

Original Research Article

Factors influencing, SWOT analysis and emerged strategies for improving the use of digital data platforms in immunisation program by frontline health care providers: a study from rural Eastern India

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ABSTRACT

Background: Digital health is a multidisciplinary concept that intermingles technology and healthcare for better service provision. Recently, these platforms are getting better utilised during the COVID-19 pandemic. We attempted to understand the factors influencing the use of digital data platforms by the frontline health workers and do a situational analysis using SWOT (strength, weakness, opportunity and threats) framework.

Methods: We adopted a qualitative research method to explore both internal and external factors in a rural block of Odisha, India. 15 In-depth interviews (IDI) were conducted among the FHWs telephonically. Analysis was done using MAXQDA software. Based on findings and extensive literature review, a conceptual framework was developed.

Results: The study explored that elder age, low education, less interest, fear of health problems, less experience in using applications, married, and work duplication were the internal factors causing reluctance and, user-friendliness, the language for operating, training on application use, handholding support, including troubleshooting, availability of internet, network and electric power supply were the external factors that influence the use. Further, opportunities such as the availability of IT platforms for data storage and troubleshooting, technological advancement, Government promotional initiatives and availability of resources through other programs could be strategically leveraged. Also, our study proposes strategies such as making the applications simple, informative, and user-friendly using advanced technology, better development of applications that are leveraging the "digital India" initiative.

Conclusions: Exploring and understanding the situational factors and based on that, adopting context-appropriate strategies will help to achieve better and wider use of the digital platforms.

Keywords: Information technology, Training, Digital health, Health worker, Mobile application

INTRODUCTION

Frontline health workers (FHWs) play a vital role in providing routine and essential health care services in the

community and connecting the local people to the health system.¹ Most often, they are the first contact for care for millions of people for managing the patients or to link them to health care facilities for treatment.² Increased

access to FHWs has shown improved maternal and child health care utilisation and outcomes in a variety of settings.³ FHWs also play an important role in disseminating community-based health information and promoting different health programs at the ground level. In India's healthcare delivery system, their role is critical in disseminating information about the government's flagship healthcare programmes among eligible beneficiaries such as pregnant women, mothers, and their children.⁴ Digital health is a multidisciplinary concept that intermingles technology and healthcare for better service provision.⁵ In recent years, digital healthcare platforms are getting better utilised in all different aspects of health care.⁶ Online pharmacies, teleconsultations, e-prescriptions, digital medical records, integrated fitness trackers are some of such examples to improve access to health care by utilising digital platforms.⁷ Mobile health (m-Health) apps, electronic health records (EHRs), electronic medical records (EMRs), wearable devices, telehealth and telemedicine, as well as personalised medicine are some of the advantages of digital health.⁵ Digital technology is bringing a wide range of stakeholders, healthcare providers, and health care seekers together on a single platform.⁸ Digital platforms help us tap into our creativity by allowing us to iteratively run through tried-and-tested solutions.⁹ It provides the opportunity to not only improve care for immediate needs by establishing how each patient's unique preferences are understood, their context is perceived, but also how their care should be designed. These platforms fasten access to health services, reduce the burden on health care facilities, improve the quality of healthcare, make health care affordable, store data for future use and improve communication between provider and care seeker.⁶ Digital data platforms increase work efficiency of FHWs.

However, there are also some challenges in implementing and ensuring the utilisation of these digital platforms by the FHWs. Poor digital literacy, especially among the FHWs, is a hindrance to its use. Most of the FHWs in India are less acquainted with the use of software applications and even smartphone technologies.¹⁰ It may cost time and money to train them for using the digital data platform. Other factors such as age, educational qualifications, and language of the application and years of experience in using smartphones among the FHWs also play an important role in using these platforms. Moreover, the availability of electricity supply for charging the device and network connectivity are also important impediments in wielding digital data platforms.¹¹ Data interoperability has also been a constant challenge due to the massive amounts of data collected from a variety of systems that store and code data differently. The growing interest in using digital media as well as the increased use of smartphone devices, has laid the groundwork for digital health care in recent times.¹¹ The recent pandemic situation has shown the increased need for digital healthcare.¹² With this backdrop, it's important to understand the factors influencing on use of digital data platforms by the FHWs and do a situational

analysis using the SWOT (strength, weakness, opportunity, and threats) framework. The present study attempts to do so and advocates for strategies based on the findings for improved use of digital data platforms by the FHWs.

METHODS

Study design, location and duration

A cross-sectional qualitative study was carried out in a rural block of Cuttack district, Odisha, India. The study had three components; determining the influencing factors (internal and external) for using digital platforms; situational analysis using the SWOT framework and planning strategies based on the SWOT findings pioneering strategies (SO), positive strategies (ST), conservative strategies (WO), and resistive strategies (WT).¹¹ The influencing factors for using digital platform were identified by carrying out 15 in-depth interviews (IDI); 8 accredited social health activists (ASHAs) and 7 auxiliary nurse midwives (ANMs) till data saturation. This allowed the researchers to build a holistic, detailed description and analysis of the factors influencing on use of digital platforms for data collection. The interviews were done using a pre-designed and pre-tested semi-structured IDI guide prepared in the local language (Odia). Study was carried out from January to April 2022.

Sampling and selection criteria

As this was a qualitative study, sample size was not determined. However, the IDIs were carried out till data saturation was attained. Study participants were selected purposively among the frontline health workers (ANMs and ASHAs) working in the study area. Those who agreed and volunteered to participate were enrolled for the IDI.

Data collection and analysis

All interviews were audio-recorded with the consent of the participants and later transcribed into English. The interview process was flexible, giving the participants freedom to participate. Compiled data were imported to MAXQDA software for coding. The interview transcripts were coded according to the internal and external influencing factors. Based on the findings, a conceptual framework was developed, and the factors were analysed to build up the SWOT framework. Under the second component, a situational analysis was done by exploring various strengths, weaknesses, opportunities, and threats related to data collection, documentation, and data management by the FHWs. A SWOT framework was developed using data obtained from a. the qualitative study and b. literature review. A comprehensive literature search was carried out on Medline/PubMed and Google Scholar using a search strategy (including MeSH and Key terms on SWOT components and digital platforms). The factors were categorised under the relevant SWOT

component. For the third component, the SWOT findings were further analysed involving subject experts. The strategies developed were; pioneering strategies considering strengths and opportunities (SO), positive strategies considering strengths and threats (ST), conservative strategies considering weaknesses and

opportunities (WO), and resistive strategies considering weaknesses and threats (WT).¹³ The process followed for factor analysis, SWOT analysis and strategy development is represented in (Figure 1). Written permission from the district immunisation officer was obtained. Verbal consent was obtained from all study participants.

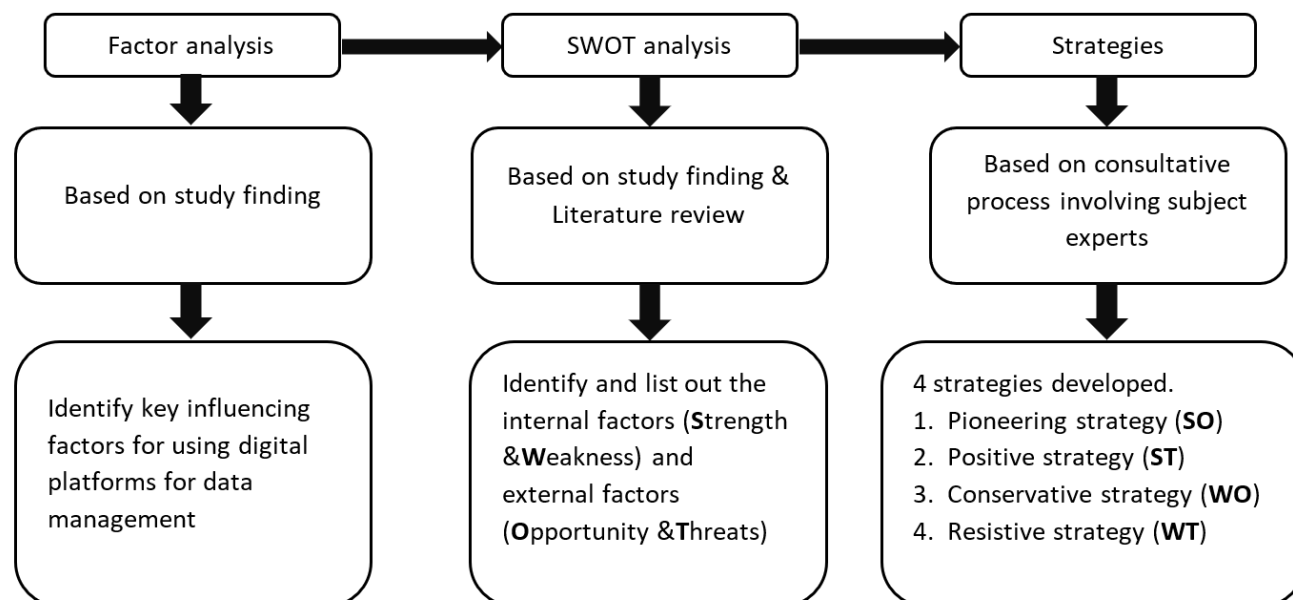


Figure 1: Processes followed for the factor analysis, SWOT analysis and strategy development.

RESULTS

The study findings are presented according to the three components.

Influencing factors (internal and external) for using digital platforms

Among the 15 FHW participants for the IDI, their age ranged from 31 to 54 years, with a mean age of 40.2 (± 5.6) years. Their average years of work experience was 12.5 (± 2.3) years. Internal factors such as age, marital status, educational qualification, interest in learning digital media, duplication of workload and experience in using smartphones were found to influence the usage of digital data platforms. Similarly, external factors such as internet connectivity, availability of electric power supply, troubleshooting in case of any breakdown, training on the use of digital data platform, user-friendliness to operate, operating language and mentoring support on field influenced its use. The influencing factors are detailed using a conceptual framework (Figure 2).

Internal factors: Some participants expressed that digital platforms are new concepts and difficult for the advanced aged to learn and use. Concern about its effect on health and low level of interest was also the limiting factors.

"Age has a role to play. More usage of phones affects the vision and blood pressure. The elders are less interested to learn and use digital media" (ANM). Some participants mentioned that they got busy with their family-related responsibilities after marriage, which hindered them from learning. "I have to do all household work. After that, I do my professional duties, and again in the evening, I have to update our paperwork. With all this, I hardly get any time to spend on mobile" (ANM).

Many participants opined that though better educational qualification helps to learn using digital data platforms better, it is not a hindrance. "Not actually, education is not impacting application use. Now a day, even daily laborers are using a smartphone. So, education has a little role for using smartphone" (ANM). In India, digitalization in the health system is still in an early phase. Overlapping of both old and new systems for data management increases the workload among healthcare providers. Some participants raised the concern of increased workload because of the duplication of their work. In this regard, one ANM told that "Yes, digitalization helps us a lot. Once the data are entered, it gets automatically stored and reported to a higher authority. But the downside is even after using the digital platform, and we still have to keep the same data on paper and report through paper documents. Entering the same data twice takes time and increases our workload

unnecessarily" (ANM). Many participants opined that experience of using digital platforms helps to handle the app better. They told that those who spend more time on smartphones could use the apps more easily. "The more

time you spend on the phone, the more you discover about new features. But people like me who are completely new to this stuff usually have a hard time using it" (ANM).

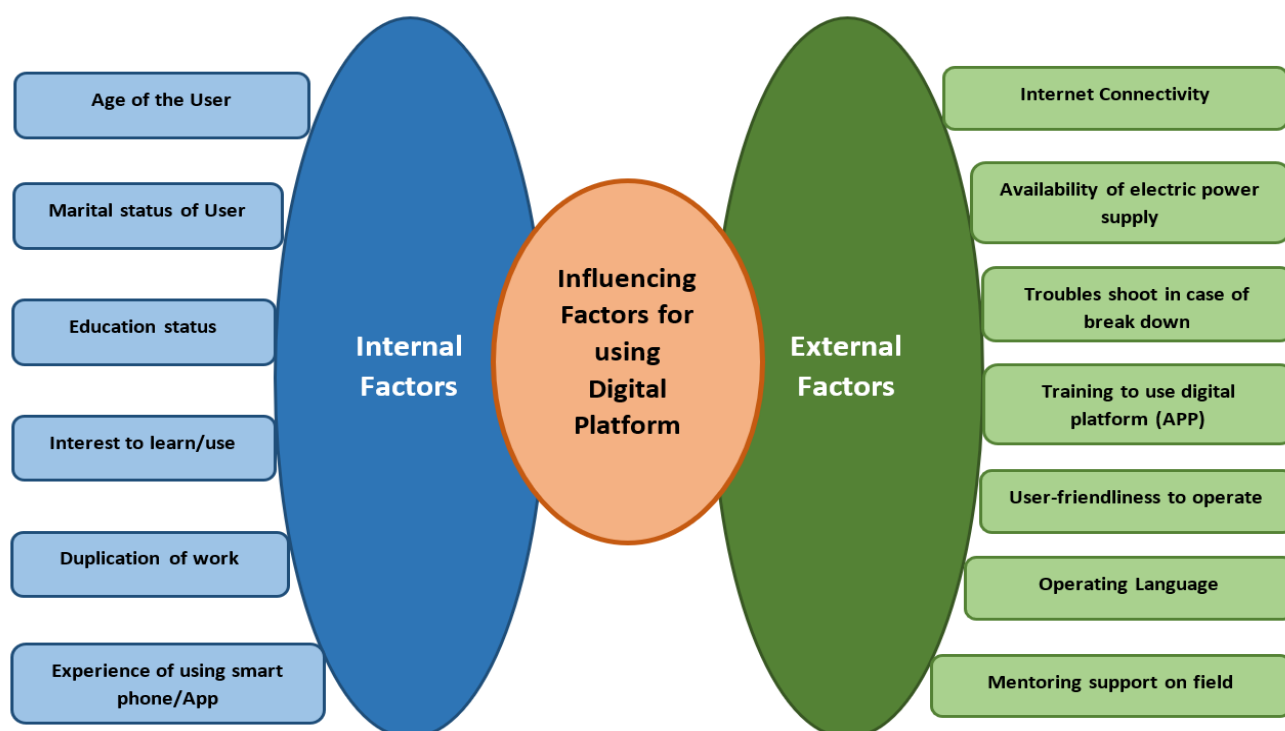


Figure 2: Conceptual framework depicting factors influencing the use of digital platform (internal and external).

External factors: Many healthcare providers expressed concern regarding the network connectivity in remote rural areas. In inclement weather, the problem gets even worse. "I encounter network connectivity issues many times. During rain and thunder, the problem is even more" (ASHA). Irregular electricity supply is a common problem in remote areas leading to the issue of charging devices such as smartphones. Sometimes their work gets delayed due to this problem. This issue is more so during bad weather. "Yes, electricity problem often happens in my village. For this reason, sometimes I cannot use my mobile" (ASHA). The participants told that they are comfortable if the application is in their local language. This seemed to be an important factor to improve their acceptance and usage. "I am not that comfortable in sending SMS in English. Sometimes I send wrong data and get scolded also"(ASHA). According to some participants, apart from training on the usage of digital platforms, they need regular handholding support in the field. "I've been using an immunization related application for a few months now, and we've received training on it as well. However, we faced problems while collecting data. So, if someone helps us at that point in time, it would be more useful" (ANM). FHWs expressed the need for proper training on a regular basis. The trainers need to have prior experience and be able to communicate their knowledge to participants. In this regard, one ANM told "during our training on an app, the trainer was inexperienced and unfamiliar to the

application. She was unable to describe the features properly and clear our doubts. The trainers need to teach us adequately and properly" (ANM).

Table 1: The SWOT framework depicting strengths, weaknesses, opportunities and threat.

Parameters
Strengths
Availability of innovative digital data platforms, user friendliness, availability of frontline health workers, availability of health supervisors.
Weaknesses
Complicated to use/not user friendly, lack of training and guidance, lack of mentors to trouble shoot any IT related problem, lack of experience on using smartphone devices and applications, lack of interest in adopting to digital platform, cost.
Opportunities
Availability of IT platforms for data storage and troubleshooting, technological advancement to make the application more user friendly, Government promoting for digital India, availability of IT devices (mobile/tablet) through other programs/projects.
Threats
Network and internet connectivity, device charging issues due to interrupted power supply, ensuring data safety and security.

Situational analysis using SWOT framework

Strength: Availability of innovative digital data platforms: India is on its way to becoming digitally advanced. It has been one of the world's largest and fastest-growing bases for digital consumers.¹⁴ Due to the increased availability of smartphones, improved affordability and high-speed connectivity, digitisation is happening faster.¹⁴ The recent evolution of mobile devices has opened up new possibilities for providing highly integrated technologies with reduced size and cost, improved screen resolution, increased computational power, and extended power autonomy. Many innovative software related to data collection and management are being developed and in place in health care.¹⁵ **User-friendliness:** the term "user-friendly" refers to an app that is intuitive, simple, and easy to use for the customer and that the customer can effectively use the app.¹⁶ Efforts are always being made to make the application user-friendly for better acceptance. So, this is a continuous process of reforming the applications to make them more useful and user-friendly.¹⁷ **Availability of frontline health workers:** Frontline health workers such as ASHAs, ANMs are providing health care services to community people at ground level.¹⁶ They stand in the first line for collecting the health care related data. By strengthening their capacity, the data quality could be improved. **Availability of health supervisors:** Health supervisors such as lady health visitors, public health extension officers, and medical officers supervise the FHWs and provide them handholding support.¹⁸ The availability of health supervisors gives an opportunity to engage them as trainers for the FHWs.

Weaknesses: complicated to use/not user-friendly: applications with complicated features make it difficult for the target users to understand and use. Applications written in the local language, simplified, compatible for the handset device, clarity with good resolution make them user friendly and better acceptable by the target users. **Lack of training and guidance:** For many FHWs, digital data platform is a new concept. For better acceptance and use, they need to be adequately and properly trained which will make them confident and efficient to use them. **Lack of mentors to troubleshoot any information technology (IT) related problem:** There is possibility that any software or hardware related problems may come up. In such a scenario, an IT expert in the form of a mentor needs to be available to resolve the problem. **Lack of experience in using smartphone devices and applications:** Many FHWs are not well versed in using smartphone devices and applications. With experience, using digital platforms makes the task easier. **Lack of interest in adopting the digital platform:** many FHWs, especially the elderly group, are not much interested to learn and use the digital platforms. They are familiar and comfortable to pen-paper system of documentation. Moreover, their concern about health effects of using digital devices leads to low interest. **Cost:** providing devices to such a huge number of FHWs, their training,

maintenance and trouble shootings requires a handsome budget for its implementation.

Opportunity: Availability of IT platforms for data storage and troubleshooting: Cloud-based data storage and file-sharing services could be beneficial for information management.¹³ This allows the users to store, update, and share documents with others from the device itself.¹⁰ In the existing health system, IT experts are recruited whose services could be utilized. Technological advancement to make the application more user friendly: With recent technological advancements, smartphone devices can be used to synchronise multiple calendars or contacts across multiple locations using a variety of methods (by Bluetooth, Wi-Fi, or a USB connection).¹⁰

Table 2: Strategies formulated based on SWOT findings for improved use of the digital platform.

Types	Strategies
Pioneering strategy (strength and opportunity)	Making the application simple, informative and user-friendly using advanced technology. Leveraging "digital India" initiative for better development and usage of smart phone and digital application. Utilising the available resources (mobile devices and other data storage devices) available under other programs.
Positive strategy (strength and threat)	Better data protection (safety and security) by taking help of advanced technology based digital data security platform.
Conservative strategy (weakness and opportunity)	Developing IT enabled platforms for monitoring and supervision of frontline workers. Involving the available IT experts for training and creating group trainers on use of application and trouble shooting.
Resistive strategy (weakness and threat)	Improving network connectivity coverage. Improving internet accessibility. Explore and ensure any alternative sources of power supply (solar/battery etc.)

Devices with a touch screen facility, built-in keyboards enable interactive and quick data entry. Memory and processing power are no longer concerns.¹⁰ **Government promoting for digital India:** The government of India is taking initiatives to build national digital health infrastructure, as stated in recent policy documents under the National health stack and the National digital health blueprint (NDHB).^{19,20} These initiatives could be leveraged to advocate for wider usage of digital data platforms. **Availability of IT devices (mobile/tablet) through other programs/projects:** under various other health programs or projects, available IT devices such as smartphones or tablets could be utilised.

Threats: Network and Internet connectivity: though efforts are made for wider coverage of network and internet connectivity with high-speed data access, this is still a problem in remote areas and especially during bad weather/climatic conditions. Device charging issues due to the interrupted power supply: an interrupted power supply, especially in remote areas and during bad weather/climatic conditions poses the problem in charging these devices (smartphone/tablet). Ensuring data safety and security: the threats for data safety and security can be felt at the system and individual level. At the system level, data may get hacked, and sensitive data can get accessed by non-reliable sources.⁶ At individual level, there are chances that the devices may get stolen, and information may be in unknown hands.

Strategy development using SWOT framework

Four strategies (pioneering, positive, conservative, and resistive) were formulated in a consultative process with the subject experts. The strategies are outlined in (Table 2).

DISCUSSION

The present study identified the influencing factors for using digital platforms among the FHWs. Elder age, low education status, less interest, fear of health problems, less experience in using applications, married and work duplication are hindrances for using digital platforms. User-friendliness, application in local language, adequate and proper training, handholding support including troubleshooting, internet connectivity and mobile network facilitate for using digital applications. According to a research study, typing, swiping, and scrolling on a mobile interface were major challenges for the community health workers (CHWs).²¹ The use of digital technology in health care, even by the FHWs, is the need of time. The m-Health technology is being used among health professionals for data collection and reporting, information and decision sharing, and communication with the patients.^{22,23} According to studies, the acceptability, feasibility, and usefulness of mobile health interventions were high among ASHAs.^{24,25} Our qualitative study also observed similar enthusiasm among the young ASHA workers. According to a study in low-middle-income countries, the challenges faced by health workers in adopting and using mobile health solutions for health service delivery include lack of their training, poor technical support, internet connectivity issues, similar to our study findings.²⁶ Opportunities such as availability of platforms for data storage, troubleshooting, advanced technology, and Government promotions could be strategically leveraged. At the same time, efforts need to be put in for preventing the threats of data safety, security and network connectivity.²⁷ Making the applications simple, informative, and user-friendly and by leveraging "Digital India" initiative and utilising available IT accessories through health system would solve the challenges to a greater extent. Advanced data security

platforms would help to achieve better data protection. Monitoring and supportive supervision by utilizing the available IT experts would achieve better acceptance and adherence to digital platforms. Moreover, wide network and internet connectivity will address the challenges in remote areas.²⁸

Limitations

Limitations of current study were since our study findings focus on the use of digital platforms by the FHWs working at community level. The results may vary depending on the setting and context.

CONCLUSION

With the advancement of digital technology, this solution has been introduced in all fields, including the health sector, because of its advantages. For the FHWs, it has enormous potential to help them collect the real data and report it easily, communicate with the patients or provide any health-related messages, etc. However, not many are friendly to use them because of varied reasons. Adopting context-appropriate strategies as outlined in the present study will surely help achieve better and wider use of the digital platforms among FHWs, especially in rural and remote areas.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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