

## Review Article

# Empowering Accredited Social Health Activists (ASHA) with mHealth for Chronic Disease Surveillance in India

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### ABSTRACT

Novel strategies are needed to provide universal health care to underserved rural and urban slum populations in India. We searched the existing literature regarding community health workers using mHealth strategies in India and other low and lower-middle income countries. The search was performed using the PUBMED database. In spite of dearth of evidence from India, the use of mHealth tools by ASHA with caution have a potential of 'novelty effect' on chronic disease surveillance in the community settings.

### INTRODUCTION

Universal health care as envisaged in United Nation's (UN) Sustainable Development Goals is focused on ensuring healthy lives and promotion of well being at all ages. This includes financial risk protection, access to quality essential health services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all.<sup>1</sup> Multiple strategies have been proposed to achieve universal health care to improve health of populations in low and low-middle income countries, including India.<sup>2</sup> Healthcare scenario in India is characterized by changing policies, lack of health financing, and poor financial protection, poor primary and secondary care infrastructure, gross inequalities in quality of care, major gaps in education and training of medical and paramedical personnel, poor access to care, and gaps in healthcare.<sup>3</sup> As India moves to confront these issues alongside the rising burden of chronic diseases, concerns have been raised about the country's ability to implement and enforce regulations to promote health, absorb

increase in public health funding without major changes in systems and processes to achieve universal health care that are focused on communicable, maternal and childhood, and non-communicable diseases.<sup>4</sup>

In India, frontline health workers viz. Auxillary Nurse Midwives/Accredited Social Health Activists (ANMs/ASHAs) are working with many difficulties like inappropriate and inadequate collection of data, lack of adequate training/re-training and reference resources, poor communication with peers or supervisors to deal with circumstances that are beyond their skills, poorly scheduled household visits and follow-up appointments with patients.<sup>5</sup> To address some of these obstacles, various mobile health technologies have been developed to support these frontline workers in healthcare delivery. There is a rapidly emerging evidence to support the feasibility and efficacy of these technologies to address some of the health workforce related issues alongwith promotion of healthy behaviors in the community.<sup>6</sup>

### ASHA and mHealth

National Rural Health Mission employs ASHAs as grass root worker which link rural communities with primary healthcare services. Their role include promoting good health practices and providing information on basic health determinants and existing health services. The role of ASHAs in communicable diseases and maternal health is well established<sup>7</sup>, but there is little evidence concerning their role in non-communicable disease surveillance in India. One study assessing ASHAs performance highlighted the need for healthcare delivery system improvements, supportive supervision, knowledge enhancement and enabling working modalities, providing

justification for mHealth exploration in this group.<sup>8</sup>

**Literature search**

We searched the existing literature regarding use of community health workers using mHealth strategies in India and other low and lower-middle income countries. The search was mainly performed using the PUBMED database. The initial search terms were ‘HEALTH’ AND ‘COMMUNITY HEALTH WORKERS’. This yielded 14270 results. We then short-listed the search with ‘mHEALTH’ AND ‘COMMUNITY HEALTH WORKERS’ with 72 results and ‘eHEALTH’ AND ‘COMMUNITY HEALTH WORKERS’ with 50 results. On addition of “INDIA” for this search yielded only three references.<sup>6,9,10</sup> This clearly showed that there is a dearth of evidence from India so we searched all the references but excluded short communications and personal notes. Only articles that reviewed the present scenario and/or original research articles were considered. More articles were found by use of bibliography from these articles. We reviewed the articles as per to role of mHealth technologies in disease screening, surveillance, data collection, and monitoring in healthcare delivery demonstrating evidences that can be explored further for noncommuni-cable diseases.

**Role in Screening**

Community health workers have played a pivotal role in screening of children and women in developing countries.<sup>7</sup> It has been reported that out of the more than 200 tests offered as a routine screening during adulthood, only 5-6 are useful in preventing overt disease and saving

lives. Screening for maternal anemia and nutritional status during pregnancy, childhood malnutrition and vaccination status, and hypertension, diabetes (in developing countries) and a few chronic diseases in adults has been shown to save lives.<sup>11</sup> Screening of pregnant women by community health workers in Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Yojana (JSSY) programs in India has shown to prevent pregnancy related complications, maternal mortality, early childhood diseases, and mortality.<sup>12</sup> On the other hand, National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS) has singularly failed to appropriately screen individuals for hypertension and diabetes using the opportunistic strategy. The prevalence of hypertension in India has been under-reported using this strategy while that of diabetes has been over-reported.<sup>13,14</sup> Gupta et al proposed a strategy of screening and surveillance for chronic diseases risk factors (unhealthy diet, smoking, body-mass index, waist size, blood pressure, glucose, and cholesterol) using basic cell phone technologies.<sup>15</sup> This strategy has been evaluated in a few studies in India and found to be useful in the collection of routine clinical data, improving coverage of maternal, newborn, and child health services, as well as for use in non-communicable diseases screening.<sup>16-19</sup> The studies highlighting role of mHealth with community health workers in disease screening are enlisted in table 1. This strategy has been used very successfully in Brazil<sup>20</sup> and can be explored in India for noncommunicable diseases.

**Table 1: Studies on deployment of mHealth with community health workers for disease screening**

Author/s and Title	Year	Area	Outcome
S Surka et al <sup>21</sup> Evaluating the use of mobile phone technology to enhance cardiovascular disease screening by community health workers	2014	Cape Town, South African	Mean screening time was significantly less (21minutes vs 36 minutes, p<0.0001) using the mobile phone application vs the paper-based chart tool. Incorrect calculations (4.3% of average systolic BP measurements, 10.4% of BMI, and 3.8% of CVD risk score) were found when using the paper-based chart tool while all the mobile phone calculations were correct.
SH Yousuf et al <sup>22</sup> Smartphone hearing screening in mHealth assisted community-	2015	South Africa	Community health workers were positive regarding the hear Screen™ solution in terms of usability, need for services, value to community members, and time efficiency.

**Role in Surveillance**

Routine surveillance of acute as well as chronic diseases can influence health policy, inform policy makers to make appropriate decisions, and improve healthcare delivery to needy. IDSP (Integrated Disease Surveillance Project) reporting has been poor in respect to wholeness and timeliness, often due to slow data flow from the facilities due to poor transport mechanism which is a major challenge in many rural areas where most of the health facilities are situated.<sup>23</sup> An alternative option is to use mobile networks available in most of the rural areas and should be taken into consideration while planning for noncommunicable disease surveillance. Table 2 enlists few studies where use of mHealth shows promising results in disease surveillance.

**Role in Data Collection and Reporting**

Many studies proved that mHealth strategies are an effective way to collect and report data from the community and to transfer patient-relevant information to a centralized database.<sup>16-20, 27-29</sup> Studies suggest that use of mHealth strategies for data collection circumvents the need for field health workers (FHWs) to travel to a health facility to transfer client information, thereby allowing them to spend more time focusing directly on service provision.<sup>30</sup> A study in rural India assessed the latency of data collection, defined as the time taken between the collection of data by FHWs and the receipt of data by a

regional coordinator. The study proved that data collection using mHealth strategies reduced average latency from 45 days to 8 hours. Additionally, data completeness improved from 67% of the required fields being filled in the paper-based system compared to 84% of the required field being filled in the mobile-based system.<sup>31</sup> A number of studies suggest that FHWs can effectively use mobile phones for data collection and surveillance irrespective of their education or prior training.<sup>32-37</sup> mHealth technologies based data collection increases rapidity of data collection, reduces erroneous-ness rates, and improves data inclusiveness.<sup>38</sup> Hence, mHealth can be a valuable tool for ASHAs in data collection and reporting of noncommunicable diseases.

**Role in Monitoring**

Monitoring primary healthcare interventions means using participatory approach to methodically ensure that activities are carried out accordingly as to achieve objectives of the intervention. Monitoring of health programs suffers from numerous setbacks such as no dedicated cell for health indicator monitoring at state or district level and lack of standardized reference manual for planning and monitoring. Multiplicity of registers and duplication of reports are still a common practice. Voluminous data are collected, which is rarely validated or used in planning. There is a mismatch between routine Management Information System (MIS) and survey data.

**Table 2: Studies on deployment of mHealth with community health workers for disease surveillance**

Author/s and Title	Year	Area	Outcome
Kaphle S et al <sup>24</sup> Adoption and usage of mHealth technology on quality and experience of care provided by frontline workers: Observations from rural India.	2015	Bihar, India	mHealth technology adoption by frontline workers, quality score for high users of Comm Care was higher by 33.4% (p=0.04) and Comm Care proficiency score increased the quality score by around half a point (0.541, p=0.07).
Rosewell A et al <sup>25</sup> Mobile Phone based Syndromic Surveillance System.	2013	Papua New Guinea	New system was more timely (2.4 vs. 84 days), complete (70% vs. 40%), and sensitive (95% vs 26%) than existing systems.
Randrianasolo L et al <sup>26</sup> Sentinel surveillance system for early outbreak detection in Madagascar.	2010	Madagascar	Study identified 5 outbreaks and 12.3% were related to Dengue-like fever, 11.1% to Influenza-like illness, and 9.7% to malaria cases.

**Table 3: Role of mHealth in disease monitoring and management**

Author/s and Title	Year	Area	Outcome
Rajput ZA et al <sup>41</sup> Evaluation of an Android-based mHealth system for population surveillance in developing countries.	2012	Western Kenya	Android system was faster (4.2660.83), easier to use (4.4360.81), and resulted in higher quality data (4.1860.80). End-users felt using the smartphone system facilitated their interactions during home visits (3.9860.88). Users felt that the training they received was adequate (4.2160.87), and wished to continue using the Android-based system (4.4760.83) compared with the earlier PDA/GPS system.

A number of descriptive studies recommend that mHealth tools also assist in improving communication between different levels of the healthcare system.<sup>39-40</sup> Table 3 enlists study highlighting role of mHealth in disease monitoring and management which can be beneficial in non-communicable diseases too.

**mHealth: The Concern**

Some researchers have broached the use of mHealth tools by ASHA with caution, suggesting that the introduction of a new and innovative intervention to ASHA leads to a 'novelty effect'.<sup>42</sup> This indicates greater acceptance at the onset of the program due to the anticipation around introduction of a new technology, which slowly wears off. This may be happening, but could perhaps be alleviated by leveraging good user-centred design, engagement strategies, and providing feedback to the users on their performance, so the mobile phone eventually becomes more of an integral part of day-to-day practice for ASHA.

**CONCLUSION**

Use of mHealth strategies can potentially circumvent several of the structural and systemic barriers faced by FHWs in delivering health care. However, a majority of the studies in this area are pilot activities and provide minimal information about the effectiveness of the use of mHealth tools by FHWs on the quality and efficiency of health systems functions and/or client health outcomes especially regarding noncommunicable disease. Understanding the impact of mHealth programs requires a multidimensional evaluation approach and utilizing mixed methods to examine the effects of the program on health workers, clients and the health system. The biggest gap in our knowledge about the use of mHealth strategies by ASHA at present is in the lack of evidence on how such strategies may improve health outcomes, health system

efficiencies, and cost-effectiveness of service delivery of noncommunicable diseases .

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