Does building any type of toilet mean safe sanitation? (Ethiopian experience)

By
Abebe Beyene (PhD)
Jimma University is located Southwest of Ethiopia near to South Sudan & Kenya
Access to sanitation, pit emptying & chain of FSM

- **An improved sanitation facility** is defined as one that hygienically separates excreta from human contact (WHO/UNICEF, 2010).

- **Access to improved sanitation** with proper utilization & Fecal Sludge Management (FSM) system as defined by WHO/UNICEF

- Monitoring of the progress of access to sanitation worldwide has been mainly focused on **household-level inventory of type & number of toilet facilities** ignoring **proper utilization & user behavior** (Kvarnstrom et al., 2011), & complete chain of FSM.
Household Human Wastes & Wastewaters

Flush water
Faeces
Urine
Toilet
Kitchen
Black Water
Storm Water
Wastewater
Combined sewage

Where it goes?

A+2 = B

A+3 = A

Source: Modified from Sobsey, M.D. (2006)
Ethiopian experience on promoting sustainable sanitation

Community Approaches to Total Sanitation (CATS) approach

Two approaches to communal behaviour change

- Participatory Hygiene & Sanitation Transformation (PHAST) &
- Community-Led Total Sanitation (CLTS)

Recently One WASH programme was initiated for multisector integration
Essential elements of Community Approaches to Total Sanitation (CATS)

- Aim to achieve 100% ODF communities through affordable, appropriate, acceptable technology & behaviour change
- Engagement with diverse members of the community, including HHs, schools, health centres and traditional leadership structures
- Communities lead the change process and use their own capacities to attain their objectives
- No direct subsidies (should not be given directly to households).
- Support communities to determine for themselves what design and materials work best for sanitation infrastructure rather than imposing standards
- Building local capacities to enable sustainability
- Government participation from the outset – at the local and national levels – ensures the effectiveness and the potential for scaling up.
- Greatest impact when they integrate hygiene promotion into programme design
- An entry point for social change `& a potential catalyst for wider community mobilisation
Diagrammatic presentation of Community-Led Total Sanitation (CLTS) Ignition

- Defecation area transect
- Defecation Mapping
- Flow diagram
- Calculation of faeces etc.

Entry/ Ignition

Self Empowered Committee formed

Identification of right person in the community

Registration daily monitoring on map

Spreading messages from the mosque

Each of us cover 10 families

We do it first and stop open defecation

Start pit latrine from tomorrow

How to get a latrine slab

Community realization of terrible impact of faecal-oral contamination

10 H/H

10 H/H

Source: Kar (2005)
History

- The CLTS approach was first introduced in Ethiopia in October 2006 in Arba Minch area by an Irish NGO.
- Later, in February 2007, Plan International Ethiopia invited Dr. Kamal Kar to conduct training for selected WASH and Health staff members from Government, NGOs and Plan.
- Large scale implementation was initiated in 2009.
- In 2015 about 4,912 kebeles/communities, with a total population of 24.56 million declared ODF.

Dr. Kamal Kar
Ending open defecation in Asia, Africa & Latin America
Lifetime Sanitation Achievement Award
Achievements ...

- Ethiopia is estimated to be at 63% ODF
- It is estimated that about 37% of the population (over 35 million people) still don’t have access to any form of toilet
- There are disparities b/n the rural & urban context, with 43% of people living in rural area defecating in the open compared to 8% in urban areas

Source: Ethiopian Ministry of Health, 2015
Sanitation in Ethiopia

Trend of access to sanitation coverage in Ethiopia increased but falls short of the MDG target of 75%
Discrepancies in the trend analyses by the AGR and the JMP

Source: Beyene et al., 2015
National ONE WASH

Since 2013, Ethiopia has established a unique Water, Sanitation, and Hygiene (WASH) sector-wide approach (SWAp) under the umbrella of the ONEWASH National Programme (OWNP), which brings together ministries, development partners, academia and civil society organisations (CSOs) to a common goal of one plan, one budget, and one report.

According to the OWNP phase I results, during the period from October 2013 to July 2017:

- 11 million people became Open Defecation Free (ODF) and the practice of open defecation reduced from 44% to 29%
- 1,280 school WASH facilities were constructed under the OWNP-Consolidated WASH Account
- EDHS 2016 also reported declining trends of proportion of HHs using improved latrines from 8.8% in 2011 to 6.7% in 2016 (EDHS, 2018)
Open defecation in villages receiving CLTS interventions in Ethiopia

Midline was after CLTS interventions ended (12-months post-baseline in Ethiopia). Endline was 1-year after midline.

- slight increases in open defecation from midline to endline
- 38% of latrines used at the midline were unusable at the end line for SNNP

- Kebele leader, teachers & health extension workers are the main facilitators of CLTS in Ethiopia
The national percent sanitation coverage along the sanitation ladder

Access to improved sanitation 47.9%
FT = Flush toilets
PIPL = Private improved pit latrine
PTPL = Private Traditional pit latrine

Access to Unimproved san. (16.5%)
ISL = Improved shared latrine
UST = Unsanitary toilets
OD = Open defecation (35.6%)

National ISC = 47.9% MDG target = 56%

Source: Beyene et al., 2015
Ethiopia’s Paradoxical Narratives of Sanitation Reports
Level of Environmental Pollution in Addis Abba & Rural Kebeles

Biological indicators (TC, FC, E-coli)

- Membrane Filtration
  - TC
  - E. coli

Chemical indictors
- Chloride
- Nitrate

Source: Debela et al., 2018
### Level of ground & surface water contamination using chloride & nitrate indicators

<table>
<thead>
<tr>
<th>Type of sample</th>
<th>NS</th>
<th>Chloride (mg/L)</th>
<th>NO\textsubscript{3} (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean(SD)</td>
<td>Range</td>
</tr>
<tr>
<td>Deep well (84-250m)</td>
<td>16</td>
<td>15.4(9.0)</td>
<td>(4.1-33.9)</td>
</tr>
<tr>
<td>Shallow well (1.5-20m)</td>
<td>6</td>
<td>41.5(65.2)</td>
<td>(3.8-169.3)</td>
</tr>
<tr>
<td>Protected spring</td>
<td>5</td>
<td>16.0(20.8)</td>
<td>(3.8-52.8)</td>
</tr>
<tr>
<td>Upstream (Rural)</td>
<td>7</td>
<td>29.0(5.7)</td>
<td>(10.0-49.1)</td>
</tr>
<tr>
<td>Midstream</td>
<td>5</td>
<td>62.0(20.4)</td>
<td>(41.5-94.7)</td>
</tr>
<tr>
<td>Downstream</td>
<td>6</td>
<td>124.1(75.8)</td>
<td>(74.6-275.8)</td>
</tr>
</tbody>
</table>

In polluted surface water in midstream and downstream, nitrate was low because of anoxia

Source: Debela et al., 2018
## Level of ground & surface water contamination using microbial indicators

<table>
<thead>
<tr>
<th>Type of sample</th>
<th>NS</th>
<th>TC (CFU/100ml)</th>
<th></th>
<th>FC (CFU/100mL)</th>
<th></th>
<th>E. coli (CFU/100mL)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%P</td>
<td>Mean (SD)</td>
<td>%P</td>
<td>Mean (SD)</td>
<td>%P</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Deep well (84-250m)</td>
<td>16</td>
<td>50</td>
<td>97 (132)</td>
<td>25</td>
<td>16 (30)</td>
<td>25</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Shallow well (1.5-20m)</td>
<td>6</td>
<td>50</td>
<td>150 (184)</td>
<td>50</td>
<td>55 (61)</td>
<td>50</td>
<td>11 (20)</td>
</tr>
<tr>
<td>Spring</td>
<td>5</td>
<td>40</td>
<td>90 (124)</td>
<td>40</td>
<td>42 (58)</td>
<td>40</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Upstream (Rural)</td>
<td>7</td>
<td>100</td>
<td>274 (98)</td>
<td>29</td>
<td>26 (50)</td>
<td>14</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Mid-stream</td>
<td>5</td>
<td>100</td>
<td>1424 (8120)</td>
<td>100</td>
<td>432 (335)</td>
<td>100</td>
<td>102 (76)</td>
</tr>
<tr>
<td>Downstream</td>
<td>6</td>
<td>100</td>
<td>1603 (796)</td>
<td>100</td>
<td>567 (389)</td>
<td>100</td>
<td>93 (70)</td>
</tr>
</tbody>
</table>

Source: Debela et al., 2018
Level of soil pollution using Ascaris ova indicators

**Concentrating**

- Straining, flotation & Sieving

**Identification & counting**

**WHO tolerable health risk**

**Quantitative microbial risk assessment**

(Eisenberg et al., 2008)

<table>
<thead>
<tr>
<th>Soil Samples</th>
<th>No. of sample</th>
<th>% positive</th>
<th>Number of Ascaris ova/100g of soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yard/garden</td>
<td>50</td>
<td>48 (96%)</td>
<td>Total: 28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Embryonated (live): 19 (68%)</td>
</tr>
<tr>
<td>Road banks</td>
<td>20</td>
<td>16 (80%)</td>
<td>Total: 21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Embryonated (live): 13 (62%)</td>
</tr>
</tbody>
</table>
Full pit latrines & the residents are forced even to use the slab for defecation (Photo taken by Beyene, A., 2013).

Pit latrines connected to flood ditches and liquid & solid waste dumped into flood ditches (Photo taken by Beyene, A., 2013).
Typical rural latrine types advocated through CLTSH

Photos Source: Pam Furniss, Abera Kumie, Worku Tefera

Is it possible to prevent pollution & promote public health using this type of toilets?
Impact evaluations of WASH interventions have demonstrated lower than expected health gains

This is due to low uptake and unsustained adoption of interventions at a community level.
Disease & death related to poor sanitation & the need for sustainable sanitation solution

An estimated 801,000 children younger than 5 years of age perish from diarrhea each year (Liu et al., 2012: 2015)

Summary

- In Ethiopia more than 250,000 children die every year from sanitation & hygiene related diseases
- About 60% of the disease burden is related to poor sanitation & hygiene
- Latrines in Ethiopia were lower quality than those in Ghana
- Most latrines remained unimproved (containment without considering standards & guidelines)

Recently the Ethiopian government realized that building any type of toilet does not mean safe sanitation

Key attributes of WASH in SDGs
Conclusion & Recommendations
(sanitation in relation to level of pollution and promotion of public health)

- Current system of sanitation technology is not convenient & there is a need to innovate or adopt with indigenous knowledge
- Mass education & awareness creation
- Promoting the use of waste as resource (valorization)

In SDG era: access to sanitation should be measured in terms of 3 indicators (technology, utilization & FSM)
A revolutionary waterless toilet powered by the Sun, developed to help some of the 2.5 billion people lacking safe and sustainable sanitation around the world, will be unveiled in India in 2014

SANI SOLAR consists of urine-diverting user interface that automatically separates urine and faeces.

SANI SOLAR has a comfortable seat. Just above the seat is a lever (see picture), which users turn after every long call.

The faeces in the containers are quickly dried and stabilized by a combination of directional airflow and solar radiation in the drying chamber. Achieve 95% mass reduction.

Source: https://raha.solutions/reduce-rainwater-contamination/#top
Developing closed-loop sanitation

Ecological sanitation
- Urine
- Faeces
- Faecal sludge (Toilets)

Energy use
- Using red cooker

Water recovery
- Solar drying bed

Pyrolysis unit
- Char & brickeet
- Energy use in industry

Agriculture
- Ash
Future prospect

- Innovation on alternative sanitation technology

- Pilot field scale demonstration of the closed-loop sanitation solution

- Integrating FSM with solid waste management
  (not only for biochar but for animal feed, biomethane, biofuel & compost)
References


Thank you for listening

Source: Global Media foundation