TREND EDITORIAL

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Rapid monitoring and evaluation of a community-led total sanitation program using smartphones

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Abstract

India accounts for around 50% of the world's open defecation, and under a World Bank initiative, a rural district was selected to be the first open defecation-free (ODF) district in Punjab. Considering this, the current study aims to evaluate the application and impact of a smartphone-based instant messaging app (IMA) on the process of making Fatehgarh Sahib an ODF district. The District Administration involved the Water Supply and Sanitation Department, Non-government Organizations, and volunteers to promote the process of a community-led total sanitation. Proper training was provided to the volunteers to spread awareness about the triggering events, health impacts of open defecation, and monetary benefits of building new individual household latrine (IHHL). IMA was used as an aid to speed up monitoring and for the evaluation of a sanitation program. All the volunteers were connected to an IMA. This helped in providing a transparent and evidence-based field report on triggering events, follow-up activities, validation of existing IHHL, and monitoring of construction of new IHHL. IMA is a cost-effective tool as it is already being used by the volunteers and requires no additional cost (on the user or on the project) but requires a training on ethical uses of mobile and data safety.

Introduction

The World Health Organization estimates that about 3.1% of deaths (1.7 million) and 3.7% of DALYs (54.2 million) in the

Highlights

- Evaluated the application of smartphone app on the process of making an ODF district
- Smartphones provide evidence-based field reporting (e.g., on triggering events) for CLTS
- Application of smartphone helped in timely reporting and instant feedback for remedial actions
- The uses of smartphone-based app have potential to revolutionize the public health care
- Smartphone user should be provided a training on ethical uses including data safety

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world are attributable to unsafe water and sanitation (WHO 2002). Further, the leading causes of death in children under 5 years are also related to unclean water. Availability of better water quality, sanitation, and hygiene will prevent millions of people, who suffer from water borne diseases (Ravindra and Mor 2013; Ravindra and Smith 2018). As per census (2011), India accounts for around 50% of the world's open defecation and 67% of its rural population defecates in the open (WHO and UNICEF 2014).

Recently, the World Bank sanctioned a $248 million loan for a project entitled "Punjab Rural Water and Sanitation Sector Improvement" to Punjab, India. The project aimed to help the state to improve its delivery of water and sanitation services including reduction in open defecation to improve the quality of life in rural Punjab (The World Bank 2015). Under the project, Fatehgarh Sahib was selected to be the first open defecation free (ODF) district in Punjab and District Administration was directed by the Government of Punjab to achieve the ODF status. The ODF was defined as (MDWS 2015):

a) no visible feces found in the environment/village; and
b) every household as well as public/community institutions using safe technology option for disposal of feces.
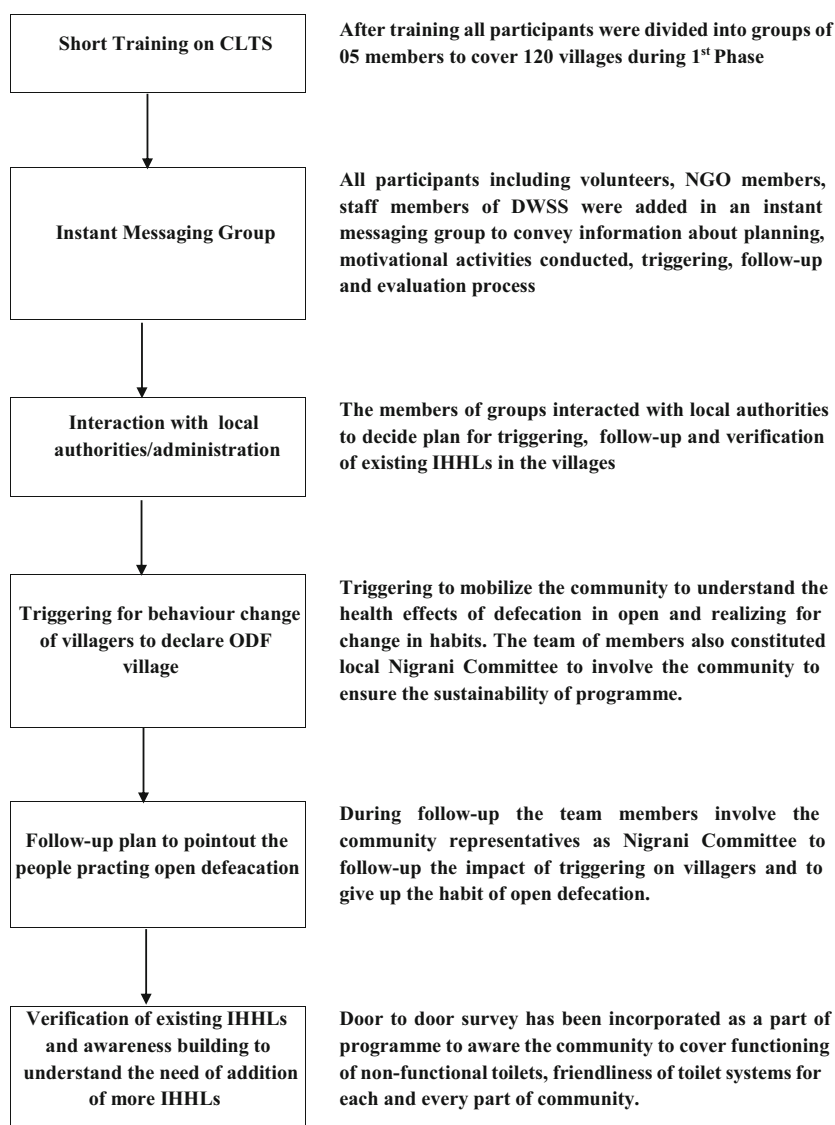
In the current project, a smartphone-based instant messaging app (IMA) was also used as an aid to share day to day plan,

monitoring, evaluation, and validation of ODF activities. The study aims to evaluate the application and impact of IMA on the process of making Fatehgarh Sahib an ODF district, so that lesson learned can be applied to other places to accelerate the process of Community-Led Total Sanitation (CLTS) to stop open defecation.

Methodology The study was conducted in Fatehgarh Sahib District of Punjab state in India using a cross-sectional design. The key information was composed from the unstructured interview of key stakeholders including District Administration. To achieve the study objectives, 20 members of the self-help group (level II) were interviewed as after that repeated information was received. Further, five interviews of SBM volunteers of level II were conducted including the engineers and their head of organization. Official documents prepared by Water Supply and Sanitation Department (Fatehgarh Sahib District) for reporting

to the state authority were also examined to review the progress and impact of CLTS in becoming an ODF district. The flow of information was assessed daily by reviewing the messages exchanged on smartphone-based IMA, i.e., WhatsApp. The impact of smartphone-based IMA and its application in CLTS was also evaluated during the extensive field visits of villages. The key question asked during the information interview included—what is your role and key activities to make district ODF? Were you provided training on CLTS and uses of mobile App? What are the benefits and limitation of using mobile App? How do you report progress to your supervisors? Do you get timely feedback from supervisors? Officials of the Water Supply and Sanitation Department were also asked how they maintained the record of sanitation program in the past? The study was conducted as a part of routine services and hence post facto approval was received from the Institute Ethics Committee.

Fig. 1 Process of CLTS adopted in Fatehgarh Sahib

| **Short Training on CLTS** | After training all participants were divided into groups of 05 members to cover 120 villages during 1st Phase |

| **Instant Messaging Group** | All participants including volunteers, NGO members, staff members of DWSS were added in an instant messaging group to convey information about planning, motivational activities conducted, triggering, follow-up and evaluation process |

| **Interaction with local authorities/administration** | The members of groups interacted with local authorities to decide plan for triggering, follow-up and verification of existing IHHLs in the villages |

| **Triggering for behaviour change of villagers to declare ODF village** | Triggering to mobilize the community to understand the health effects of defecation in open and realizing for change in habits. The team of members also constituted local Nigrani Committee to involve the community to ensure the sustainability of programme. |

| **Follow-up plan to pointout the people practing open defeacation** | During follow-up the team members involve the community representatives as Nigrani Committee to follow-up the impact of triggering on villagers and to give up the habit of open defecation. |

| **Verification of existing IHHLs and awareness building to understand the need of addition of more IHHLs** | Door to door survey has been incorporated as a part of programme to aware the community to cover functioning of non-functional toilets, friendliness of toilet systems for each and every part of community. |

Results

Local settings District Administration involved the Water Supply and Sanitation Department, local Non-Government Organizations and volunteers to achieve the status of an ODF district using CLTS approach. CLTS involves facilitating a process to inspire and empower rural communities to stop open defecation and to build and use latrines, without offering external subsidies (Kar 2005). However, in the current project, arrangements were made to provide a financial incentive (~$250) for building a new individual household latrine (IHHL). Over 60 volunteers from both government and private sectors were trained in two 5-day workshop. After the training, volunteers were termed as "facilitators" and their main goal was to ignite a sense of disgust and shame among the community. The other components covered in the training include spreading awareness about the fecal-oral contamination, health impact of open defecation and to highlight monetary benefits for building new IHHL. The process adopted in the Fatehgarh Sahib district is shown in Fig. 1.

Fatehgarh Sahib has a total of 440 villages and to start-up the triggering and awareness activities, 135 villages were selected in the first phase. Trained volunteers were divided into 13 teams having normally four members. Sarpanch (Village Heads) were informed in written by the District Administration to cooperate with the volunteers and were also made aware of the ODF activities in a public meeting, chaired by a senior Cabinet Minister of the State.

Approach After the volunteers' training, a group namely "SBM Volunteers" were created on IMA including a separate group only for hierarchal top administrators (Fig. 2). The goal of using IMA was to facilitate monitoring, evaluation, and validation of the field activities. To finalize the dates of triggering and follow-up, District Administration organized a planning meeting with the Sarpanch, having involvement of Block Development Office (BDO). A schedule of CLTS activities was prepared and shared on IMA. Involvement of the school children was also ensured in triggering and in spreading awareness through rallies. Facilitators were asked to engage more volunteers including Swachhata Doot (Cleanness Messengers) to follow the ODF activities in various villages. Under the project, Swachhata Doot received a nominal honorarium for follow-up activities and normally they belong to the same vicinity. A voluntary Nigrani Committee (Watch Committee) was also formulated to facilitate the triggering and smooth execution of follow-up activities. Facilitator in coordination with "Watch Committee" and "Cleanness Messenger" conducted the patrol during the early morning hours in the village to observe if the individuals are going in the field for open defecation. Volunteers used to whistle, whenever a person starts squatting to defecate. This "shaming strategy" created embarrassing situation for the person defecating in open. Villagers normally agreed to never defecate in the open again and ensured that if they need to defecate in open (until the arrangement for IHHL), human shit will be covered properly with soil to avoid any fly sitting on it.
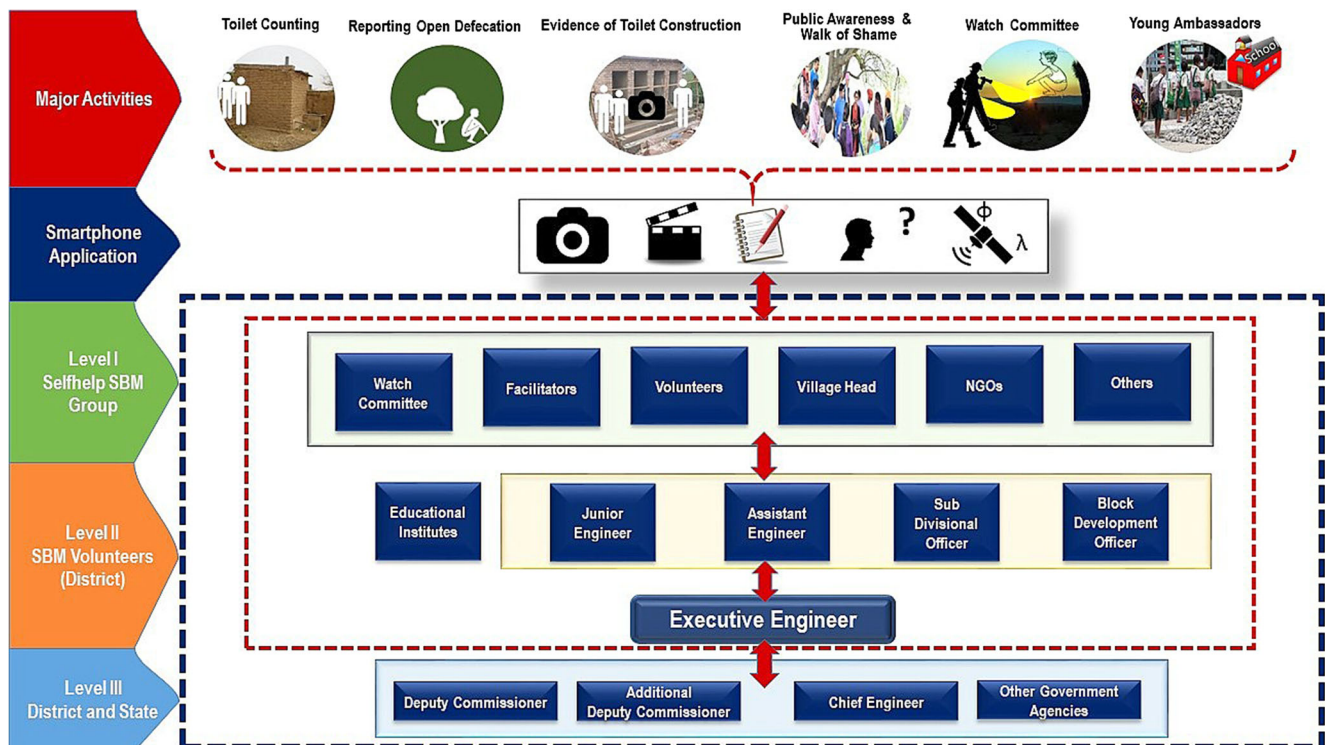

Fig. 2 Process of smartphone-based IMA in CLTS

Relevant changes Under CLTS, short trainings were provided to lead the behavioral change needed to ensure real and sustainable improvements. After the training, facilitators were invited to connect with "SBM Volunteers" group on IMA. The first step in the process was to identify the existing IHHL including the current uses of the toilets. The volunteer collected the photographs of various CLTS activities including the photographs of existing toilet with owners and also if there is a construction of new IHHL going on. They were also trained to note the geographical coordinate of the toilets on their smartphones. It was expected that photographs (with consent) of the CLTS activities along with daily experience will be uploaded in "SBM Volunteers" group on IMA by the facilitators at the earliest time possible. As the IMA offers two-way communications, this resulted in timely reporting and getting immediate feedback for remedial actions. Self-help SBM group (see Fig. 2) member mentioned that instant feedback and motivation by the higher authorities were the key to keep the high morale of the watch committee, facilitators, volunteers, and NGOs etc. As highlighted by the key stakeholders, IMA helped in providing transparent and evidence-based field report on triggering events, follow-up activities, validation of existing IHHL, and monitoring of construction of new IHHL. The extension of IMA in CLTS proves as a cost-effective tool, as most of the facilitators and volunteers were already using it on their smartphone and there was no need to provide a specialized training as the smartphone users were already using it.

Discussion

The Government of India launched a Swachh Bharat Mission (SBM) in October 2014 to achieve Clean India by 2019 (Ravindra and Smith, 2018). SBM aims to improve the levels of cleanliness in rural areas through solid and liquid waste management activities and making village communities (Gram Panchayats) ODF, clean and sanitized (MDWS 2014). The application of IMA in CLTS activities is innovative and as shown in Table 1, it helped to achieve rapid progress (within 1 year) to make ODF villages in Fatehgarh Sahib. Table 1

also shows that clustering of villages declared as ODF but that happened due to administrative approval, as the authorities normally clear the cases together. A comparative assessment of traditional and IMA approach in CLTS is shown in Table 2, which highlights the importance of IMA in planning, monitoring, evaluating and validating a community-led total sanitation program. Application of IMA for sharing multimedia files was felt as the most useful feature by District Administration to observe daily progress and plan further. Hence, the ease of attaching multimedia files like audio, video, and image makes IMA more comprehensive and authentic for public service delivery. This also expedited the process of CLTS to make Fatehgarh Sahib as ODF district.

However, IMA also have some limitations apart from the requirement of internet/data packages. Multiple users uploaded their multimedia files like audio, video, images, which need to be deleted time to time by the users depending on the available memory of their smartphones. Further, downloading of multimedia files is also depend on the speed of internet data package. The users of smartphone were not provided any training on ethical uses of information collected, this may lead to possible misuse of information. Hence, training should be provided on ethical data sharing and uses. The information of individual household collected and shared on IMA may not be secured as the primary data collectors (e.g., volunteers) use their personal phone for data collection and stroage.

Currently, India has over 960 million mobile users and out which 213 million have smart mobile phone, this is expected to be 651 million in 2019 (TRAI 2015; Cisco 2015). Hence the use of such smartphone-based app promises to revolutionize the public health care in the country but there should be some guidelines, while using the personal smartphones for professional purposes.

Conclusions

District Administration involved the volunteers from the region to achieve the status of ODF district. Short trainings were provided for the volunteers to ensure sustainable

Table 1 Progress of villages becoming open defecation free under community led total sanitation (CLTS) drive in Fatehgarh Sahib during 2015–2016

Blocks in Fatehgarh Sahib	Monthly progress of villages becoming open defecation free under CLTS drive												
	Total villages	Sep 15	Oct 15	Nov 15	Dec 15	Jan 16	Feb 16	Mar 16	Apr 16	May 16	Jun 16	Jul 2016	ODF villages
Khera	86	0	18	0	0	11	0	0	7	3	9	38	86
Khammno	71	0	10	0	0	0	0	0	0	0	0	61	71
Bassi	83	0	38	0	0	5	0	0	0	0	40	0	83
Amloh	94	0	18	0	0	5	0	0	0	3	7	61	94
Srihind	106	0	17	0	0	6	0	0	3	0	1	79	106

Table 2 Comparative assessment of IMA and traditional methods in CLTS management

Particular	Traditional methods	Smartphone based IMA
Resources		
Multimedia	Camera with roles and required time to develop the photographs	Easy sharing of multimedia files (photos, audio or video) However, multimedia files need to be deleted from time to time depending on the available memory of smartphones
Locations	Normally field-based verification of existing and new IHHL	Smartphone are by default enabled with GPS, which can be used to mark the location of existing and new IHHL
Documentation	Paper-based documentation to record the evidences. This requires several stationary items	Evidences are being recorded on internal/external memory of smartphone/computers
Data losses	Damaged/lost documents are difficult to recover	Data can be recovered for lost phones and backup can be managed by few clicks
Data sharing	Documents could be shared by post or in person. This is time consuming and requires additional expenditure on postage or transport.	Data sharing is immediate with no cost based on the availability of the internet
Training	Require training to use GPS and camera	Smartphone-based application requires no specific training but orientation of the programs
Economy	Require manpower and stationary, cost of travel and subsistence during field visit	Low-cost, may require short training Availability of mobile internet/data and smartphone
Management		
Planning	Plan submission to coordinate the activities is time consuming	Plan can be submitted to higher authority quickly for approval and feedback without any lag
	Availability of each group member is required to ensure for planning the events	Discussion to plan and fix the dates of events can be done easily through group conversation
	Any changes in planning is time consuming to re-plan the events	Re-planning of events can be done easily through group conversation
Monitoring/evaluation	Immediate evaluation report submission with evidences is very tedious	Evidence-based reports of monitoring, evaluation, and follow-up activities can be submitted instantaneously
	Required complied reports for feedback and hence it is time-consuming	Feedback can be swift as the files are shared immediately. Files can also be made available to other officials
	Information cannot be circulated rapidly. However, no need of internet connection to submit and circulate the information	Information, experiences of other groups can be shared rapidly and motivate other team members
	Data was recorded in official documents and provided through proper request	Required training on ethical and safe uses of mobile data as anonymity of the individual household can be disclosed to others, which can lead to possible misuse
Validation	Requires resources, time consuming	Rapid and evidence-based
	Assessment of information of past events from hard copy is very difficult	Assessment of information of past activities and events is quick
	Data compilation from hard copy is very difficult to filter out the relevant data	Data filtering is a much easier process on using IMA
	Record handling and maintenance is required	No requirement of record handling and maintenance as data is saved on internet server
	Evidences and data of all the ODF activities is more vulnerable to external conditions	No issue of vulnerability of data

improvements in the rural communities. It was planned to apply a mobile-based IMA to appraise the daily progress and to evaluate and validate the ODF activities under CLTS. The two-way communication offered by IMA facilitated the timely reporting and feedback for remedial actions. However, training on ethical uses of mobile phone app and data safety should be provided to avoid any misuse by stakeholders or third party. The study indicates that IMA is a cost-effective tool, which can play a key role in monitoring and evaluating a sanitation program. The uses of such smartphone-based app have potential to revolutionize the public health care.

Compliance with ethical standards

Competing interests The authors declare that they have no competing interests.

Ethical clearance The study was conducted as per part of routine services and hence post facto approval was received from the Institute Ethics Committee via letter no INT/IEC/2017/140 dated 11 August 2017. The study is also linked with "Promoting Ecological Village (ECO-VILL) Models for Sustainable Environment and Healthy Livings" project, which was approved by the Institute Ethic Committee via letter number PGI/IEC/2016/2173 dated 29 Feb 2016.

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