



Use and maintenance of dry toilets as a result at the community perceptions on the management of human excreta in rural Mexico

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ABSTRACT

The present work forms part of an ongoing project more closely related to Primary Health Care, based on ecological principals and sustainable development where the conditions of human health area subject to the conditions of the health of the ecosystem. The location of the aforementioned project corresponds to a highly marginalized zone on the Pacific Ocean in the south of the Republic of Mexico, specifically the state of Oaxaca, where one finds various indigenous groups Chatinos, Mixtecos, afromexicans and mestizos, among others.

The main objectives of this integral project have been:

- a) To elaborate and to evaluate the educational material produced to promote the construction, use and maintenance of ecological dry toilets.
- b) To measure the impact on health and nutrition and data collection on use and maintenance obtained from the users of these toilets.
- c) To carry out ethno-anthropological study on the communities perception of the management and disposal of human excreta.
- d) To increase families food availability through the use of recycled human waste from their own dry toilets.

The present paper retakes the issues of the use and maintenance of dry toilets as well as the community perception of human excreta management. Comparison of all this collected information was done with direct observations at household level.

75 households from three beneficiary communities were selected, where the use of dry toilets was initiated more than a year ago.

INTRODUCTION

The scarcity and paradoxical waste of water in Mexico represents one of the greatest challenges for the country in many aspects, including food supply, sovereignty and national security. A few facts which show the gravity of the problem are summed up as follows: Twelve million Mexicans lack potable water; a considerable number of purification plants in several cities do not function adequately or the liquid is contaminated in the conduction systems, cisterns and storage tanks; water from the system is wasted in every city (up to 45%); virtually all of the aquifers are overexploited. The 300 hydrographic basins in the country have some degree of contamination. Less than 10 percent of the water used is treated. More than a half of the country's dams are full of sediment; in agriculture half of the water destined for irrigation is lost due to obsolete conduction systems and poor resource administration. [1]

In this particular case of the state of Oaxaca the water problem is even worse than in the rest of the Republic. Its indigenous inhabitants represent 35% of the existing ethnic groups in Mexico, of which more than 80% are classified within the range of "extreme poverty" and for whom access to water is very limited. [2]

For background purposes we point out that at the II and III International Conference on Ecological Sanitation (Lübeck 2003 and in Durban 2005), the first and second part of this project were presented. The objectives were to evaluate the educational material produced (to promote the construction, use and maintenance of dry toilets) and the impact on Health and Nutritional DT users, respectively. [3, 4]

METHODOLOGY

Sampling and Methodological tools

Currently and part of the third phase of the project we retake data on use, maintenance and recycling excreta from the DT users, as well as the ethnographic information related to the perception that this population has on the handling of human excreta presented previously [4]. The final objective is to compare all this previously collected data, from the direct observations made at the household level.

75 beneficiary families of three different communities were selected to collect data on:

- *Use and maintenance of DT* through a **structural close questionnaire**.
- *The perception of management and use of urine and excrement*, through a questionnaire with **open ended answers** electronically recorded.



Finally comparison of all this information was done through direct observation of all the beneficiary households included in the sample.

RESULTS

Use of the Dry Toilet: Every beneficiary household considers that this toilet has benefited them and everybody uses it except for small children (15.3 percent) under three years old because they can fall into it. Most of the adults use it correctly (96.1 percent), and almost 70 percent of the children over three years old use it correctly; 60 percent do not use the urinal, even though it is installed. The majority (53.8 percent) use the mixture of soil, ash and lime, followed by those who use only soil and ash (21.1 percent), others who use lime and ash (15 percent), and the remainder use soil and lime (1.9 percent) or only ash (1.9 percent). Ninety-six percent of the families throw this mixture into the excrement every time someone defecates.

Maintenance of the Dry Toilet: There is no odour in 67 percent of the toilets and there are no flies in 58 percent of the toilets, according to interviewed families. Most of the toilets (79 percent) have a clean appearance and 90 percent of interviewees throw the toilet paper into a trash bin.

Recycling of excreta of the Dry Toilet: Everyone has filled the chamber at least once and its contents have been used as a fertilizer in 48 percent of the cases. Ninety-two percent consider the idea of using it when the excrement turns to fertilizer. On the contrary, most people (83 percent) do not use urine as fertilizer.

Community perception of the management of human excrement (Tables 1, 2) resulted in an interesting and satisfactory exercise which, although only in estimation, demonstrates a set of ideas, knowledge, myths and perceptions, etc., that the interviewees revealed, and which in a way explains some problems detected during the development of this research. For example, we could understand people's rejection to delivering the excrement samples for analysis because they consider it as a disgusting and indignant act. We could also understand that human excrement can be accepted (with some reservations) as "fertilizer" and exceptionally as a remedy to cure snake bite. However, urine cannot be considered as "fertilizer", but as pesticide even though it can sometimes burn the plants. But, of course, the most important and generalized use of urine is a medical remedy.

Table 1. Perception of the management of human excrement.

Excrement		Urine	
Negative Aspects	Positive Aspects	Negative Aspects	Positive Aspects
<ul style="list-style-type: none"> • Very disgusting • Dirty • Rejection • Stinks • Sickens 	<ul style="list-style-type: none"> • Fertilizer • Good disease indicator • Medicine (snake bite) 	<ul style="list-style-type: none"> • Dirty • Stinks 	<ul style="list-style-type: none"> • Disease diagnosis • Insecticide • Many medicinal uses
Comparison			
Hard and dry natural product that is eaten More contaminating Smells bad Produces more stomach diseases Does not burn plants		Liquid natural product that is drunk Non-contaminating Smells less Does not produce illness, yet cures many diseases Burns plants	

Table 2. Curative Remedies

Excrement		Urine	
Illness	Form of Administration	Illness	Form of Administration
Poisonous snake bite	Boiled in water and ingested, or applied topically to wounds	"Child Rage" (crying children) cured w/ urine of male children Diabetes Stomach ache Rheumatism Headache Wounds Eye problems Other (scorpion stings, fever, etc.)	Drunk and applied topically Mixed with: Tobacco; Wormwood; Basil; Rue; Pitona; Lima; Lemon; Mustard; Nuts Drunk before breakfast Mixed with herbs <i>Drunk before breakfast and applied topically to painful areas of legs and feet.</i> Applied topically

Direct observation at beneficiary house-hold level. In trying to correlate and/or to confront the quantitative and qualitative information obtained from the previously

interviewed families [4], we decided to make a direct visit at a house-hold level, not just of the original fifty sampled families, but also beneficiary families from other communities which also have been theoretically using the DT for more than one year. The reason of this procedure responses to the fact, that we had already detected certain inconsistency and incoherence between the replies of the beneficiary families related to the use, maintenance, recycling and perceptions, with the direct observation of the physical conditions of the DT. As a result of this direct observation we can talk now about “bad and good news”.

“The bad news” is that a considerable percentage of beneficiary families (50.6%) did not follow up the main recommendations about the use, maintenance and recycling of their DT. From this 50.6% of “negative observations” at household level **16%** of them were not any more “in use” from 3 main reasons; the ones still “in use” **34.6%** have some other reasons (see figure 3). In any case all these “reasons” reflect the **lack of sensitization and/or knowledge or simply intransigence** towards the use of DT.

Table 3. Negative direct observations of the DT users

(n = 75)

IN USE		No.	%	NOT IN USE		No.	%
Unfinished construction		4	5.3	Threw down		3	4
Technical problems (disconnected, blocked and broken pipes)		18	24	Abandoned (migration)		4	5.3
Turned into a cistern		4	5.3	Used as a warehouse		5	6.6
Total		26	34.6			12	16
Total from sample						38	50.6

“The good news” is that 49.4% of families are using their DT correctly with some minor problems on the use and maintenance (presence of flies, lack of a correct mixture, etc.). Nevertheless, they have been using the urine and excrement as fertilizer to produce food (chilies, fruits, non conventional edible plants, flowers, etc.) in a very efficient way.

CONCLUSIONS

Our first conclusion is that we confirm the inconsistency and incoherence between the data collected through the family’s survey and the direct observation in relation to the use and maintenance of DT.

Regarding the perceptions of handling human excreta, we can say that we found no contradictions between them.



As we have mentioned in one of our previous presentations [4] “we have not met the program expectative at 100%” that is to say that we found **certain resistance** toward the use of this kind of technology according to our previous (quantitative and qualitative) data obtained from the direct replies (i.e. lack or urinal use refusal to use urine as fertilizer, proper use of mixture preparation, etc.) Nevertheless this resistance towards the DT use turned out to be greater, when we decided to make the direct observations of the visited beneficiary households. According to the “bad and good news” we found that there is an absolute need to give a closer follow up on the use, maintenance and excreta recycling of the DT users. In spite of our big effort for the sensitization process and evaluation of didactic material on the construction, use, maintenance of the DT [3]; as well as the enquiries and surveys done with the beneficiary families, there is an **enormous resistance**, which might have socio-cultural and/or educational origins, which need to be studied in a longitudinal process.

Regarding the “negative observations” on the DT use, we can conclude that the unfinished constructions founded, have to do with the lack of supervision on the construction process, which was the responsibility of the DT community committee; the technical problems have their origins on the lack of maintenance, family intransigency and poor quality of the pipes among others. We were told that little children are the ones that block the pipes with sand and/or stones. The families that turned the DT into cisterns claimed the “the terrible stinking” produced by the DT. Those who threw them down, did not wanted to talk about it; the abandoned ones belonged to families who decided to migrate to the United States; and those that used them as warehouse, never use them as DT. In any case there is a need to find out what are the real root-causes behind these negative families’ attitudes considering that they represent half of the studied beneficiary families.

Up to now, we have decided to start repairing and/or finishing the construction of the “still in use” DT from these families, together with the DT community committee. We have also started the design of a socio-anthropological strategy in order to respond the question “**why the resistance?**”

Although we haven’t got yet much information on food production at family level, which is part of the last objective of this project, we can add as preliminary data that the soil analysis as well as the presence of pathogens in three samples of the compost proceeding from the participant families, show that they are free from pathogens [5] and considered as “more than acceptable” in terms of its nutrient contents [6].

Finally, there is a great need to develop an “EcoSan Culture” for a sustainable sanitation not just based on the DT, but in a broader way to keep breaking this big resistance towards the use of this paradigmatic technology. We also believe that EcoSan in general (sanitation that keeps the nutrient and water cycles separate, for the most part, and breaks the pathogen cycle) would be urine-diversion toilets; composting/desiccating/biodigesting processing systems; etc. In this case, the same criteria that define the “approach” can be used to



identify whether the specific “techniques” (e.g. urine-diversion systems; composting systems; biodigester systems, etc), more specific criteria can be developed to differentiate between techniques and their level of sustainability [7].

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