Evaluation of Impact of the M-SAKHI mHealth App on Knowledge, Skills and Acceptance of use of App by Maternal and Child Health Community Health Workers in Rural Maharashtra

Archana Patel
dr_apatel@yahoo.com

Lata Medical Research Foundation

Priyanka Kuhite
Lata Medical Research Foundation

Samreen Sadaf Khan
Lata Medical Research Foundation

Michael Dibley
Global Public Health Nutrition, School of Public Health, University of Sydney

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Abstract

Introduction:

Accredited Social Health Activists (ASHAs) play a vital role in bridging the gap between rural communities and the public healthcare system. Through the Mobile Solutions Aiding Knowledge for Health Improvement (M-SAKHI) clustered randomized controlled trial, ASHAs were equipped with a mobile application for real-time data collection and face-to-face counselling. This study evaluates the App's impact on their knowledge, skills, and acceptance.

Method

Knowledge was assessed using multiple-choice pre- and post-test questionnaires. ASHA skills were continuously evaluated across five domains: (1) participation in meetings/trainings, (2) server monitoring of activities, (3) App and phone operating skills, (4) 5% random checks, and (5) field supervision feedback. ASHA's Performance was graded as poor, satisfactory, or good based on performance scores. Feedback was collected on M-SAKHI training, mobile and app usability, and preferred features in the App using a 3-point Likert scale.

Results

Knowledge assessment showed a significant decline in the ASHAs' scoring in "Poor" category 18.7% (p = 0.00) (pretest 32% (48/150) vs post-test 13.3% (20/150)) and a 14% (p = 0.00) increase in the number of ASHAs scoring "Good" category (pretest 4.7% (7/150) vs post-test 19.3% 29/150)). Only a fifth displayed poor performance in skills assessment across attributes. Data or device misuse was limited to 6.7% (10/150). Over 90% (139/150) of ASHAs could operate the device and app independently; nearly all found the App's content user-friendly and easy to understand.

Conclusion

The M-SAKHI app positively impacted ASHAs' knowledge and enhanced their implementation capacity. With the very high acceptance of mHealth technology by ASHA workers, this shows promise in empowering ASHAs to deliver services more effectively in rural settings.

Trial Registration Number: CTRI/2018/02/011915 [Registered on: 15/02/2018] **https://ctri.nic.in/Clinicaltrials/searchbyctri.php**

1.INTRODUCTION

India has seen a sharp decline in maternal and infant mortality. The infant mortality rate was 25 per thousand live births in year 2022 which was less than one-fourth as compared to 1971. [1] The Maternal Mortality Ratio in India has declined to 93 in 2019-21 from 103 in 2017-19 and 130 in 2014–2016. [2] While this progress is encouraging, maternal deaths persist, especially in low and lower-middle-income countries, due to limited access to quality care. Skilled healthcare before, during, and after childbirth is vital, and poor knowledge and skills among healthcare workers remain key barriers to improving maternal and child health. [3–5]

Launched in 2005, the National Health Mission (NHM) aimed to reduce maternal and infant mortality by improving access to healthcare through trained Community Health Workers (CHWs), known as Accredited Social Health Activists (ASHAs). NHM follows a continuum of care approach for maternal and newborn health, encompassing antenatal care (ANC), safe institutional delivery, immediate newborn care, and home-based postnatal care. [6, 7] ASHAs, residents of the same village, are trained to assess basic healthcare needs and facilitate access to services. [8] The ASHAs are trained to communicate, build rapport through regular visits to pregnant women, lactating mothers, and newborns, and often participate in family functions. [9] The health sector has invested in empowering ASHAs through training and provision of health kits for service delivery and documentation. However, recent studies highlight gaps in their knowledge and delivery skills, emphasizing the need for ongoing planning and sustained health system support. It also mentions how ongoing planning is necessary to facilitate and sustain health systems support for ASHA programmes. [10, 11] ASHAs are currently using paper registers to list their beneficiaries, manage their visit schedules, and collect relevant health data. These registers are not only cumbersome to carry along with the medical kits but manual entry results in poor legibility, errors in scheduling and tracking. The data management is time consuming and cumbersome resulting in both errors which leads to data lag. Additionally, the ASHAs are often overburdened with supplementary community-based health programmes responsibilities. Therefore, there is an opportunity to substitute this manual method of data collection and management using android-based technology. This technology also provides a platform for pre-recorded counselling messages and videos which can aid counselling of their clients regarding health improving behaviour. [12] These features also help update the knowledge of the ASHAs and standardize the process of counselling making it interactive and assisting prompt referral.

Training programs are essential for CHWs to build knowledge of community resources, health promotion, and professional behavior. Structured training enhances their critical thinking, communication, and collaboration skills, key to delivering health education. Integrating mobile technology into training further improves ASHAs' knowledge, skills, and efficiency in serving their communities.

India has more than one billion mobile phone users, out of which 45% account for those based in rural areas. [13] In recent times, the use of mobile devices for data collection has gained significant traction due to their ability to enhance efficiency, accuracy, and real-time monitoring. The utilization of mobile and wireless devices to improve healthcare services, commonly referred to as "mHealth, "holds significant promise for enhancing the efficiency and effectiveness of the ASHA. [14–16] Mobile data collection allows users to gather qualitative and quantitative information directly through smartphones and tablets, which streamlines the process and reduces the likelihood of errors associated with traditional paper-based methods. This approach not only minimizes costs related to data entry and transportation but also enables immediate data analysis and reporting, facilitating quicker decision-making. Furthermore, mobile data collection tools often integrate seamlessly with existing systems, allowing for better data management and collaboration among team members. As

organizations increasingly recognize the benefits of this technology, mobile data collection is becoming an essential component of research and project management across various sectors.

India has been implementing maternal and child health interventions through mHealth. Successful studies of mHealth Applications (App) for various interventions have been documented. [16–18] However, there is a dearth of literature assessing the feasibility, the challenges and the utility of mHealth interventions by the ASHA workers in India using community-based cluster randomised controlled trial (cRCT), which has broader implications on policies for public health services delivery in the community. M-SAKHI ("Mobile Solutions Aiding Knowledge for Health Improvement") is an mHealth comprehensive Behavioural Change Communication (BCC) intervention that extends through the continuum of care from pregnancy to infancy. The description of this intervention and the methodology to evaluate its effectiveness in reducing the prevalence of stunting in children using a cluster randomised control trial has been published. [19] An intervention's effectiveness depends on how it impacts the users and how well it is implemented by them, in this case the ASHA workers. So, our objectives were to evaluate if the ASHA App, a key element within the M-SAKHI intervention package, helped to improve the knowledge and the skills of the ASHA workers and if the ASHA's perceived the App to be a useful aid for their health outreach work in the community.

2. METHODS

The current evaluation of the M-SAKHI ASHA App on knowledge and skills of the ASHA's was a nested study within the larger M-SAKHI cRCT, which was implemented during 2016–2019.

2.1 Description of the M-SAKHI ASHA App:

The five components of the M-SAKHI cRCT intervention have already been published.[19] The M-SAKHI ASHA App was one of the core component of the M-SAKHI intervention. (Fig. 1: **M-SAKHI ASHA ASHA App Screenshots)**. The M-SAKHI ASHA App, built on the CommCare platform for Android devices, supports real-time data collection and face-to-face counselling during ASHA's monthly home visits. It includes bilingual (Marathi and English) forms with written and audio for each question and response. Embedded audio messages reinforce key health behaviours, and inconsistent participant responses trigger automated text alerts to the auxiliary nurse midwife counsellor, the participant, and their ASHA. The App also offers audio-visual content on maternal and infant health, nutrition, hygiene, immunization, illness recognition, and health-seeking behaviours, aligned with WHO, UNICEF, and the Indian government guidelines. Features like auto-calculations, skip patterns, and validation checks reduce data entry errors, while visit reminders and task prompts enhance efficiency. Family involvement during visits fosters shared decision-making. Real-time data uploads enabled study staff to monitor ASHA performance, ensure data quality, and take timely corrective actions.

2.2 Study Setting and Participants:

The participants of this evaluation were 150 ASHAs from the 119 villages of the 20 intervention clusters (PHCs) of the M-SAKHI trial from Bhandara and Nagpur districts in Maharashtra, India. The clusters were defined as a range of three to eight rural villages from the areas of two districts. These villages provided a cumulative population of approximately 8,000 persons per cluster. Additionally, they were at least 4 km apart and under the coverage area of separate primary health centres. Government programs on maternal and child health and nutrition were ongoing. A total of 165 eligible villages in Nagpur and 79 in Bhandara were grouped into clusters. Then, propensity scores of all identified clusters were developed based on certain indicators. Afterwards, stratified cluster randomization was performed (out of a total of 40 clusters, 20 intervention clusters and 20 control clusters). The 20 intervention clusters included 119 villages. The number of ASHA workers depended on the population and geographic area they had to serve; hence, some of the villages had more than one ASHA worker. Therefore, the total number of ASHA workers for the M-SAKHI intervention arm was 150 from the 119 villages.

2.3 Training and Re-Training Of ASHAs:

ASHAs were trained in batches of 6–10 at their respective PHCs over five days by a trainer and assistant. Three project managers collectively trained 150 ASHAs over three months. On day one, each ASHA received an Android smartphone preloaded with the M-SAKHI ASHA App and a data pack for study use. The project managers were master trainers, trained during the Training of Trainers (TOT). The TOT was conducted in collaboration with App development team from CommCare and the study investigators. Data for this evaluation was also partly gathered by the master trainers to ensure valid and high-quality data collection. Additional performance reports were generated using project monitoring reports.

The training curriculum included App modules, audiovisual aids, role-play, and hands-on sessions covering participant screening, informed consent, registration, and counselling. ASHAs were also trained in smartphone use, data entry, follow-up scheduling, and procedures for form submission and synchronization.

Monthly review meetings at PHCs assessed performance, monitored task completion, and addressed field challenges. As ASHAs gained confidence, meetings shifted to a bi-monthly schedule. If an ASHA was found to be struggling, she underwent a one-day refresher training tailored to her specific learning needs. These refresher sessions not only addressed knowledge gaps but also helped establish a mentorship dynamic between project managers and ASHAs fostering mentorship and reinforcing accountability.

2.4 The Nested Evaluation of ASHAs of Intervention Clusters:

The evaluation of intervention cluster ASHAs was done using a multiple-choice pre- and post-test questionnaire. Pre-test data were gathered at the start of training, while post-test data were collected at the end of the intervention.

2.4.1 Knowledge assessment:

The pre and post-test questionnaires were developed based on the Maharashtra State ASHA training modules and included questions on topics such as antenatal care, neonatal and infant care, immunizations, infant, and young child feeding practices, identification of danger signs in mothers and infants, and other health-related aspects. The questionnaire comprised 35 multiple-choice questions (MCQs) with four different versions, each containing the same questions in a different sequence. Scores ranged from 0 to 35, and ASHAs' knowledge performance was categorized as Poor (≤ 50%), Satisfactory (51–75%), and Good (≥ 76%).

2.4.2 Skill Assessment:

ASHA's skill in technology use and intervention implementation via the M-SAKHI App was assessed across five domains. Table 1 outlines each domain's attributes, definitions, assessment timing, data sources, and grading methodology. At the end of the intervention, ASHAs completed a self-administered structured questionnaire assessing their training experience, mobile and App usage skills, and feature preferences. Responses were recorded using a 3-point Likert scale.

Table 1
Domains, attributes, definition, time of assessment, source of information and grading of ASHAs skills.

Domain1: Meeting /Trainings			
Definition	**Time of assessment**	**Source of information**	**Grading**
Attribute 1: Attendance			
Number of meetings and trainings, re-trainings attended for feedback on field activities during the course of the study.	End line assessment	Attendance sheets of ASHA monthly meetings	*Poor*: ≤50% *Satisfactory*: 51 – 7 % *Good*: ≥ 76 – 10 %
Attribute 2: Involvement in trainings and implementation activities			
Involvement in strategy planning and problem resolution for smooth implementation	Monthly assessment	Assessed by project manager	*Poor*: No involvement *Satisfactory*: Partial involvement *Good*: Active involvement
Attribute 3: Need of re-trainings			
Number of separate re-trainings required throughout the implementation period (30 months) apart from regular schedule	End line assessment	Assessed by project manager	Poor: ≥5 re-trainings Satisfactory:3–4 re-trainings Good: ≤2 re-trainings
Domain 2: Server monitoring of ASHAs activities			
Definition	**Time of assessment**	**Source of information**	**Grading**
Attribute 1: Enrolment of participants			
Total percentage of participants enrolled out of expected number of pregnant women from the given population	End line assessment	CommCare server reports	Poor: ≤50% Satisfactory: 51 – 7 % Good: ≥ 76–100%
Attribute 2: Visit compliance for follow ups			
Total number of scheduled visits completed compared to expected number of scheduled visits.	End line assessment	CommCare server reports	Poor: ≤50% Satisfactory: 51 – 7 % Good: ≥ 76 – 10 %
Attribute 3: Timeliness of completing scheduled visits			
Total number of scheduled visits completed on time (+ or − 7 days) compared to the total number of follow up visits.	End line assessment	CommCare server reports	Poor: ≤50% Satisfactory: 51 – 7 % Good: ≥ 76 – 10 %
Domain 3: ASHA app and phone operating skills			
Definition	**Time of assessment**	**Source of information**	**Grading**
Attribute 1: Handling of Comm Care app			
Ability to effortlessly perform seven app related activities (1. Login 2. Select module 3. Select case 4. Data entry in the form 5. Save the form. 6. Sync the form 7. Log out)	Monthly assessment	Assessed by project manager	Poor: Performs only 3 activities Satisfactory: Performs 4–6 activities Good: Performs all 7 activities
Attribute 2: Understanding app Questionnaire			
Ability to understand the questionnaire in the app and explain it to the participants	Monthly assessment	Assessed by project manager	Poor: Unable to understand Satisfactory: Able to understand but unable to explain Good: Able to understand and explain

Domain1: Meeting /Trainings			
Definition	**Time of assessment**	**Source of information**	**Grading**
Attribute 1: Attendance			
Attribute 3: Device/ phone handling			
Ability to perform six device/ phone related activities (1. Insert/remove SIM. 2. Raise/lower volume. 3.Turn Device on/off 4. Turn data on/off. 5. Turn WIFI/Hotspot on/off 6. Change the date/time)	Monthly assessment	Assessed by project manager	Poor: Performs any 2 activities Satisfactory: Performs any 3–5 activities Good: Performs all 6 activities
Attribute 4: Troubleshooting			
Ability to timely report and resolve troubleshooting issues independently.	Monthly assessment	Assessed by project manager	Poor: Unable to report and resolve issue independently. Satisfactory: Able to report issue, but resolved by project staff. Good: Able to identify and resolve the issue independently or with remote support.
Domain 4: 5% Random checks			
Definition	**Time of assessment**	**Source of information**	**Grading**
Attribute 1: Participants feedback for home visits sessions			
Followed the expected protocol for home visit sessions (1. Monthly home visit with mobile phone for data collection 2. Entering information from source document 3. Reconfirmation of responses in case of any queries 4. Sensitizing participant with in-app audio-visual aids)	Random visit assessment	Assessed by project manager	Poor: Not followed any of the tasks Satisfactory: Followed any 2 tasks Good: Followed all 4 tasks
Attribute 2: Data quality checks			
Ability to collect and enter in app data for these variables: 1. Date of delivery 2. Place of delivery 3. Time of Delivery 4. Gender 5. Birth weight 6. Mode of delivery 7. Maternal and child complications 8. Hospitalization.	Random visit assessment	Assessed by project manager	Poor: Able to enter ≤ 4 variables Satisfactory: Able to enter > 5–7 variables Good: Able to enter all variables.
Domain 5: Field supervision feedbacks.			
Definition	**Time of assessment**	**Source of information**	**Grading**
Attribute 1: Participants feedback for home visits sessions			
Percentage of billing amount exceeded by the ASHA against actual data plan issued to her by the study and/ or phone damage	Monthly assessment	Monthly phone billing statements assessed by project manager	Bad: Exceeded 50% Worse: Exceeded 51 – 7 % Worst: Exceeded 76–100%

2.5 Data analysis:

The demographic characteristics of the ASHA workers were summarized using descriptive statistics, including frequencies and percentages. For each domain assessed, such as knowledge and skills, ASHAs were categorized into three performance levels: Poor, Satisfactory, and Good. These categories were defined using the mean (± standard deviation, SD) of the knowledge scores. Scores below (Mean − SD) were classified as Poor, scores around the Mean (± 0 SD) as Satisfactory, and scores above (Mean + SD) as Good. This method provides a statistically robust basis for categorizing knowledge levels and enhances the objectivity of the analysis. The number and proportion of ASHAs in each category were reported to provide an overview of their baseline and

post-intervention performance. To evaluate the change in knowledge following the intervention, the pre-test and post-test scores were compared using **McNemar's test**, a statistical method suitable for analyzing paired nominal data. This test helped determine whether there was a significant shift in the proportion of ASHAs across the different knowledge categories after the training and use of the ASHA App.

2.6 Ethical Consideration:

The trial was approved by three Institutional Review Boards (local IRB: Lata Medical Research Foundation, Nagpur; the Indian National IRB: Indian Council of Medical Research; and the University of Sydney Human Research Ethics Committee) (Ref: 2015/990). The study was conducted in accordance with the guidelines laid down in the Declaration of Helsinki. Written informed consent was obtained from all study participants, and confidentiality was maintained throughout the study. Individual informed consent was also obtained from the ASHA workers prior to the commencement of their training. (**Trial Registration Number**: CTRI/2018/02/011915.)

3. RESULTS

3.1 ASHAs characteristics at baseline:

Two-thirds of ASHAs were between 31–40 years of age, over half were educated till at least 12th grade, most (93%) had more than 5 years of job experience as ASHAs and half of them also had other jobs. Nearly all were using mobile phones prior to the trial but only 5% used android smart phones (Table 2: **Baseline Characteristics of ASHAs).**

Table 2
Baseline Characteristics of ASHAs (N = 150):

Characteristics	Frequency (%)
Age (Years)	
≤ 30	9(6)
31–40	99(66)
41–50	42(28)
Education (Grades)	
10th complete	29(19.3)
12th complete	84(56)
more than 12th	37(24.6)
Tenure as ASHA (Years)	
0–5	10(6.7)
06–10	140(93.3)
Employment status other than ASHA	
ASHA as a house wife	76(50.7)
ASHA + Other work	74(49.3)
Availability/ access to any mobile phone	
Yes	149 (99.3)
No	1(0.7)
Type of mobile phone used prior to M-SAKHI training	
Java	137(91.3)
Symbian	5(3.3)
Android	7(4.7)

3.2 ASHAs Knowledge Before Implementation (Pre-Test) and After Implementation (Post-Test) of the M-SAKHI Intervention:

Figure 2 compares the distribution of ASHA workers' knowledge scores across three categories: Poor, Satisfactory, and Good, based on their performance in pre-test and post-test assessments. The post test scores indicate a notable shift in the distribution. The percentage of ASHAs in the "Poor" category decreased significantly (p = 0.00) by 18.7% (pretest 32% (48/150) vs post-test 13.3% (20/150)). There was a marginal improvement in the percentage in the "Satisfactory" category by 4% (p = 0.57) (pretest 63.3% (95/150) vs post-test 67.3% (101/150)). The percentage of ASHAs in the "Good" category increased substantially by 14.6% (p = 0.00) (pretest 4.7% (7/150) vs post-test 19.3% (29/150))

3.3 ASHAs skill testing on use of the M-SAKHI ASHA App after implementation:

The scores obtained by ASHAs for the five domains across various attributes are shown in Fig. 3. **For the Domain 1**: Meetings and Trainings (3 attributes- attendance, involvement in trainings and implementation activities, need for re-trainings)- The three attributes were “poor” only in a fifth. **In Domain 2**: Server monitoring of ASHAs activities (3 attributes -enrolment of participants, visit compliance for follow ups, timeliness of completing scheduled visits) - The ASHAs depicted “poor” skills for 13.3% (20/150) for participant enrolments, and, a fifth had “poor” skills for visit compliance and timeliness of visits. **For Domain 3**: ASHA App and phone operating skills (4 attributes – handling of App, understanding the App questionnaire, device handling and troubleshooting), - “Poor” performance was observed in 7.3% (11/150) for App handling, 12.7% (19/150) in questionnaire understanding, 6.7% (10/150) in device handling, and a fifth in trouble shooting. In **Domain 4**: 5% Random checks (2 attributes – participant feedback for ASHAs home visits, data quality checks), a fifth had poor skills for both attributes. For **Domain 5**: 1 attribute – misuse of device or data, only 5% ASHAs were found to use the phone for other than study activities.

3.4 ASHA’s Feedback on the M-SAKHI trainings and ASHA App Intervention Acceptance:

A significant majority of ASHAs (52.3%) rated the training as "excellent." Following the training, over 90% of ASHAs demonstrated the ability to independently operate the device and utilize the ASHA App. Furthermore, nearly all ASHAs reported that the App's questionnaires, images, embedded videos, and counselling messages were easily understandable. **(**Table 3: **ASHA’s Feedback on the M-SAKHI ASHA App and Trainings)** The ASHA’s experiences regarding the training and feedback about the App was gathered soon after initial training.

Table 3
ASHA’s Feedback on the M-SAKHI ASHA App and Trainings

ASHA's Feedback Attributes	N = 149 (%)
Training experience	
Excellent	78(52.35)
Good	55(36.91)
Satisfactory	16(10.74)
Bad	0(0)
Independently handling mobile device	
Need help to use mobile	14(9.4)
Use independently	135(90.6)
Can't use mobile device	0(0)
Independently handling ASHA app	
Need help	7(4.7)
Use independently	142(95.3)
Can't use ASHA app	0(0)
ASHA App questionnaire	
Easy to understand	146(97.99)
Hard to understand	3(2.01)
Not understood	0(0)
App images	
Easy to understand	143(95.97)
Hard to understand	6(4.03)
Not understood	0(0)
App embedded videos	
Easy to understand	142(95.3)
Hard to understand	7(4.7)
Not understood	0(0)
App embedded counselling messages	
Easy to understand	138(92.62)
Hard to understand	11(7.38)
Not understood	0(0)

When ASHA workers were asked to elaborated about the most important component of the M-SAKHI App, most of them find the video and audio recordings as most useful. The reason behind this choice as quoted by one ASHA worker was **"By watching videos mothers get chance to watch and hear the content. Videos can clear all the questions or doubts which she and her family had in their minds. Also, we (ASHAs) are now able to convince the family members on topics related to rest to pregnant woman and consumption of iron tablets with confidence and a video as proof."**

Also, the auto calculation feature was liked by ASHA workers, as stated by one ASHA **"When we type dates like date of birth or last menstrual period the application automatically calculates age and expected date of delivery respectively. This minimizes the chances of manual calculation errors."**

Another ASHA mentioned that **"The audio-visual training aids used during the trainings, and, the images, videos and counselling messages in the App has made our job easy and we can share this information with the participant nicely."**

Most of the ASHAs mentioned that they felt happy because their trainer appreciated them for the improvement in their skills and performance.

Our trainers are happy as they observed our growing confidence in handling the android phones as well, we were better able to answer the ANC, PNC questions in the App without their help.

4. DISCUSSION

This study aimed to evaluate the impact of the M-SAKHI ASHA App on training, knowledge and skills of ASHA workers and their acceptability towards using the App. We conducted a rigorous assessment of use of mobile phone technology by the ASHAs to inform the feasibility of its use as a job aid to execute their responsibilities of data collection and counselling to improve maternal and child health in rural communities. Our findings showed a significant improvement in ASHA workers' knowledge after using the App compared to the start of the intervention. Majority of ASHAs demonstrated 'Satisfactory' to 'Good' performance in training, participant enrolment, timely visits, and using the M-SAKHI App for counseling and data entry. Over 90% managed the devices and App functions satisfactorily and about 80% could independently address technical issues. The rate of misuse of phones or data was minimal at 5%. Overall, the performance evaluation suggests that the training and use of the App effectively met ASHAs' needs and improved their performance. The ASHA App component of the M-SAKHI intervention proved to be a successful integration of technology and mentorship, empowering ASHAs. According to the feedback received from ASHAs, the App's user-friendly interface and interactive modules likely enhanced knowledge retention, comprehension, and communication with beneficiaries. The ease of accessibility of information and resources provided in the App allowed ASHAs to expand their knowledge at their own pace. Recent evaluations of mHealth interventions to support and empower CHWs have gained popularity and one such example is the Catholic Relief Services' ReMiND project in Uttar Pradesh, developed in partnership with the NHM and DIMAGI, which created a CommCare App to enhance ASHA performance. The App helped ASHAs manage workload by scheduling visits and supported counselling through text messages. It improved visit compliance, increased household receptiveness to maternal and newborn health messages, and was cost-effective in saving lives.[20] Similarly, a joint SEWA and Gujarat government initiative showed that the ImTeCHO App enhanced ASHAs' knowledge and skills.[21] The M-SAKHI App featured user-friendly tools such as audio-visual health messages and a data collection questionnaire with readable and audio options for illiterate women. It also integrated with the broader intervention by triggering alerts to nurse counsellors when health issues were identified. These features improved ASHAs' communication with beneficiaries and were especially helpful for those with limited experience using smartphones. ASHAs reported that digital assistance for counselling and data collection significantly enhanced their work quality. This study adds to the growing evidence supporting the feasibility of using mobile apps to aid ASHA workers.

This study has several limitations. First, the feedback was collected through self-administered forms completed by ASHA workers, which may have introduced a Hawthorne effect. Second, it cannot be determined whether the observed improvements were attributable to the app itself or to the training and strict supervision provided by the implementation team. Although project managers conducted 5% random surprise visits, this proportion may be considered limited given the larger sample size. However, backend server–based monitoring helped to mitigate this limitation. Such server-based monitoring is less resource-intensive than traditional field monitoring and may be particularly useful in low-resource settings and remote areas with reliable network coverage.

In conclusion, the study highlights the M-SAKHI App as a promising tool to enhance ASHA workers' capacity and effectiveness in delivering community health services. Improved knowledge through the App led to better decision-making, communication, and adherence to health protocols, contributing to positive health outcomes for those communities served by ASHAs. Importantly as shown in this evaluation the intervention demonstrated strong user acceptability, reinforcing its practical value. The findings support the use of mHealth technology as a job aid for training and empowering community health workers across rural and urban India. This approach can strengthen healthcare delivery and coverage, particularly for maternal and child health, and has broader implications for public health policy. With appropriate planning, monitoring, and supervision, the intervention shows potential for scalability and long-term sustainability.

Abbreviations

ANC
Antenatal care
App
Application
ASHA
Accredited Social Health Activists
BCC
Behavioural Change Communication
CHW

Community health workers
cRCT
Clustered Randomized Control Trial
MCQ
Multiple Choice Questions
M-SAKHI
Mobile Solutions Aiding Knowledge for Health Improvement
NHM
National Health Mission
PHC
Primary Healthcare Centres
UNICEF
United Nations Children's Fund

Declarations

9. COMPETING INTERESTS:

The authors declare no competing interests

8. FUNDING:

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Author Contribution

The study was conceived and designed by ABP and MJD. ABP, PK and SBK wrote the draft manuscript with inputs from MJD. Statistical analysis for the manuscript was performed by ABP. All authors contributed in interpretation of data analysis, drafting the manuscript and approving the final manuscript.

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Data Availability

The primary data supporting this study were collected by the study authors. Due to ethical restrictions and privacy considerations, the datasets cannot be publicly shared. However, anonymized data may be made available from the corresponding author upon reasonable request.

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Figures

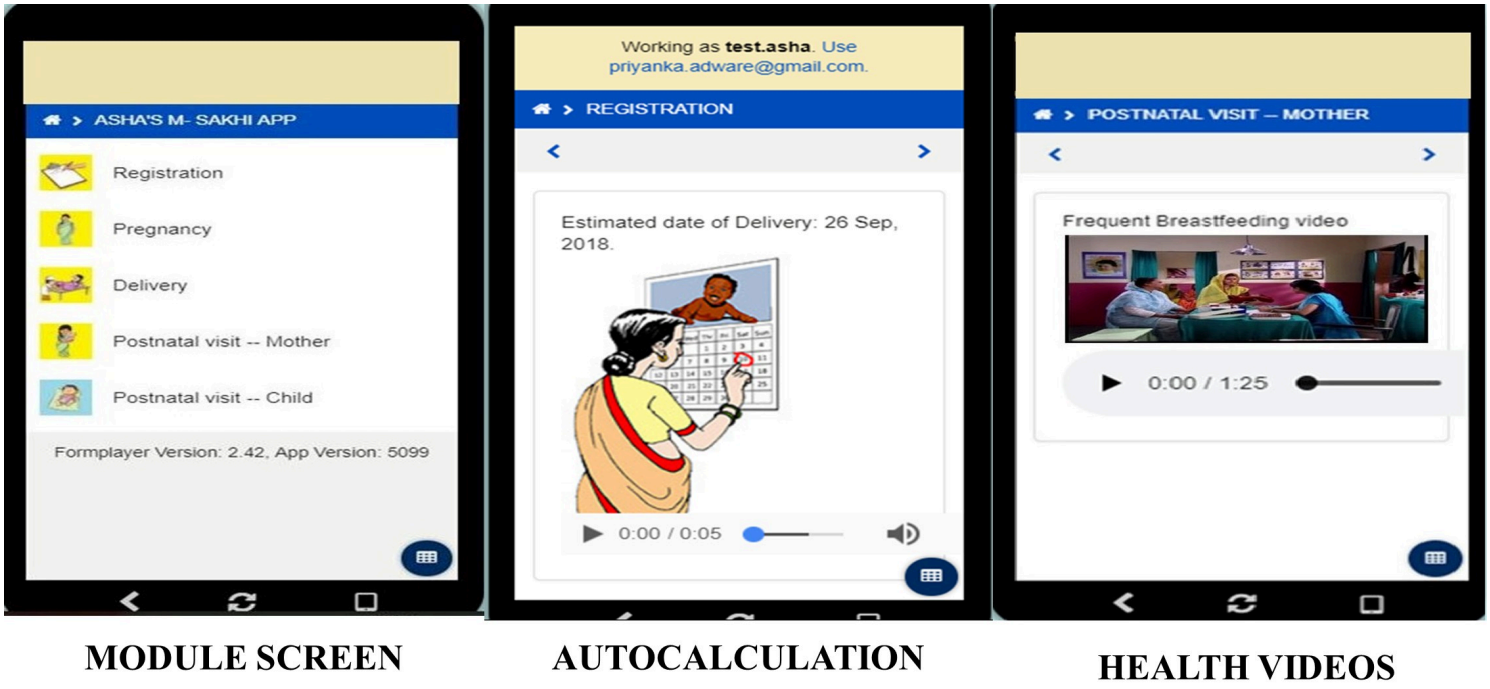

Figure 1

ASHA App Screenshots

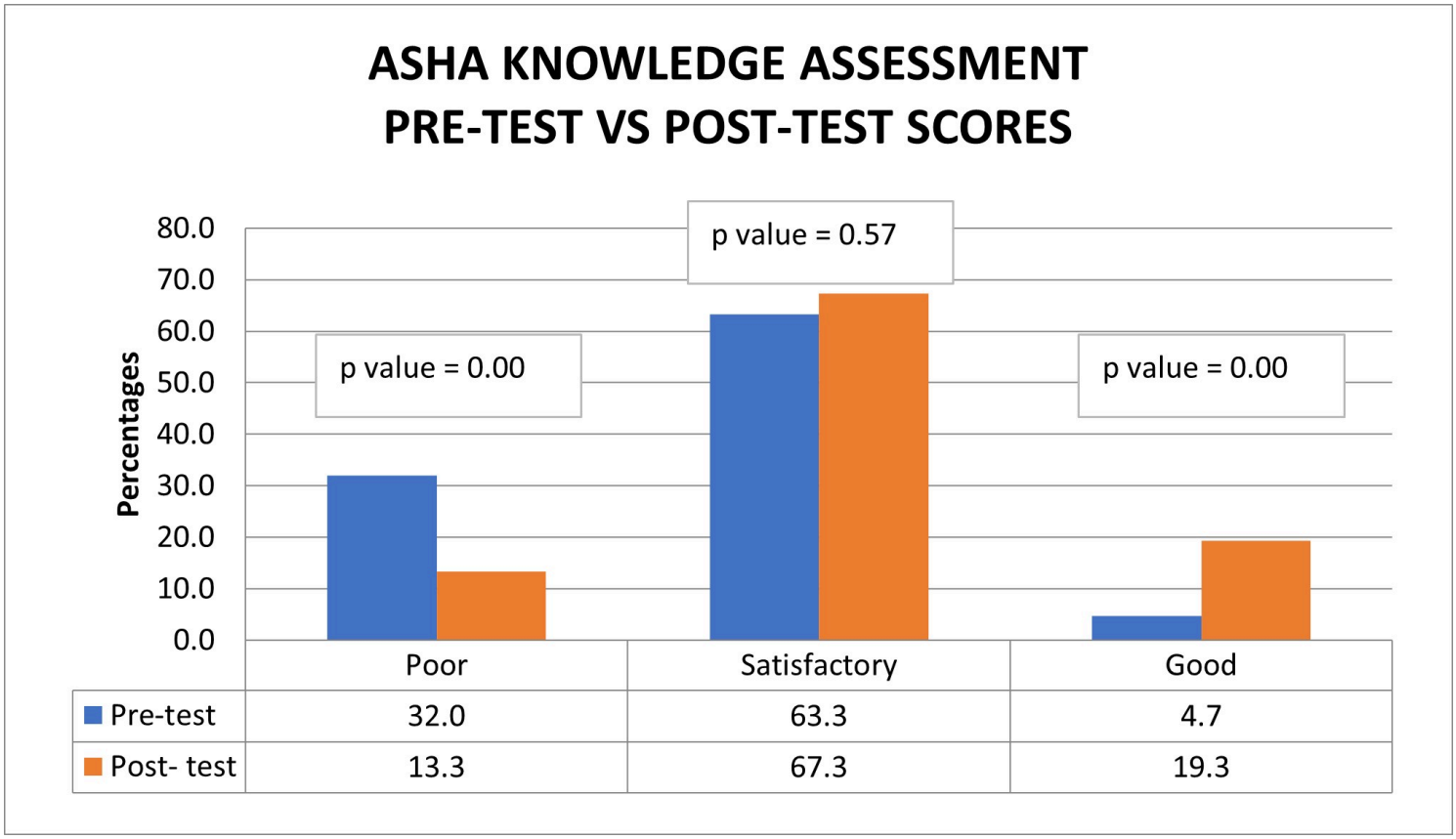

Figure 2

ASHAs Knowledge Assessment based on Pre -Test and Post Test Scores)

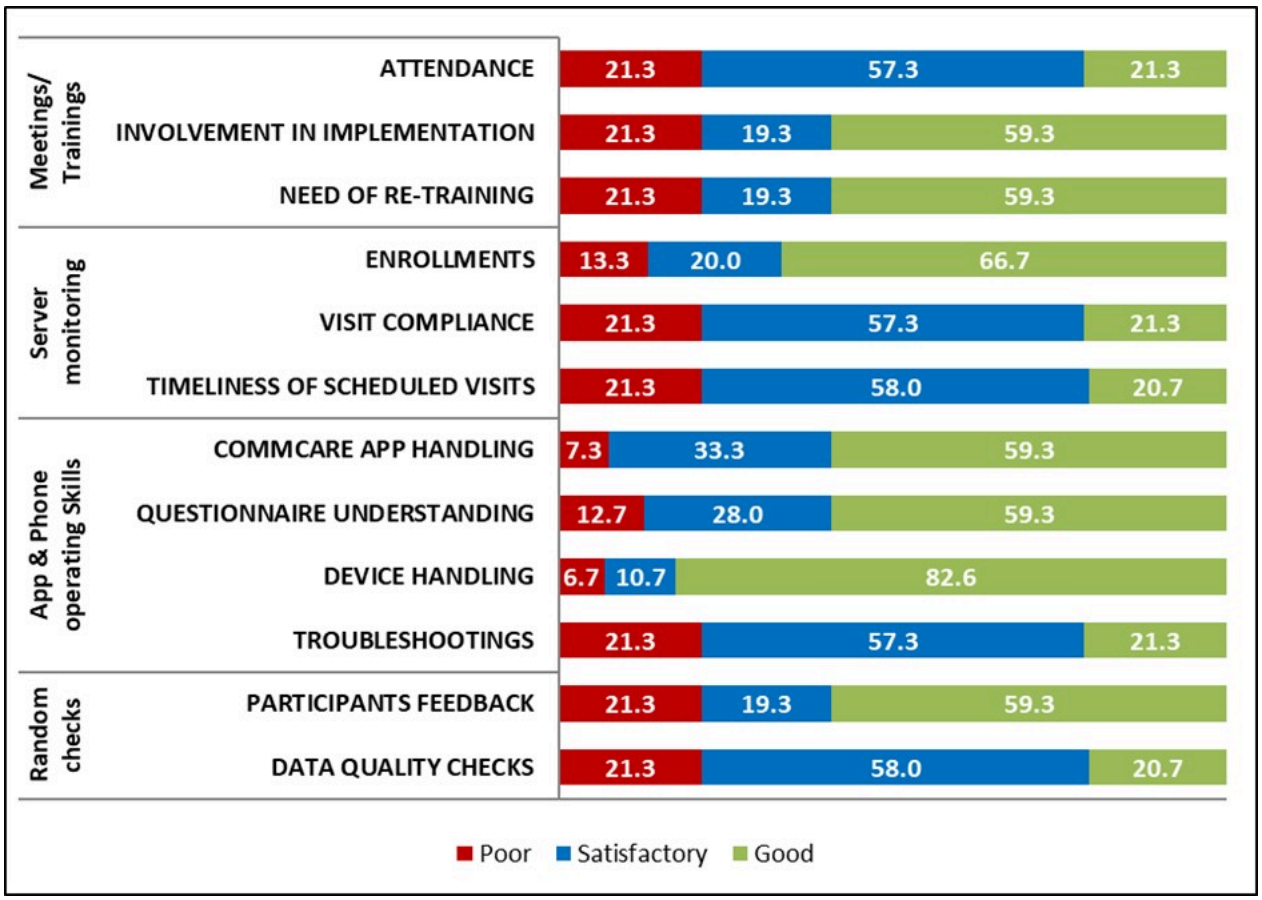

Figure 3