terms of excreta use. During new technology testing, it is better to take volunteers from a variety of groups within the community (different income levels, people in good health and with chronic diseases).
- More work on promotion is needed to help Fossa alterna users in linking its outputs with farm production. The value of human excreta to the farmers as fertilizer in relation to the price and availability of chemical fertilizer are very important points to be addressed.
- Fossa alterna technology needs to address the social, economic and technical challenges identified in this report. Its acceptability to user conditions needs rethinking, especially in terms of the value of the compost, construction costs and proper design in terms of retention period.
- The sanitation policy needs to consider full or partial subsidy for household sanitation technologies when the capital costs are too high for rural communities.
- Awareness raising including practical demonstration programme or training of trainers (ToT) on Fossa alterna for experts at different levels should be considered by the Regional Health Bureau, so that proper implementation and wider scaling-up of the technology through effective coordination can be achieved at all levels.

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