Effect of a community-led sanitation intervention on child diarrhoea and child growth in rural Mali

Summary of research

Location: Mali

What we know: Community-led total sanitation (CLTS) is being scaled up, but there is limited evidence on child health impacts.

What this article adds: A randomised trial of CLTS to assess its effect on child health was undertaken in a rural setting of Koulikoro, Mali. No differences were observed in diarrhoeal prevalence between CLTS and control villages. In CLTS villages, access to private latrines doubled and was twice as high as controls, reported open defaecation was reduced, children were more likely to use a potty for defaecation, latrines were observed to be in better condition, and households were more satisfied with their overall sanitation situation. Children in CLTS villages were taller and less likely to be stunted (especially children under two years old); there was minimal difference in underweight prevalence. CLTS households were less likely to report a child death by diarrhoea. No significant difference was found in faecal contamination of drinking water sources and household-stored water. The results suggest that a behavioural intervention can substantially increase access to sanitation facilities in a rural setting without financial subsidies. Future research is warranted to understand whether improved sanitation could improve child height through pathways other than diarrhoea reduction.

Background

Community-led total sanitation (CLTS) uses participatory approaches to mobilise communities to build their own toilets and stop open defecation. CLTS aims to change behaviour sustainably through the elicitation of strong emotional drivers such as shame, disgust, pride and dignity that trigger collective action in the community to stop open defecation. While CLTS has been scaled up in 50 countries to date, there is some concern regarding the few independent evaluations of the approach and no published randomised controlled trials of the programme. The aim of this study was to undertake the first randomised trial of CLTS to assess its effect on child health in a rural setting of Koulikoro, Mali.
Methods

A cluster-randomised trial was used to assess a CLTS programme implemented by the Government of Mali in collaboration with UNICEF. The study population included households in rural villages (clusters) from the Koulikoro district of Mali that met government eligibility criteria (not previously received CTLS programme, latrine coverage less than 60% and population 30-70 households). Every household had to have at least one child under ten years of age. Data collection was completed by an independent organisation. Villages were randomly assigned (1:1) with a computer-generated sequence by a study investigator to receive CLTS or no programme (with at least a 10 km buffer between all villages to prevent programme contamination from intervention to control populations). In intervention villages, a sanitation committee was formed and CLTS ‘triggering sessions’ conducted involving orientation on practical actions and securing commitments to build latrines and on safe defecation practices. Villages were visited every two to four weeks to monitor progress.

A village census, gathering of household survey data and child anthropometric measurements were undertaken to provide baseline data. In-home interviews were conducted with the female primary carer of the youngest child in the household. Health outcomes included diarrhoea (three or more loose stools in the previous 24 hours as the primary outcome), with the secondary outcome of respiratory illness. Child growth (as a broad indicator of child enteric infections) was measured by height-for-age (HAZ) and weight-for-age (WAZ). Households were asked to report all cause and diarrhoea-related mortality. To better understand pathways of impact on child outcomes, direct observations of sanitation facilities and household interviews were undertaken and drinking water source and household-stored water were sampled. Outcomes were measured one and a half years after intervention delivery (two years after enrolment) among children under five years old. Participants were not masked to intervention assignment.

Findings

Participants were recruited between April 12 and June 23 2011. Sixty villages (2,365 households) were assigned to receive the CLTS intervention and 61 villages (2,167 households) were assigned to the control group. The study population included 6,862 children younger than five years old at baseline and 6,413 children who were younger than five years were included at follow-up from baseline households. Baseline diarrhoeal and respiratory illness symptoms were at higher prevalence in villages assigned to the CLTS intervention. Anthropometric mean measurements and distributions of children younger than five years were similar.

No differences were observed in terms of diarrhoeal prevalence among children in CLTS and control villages (706 [22%] of 3,140 CLTS children vs 693 [24%] of 2,872 control children; prevalence ratio [PR] 0·93, 95% CI 0·76-1·14).

Access to private latrines doubled (from 33%) and was almost twice as high in intervention villages where access did not change from baseline (1,373 [65%] of 2,120 vs 661 [35%] of 1,911 households). Reported open defecation was reduced in female (198 [9%] of 2,086 vs 608 [33%] of 1,869 households) and in male (195 [10%] of 2,004 vs 602 [33%] of 1,813 households) adults. Mothers reported that children younger than five years were significantly more likely to use a child potty (50.5%) as the main defecation location in CLTS villages than in control villages (15.4%).

Children in CLTS villages were taller (0·18 increase in HAZ, 95% CI 0·03-0·32; 2415 children) and less likely to be stunted (35% vs 41%, PR 0·86, 95% CI 0·74-1·0) than children in control villages. Twenty-two per cent of children were underweight in CLTS compared with 26% in control villages (PR 0·88, 95% CI 0·71-1·08), and there was minimal difference in mean WAZ at 0·09 (95% CI 0·04-0·22) between groups. Effects on child growth were more pronounced for younger children in CLTS villages (<2 years), who showed greater improvements in height and weight than older children, were less likely to be stunted and less likely to be severely
underweight than children in control villages. Children younger than one year old at baseline showed the largest improvements in height and weight.

Regarding deaths during the study period, 48% (n=331) of all deaths were of children aged under five years. While households in CLTS and control groups were equally likely to report a death of a child younger than five years, CLTS households were less likely to report a child death by diarrhoea than control households (PR 0.47, 95% CI 0.23-0.98).

Latrines at CLTS households were more than twice as likely to have a cover over the hole of the pit, appeared to be in regular use (according to reports from field staff), were more likely to be stocked with soap and water for hygiene purposes, and were less likely to have animal or human faeces in them or the surrounding area. Households in the CLTS programme were less likely to share latrines with other households than in the control group. CLTS households were more likely to report being satisfied with their overall sanitation situation and women were more likely to feel they had privacy and safety while defecating at night.

CLTS households were more likely to report treating their stored drinking water, although no significant difference was found in faecal contamination of drinking water sources and household-stored water between control and intervention households. Female respondents in CLTS villages reported higher daily frequency of hand-washing than in control villages, although no difference was reported between those who had visible dirt on their palms between the two groups.

**Discussion**

For villages that received a behavioural sanitation intervention, diarrhoeal prevalence remained similar to control villages. The absence of an effect on diarrhoea is consistent with the study finding of similar drinking water quality across the two groups. However, access to toilets substantially increased, including the safe-management practices of child faeces.

Child growth substantially improved, with a reduction in stunting observed particularly in children under two years of age. These findings are consistent with the window of opportunity to prevent long-term stunting in this age group and suggest that preventing early exposure to faecal contamination could be crucial to achieve improvements in child health. Future trials need to assess whether the association between reduced open defecation and child growth reported in this study can be replicated.

The authors suggest that CLTS might have prevented growth faltering through pathways other than reducing diarrhoea, such as reduction in the prevalence of intestinal worm infections, reduced child exposure to faecal contamination and improved hand-washing (and hence less exposure to environmental enteropathy). Future research is warranted to understand whether improved sanitation could improve child height through these pathways.

The results of this study suggest that a behavioural intervention can substantially increase access to sanitation facilities in a rural setting without financial subsidies. This is particularly relevant for poor households, who were three times more likely to have a private latrine in intervention villages than in control villages. The authors suggest that these findings justify scale-up of the CLTS programme in rural Mali and that the CLTS approach can be effective in improving access to sanitation.

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