DEF COVID-19 GROUND REPORT SERIES

Understanding the Role and Potential of M-Health during Covid-19 Crisis in India

PART 1

VIDISHA LAL

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Author: Vidisha Lal
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PART 1 Introduction to m-health in India

INDIA IS CURRENTLY UNDERGOING A phase of digital empowerment. With the Indian market having easy availability of mobile phones at a cheap rate and even cheaper internet and telephonic facilities, India has become the second largest user base in mobile phones[1] . Around 42% of this user base is situated in the rural areas[2]. According to a 2017 data among the 650 million mobile users, 300 million had a smartphone[3]. Such a technological advancement makes India a fertile ground for the development of mobile healthcare services.

Healthcare system in India has a poor infrastructure and is unevenly distributed within the rural and semi urban areas, having the least facilities especially in terms of secondary and tertiary healthcare[4]. In order to fill the infrastructural gaps, mobile and telephonic health services are emerging in a big way in the healthcare market. The Global Observatory of e-health defines m-health or mobile health service as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, Personal Digital Assistant (PDAs)[5] and other wireless devices"[6] The field of mobile health has emerged as a sub segment of e-health which makes use of Information and Communication Technology (ICT) for services and information[7]. M-health applications also provide community health related data to researchers and practitioners.

Mobile health applications emerged as a facility in developed nations but lately with the rapid penetration of cellular gadgets in low income countries, the m-health field is promising to make quality healthcare accessible in the most far off locations[8] [9]. Through mobile applications trained non-physician health workers will provide medical support, optimize monitoring and patient engagement, minimize the variability in quality of delivered care while also reducing the response time and cost of care[10]. Mobile phones are also powerful tools to disseminate health related information to enable people in terms of self- monitoring and self- care.

The 2009 UN Foundation and Vodafone foundation reports present seven kinds of applications within the mhealth field. They are: 1. Education and awareness 2. Helpline facility 3. Diagnostic and treatment support 4. Communication and training for healthcare workers 5. Disease and epidemic outbreak tracking 6. Remote monitoring 7. Remote data collection[11]. M-health space is also expanding its wings in areas like mental health promotion, emergency response system (road accidents etc.),

[1] Ahakar, A.(Feb, 2020), India pips US to become second-largest smartphone market after China in 2019, Livemint, Retrieved from: https://www.livemint.com/technology/gadgets/india-pips-us-to-become-second-largest-smartphone-market-after-china-in-2019-11581071893368.html

[2] COAI Annual Report, Cellular Operators Association of India (COAI), Retrieved from: https://coai.com/reports-and-papers/coai-annual-report

[3] Iyengar R.(Sept, 2017), India poised for smartphone revolution, Money.cnn, Retrieved from: http://money.cnn.com/2017/09/26/technology/india-mobile-congress-market-numbers/index.html

[4] National Urban Health Mission-Framework for Implementation, (May 2013), Ministry of Health and Family Welfare, Retrieved from: http://nrhm.gov.in/images/pdf/NUHM/Implementation_Framework_NUHM.p Available at http://nrhm.gov.in/nhm/nuhm/ nuhm-framework-for-implementation.html.

[5] Personal Digital Assistant is an umbrella term used for referring to a variety of mobile devices that function as personal information manager. PDAs have now mostly been replaced with smartphones. Retrieved from: http://agilemobility.net/2009/04/the-history-of-personal-digital-assistants1

[6] mHealth: New Horizons for Health through Mobile Technologies, Global Observatory for eHealth series(2011), World Health Organization, Retrieved from : http://www.who.int/goe/publications/goe_mhealth_web.pdf

[7] mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World (PDF) (Feb, 2009), United Nations Foundation, The Vodafone Foundation, pg. 9, Retrieved from: https://reliefweb.int/sites/reliefweb.int/files/resources/A695C439809709CF49257689001019B9-UNF_Feb2009.pdf

[8] mHealth: New horizons for health through mobile technologies (2011), Based on the findings of the second global survey on eHealth, Global Observatory for eHealth series - Volume 3, World Health Technology, Retrieved from: https://apps.who.int/iris/bitstream/handle/10665/44607/9789241564250_eng.pdf;jsessionid=5A361F0066DD6F3FCBE96C7A773FF0A3?sequence=1

[9] The limits of leapfrogging (2008), The Economist, Retrieved from: https://www.economist.com/leaders/2008/02/07/the-limits-of-leapfrogging

[10] Bassi, A., John,O., Praveen, D., Maulik, P.K., Panda,R., Jha,V. (Oct, 2018), Current Status and Future Directions of mHealth Interventions for Health System Strengthening in India: Systematic Review, Journal of Medical Internet Research, Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6229512/

[11] Vital Wave Consulting (February 2009). mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World (PDF). United Nations Foundation, Vodafone Foundation. p. 9. Retrieved from: https://web.archive.org/web/20121203014521/http://vitalwaveconsulting.com/pdf/2011/mHealth.pdf

and training for healthcare workers etc.[12] [13] Around the world few of the ongoing m-health initiatives are: Dokita and DokterGratis in Indonesia that allows patients to chat and consult with physicians, the m-Ramadan initiative in Senegal which extends support to people with diabetes through mobile technology since the dietary habits are drastically affected during the fasting month and creates health complications, m-tikka is another great application being used by vaccine workers in Bangladesh for infant registration, and so on[14].

The facility of m-health is being explored by both government and non-government stakeholders. The public health initiatives that are currently tapping the potential of mobile devices for the delivery of health services at low cost, target maternal and child health, HIV and Tuberculosis prevention and control, management of non-communicable diseases and data collection for disease surveillance[15]. The world is currently grappling with the worst pandemic (COVID-19) to have ever occurred in centuries and we need the support of healthcare workers more than ever. In India especially there has been an unprecedented rise in the number of infected people[16]. It is in these grim times that m-health applications have come to the rescue. The government of India through SMS and telephonic services disseminated the necessary precautionary measures to be taken for keeping oneself healthy, besides that the Arogya Setu app was designated to help in contact tracing of infected people, syndromic mapping and self-assessment[17]. This app is an initiative by the Department of Health, Government of India to contain COVID-19 and suggest best practices.

However, the m-health industry faces huge challenge of privacy breaching and in turn threatening the security of people since it requires sensitive information from the users to extend any health related advises. Artificial Intelligence is a data hungry technology which devours personal information of marginalized population for service delivery in social infrastructure such as health.[18] This unknowingly costs the people their fundamental rights and freedom as they mostly remain unaware of what they are signing up for.

The Aarogya Setu app was made mandatory for the people of India without seeking authorization from elected representatives of the parliament[19]. The application's use was mandated under the Disaster Management Act which was deemed unacceptable by legal scholars such as Gautam Bhatia. While discussing about the issue he wrote in The Wire, "Any such law has to be specific and explicit with respect to the rights that it seeks to infringe, the bases of infringement, the procedural safeguards that it establishes, and so on"[20]. Aarogya Setu further uses phone's Bluetooth and GPS to track user's movements[21]. This is unlike other apps that collect just one data

In low income countries, the m-health field is promising to make quality healthcare accessible in the most far off locations

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[13] Ahamed, F., Palepu, S., Dubey, M., Nongkynrih, B.(2017), Scope of mobile health in Indian health care system – the way forward, International Journal of Community Medicine and Public Health, 4(4):875-881, Retrieved from: https://www.researchgate.net/publication/315676882_Scope_of_mobile_health_in_Indian_health_care_system_-_the_way_forward

[14] Ahamed, F., Palepu, S., Dubey, M., Nongkynrih, B.(2017), Scope of mobile health in Indian health care system – the way forward, International Journal of Community Medicine and Public Health, 4(4):875-881, Retrieved from: https://www.researchgate.net/publication/315676882_Scope_of_mobile_health_in_Indian_health_care_system_-_the_way_forward

[15] Bassi, A., John,O., Praveen, D., Maulik, P.K., Jha,V.(2016), Mhealth Interventions for Health System Strengthening in India, A Scoping Study Report; The George Institute for Global Health India. Retrieved from: https://www.georgeinstitute.org.in/sites/default/files/scoping_health_report_final_uploaded.pdf.

[16] Kulkarni, Sagar (July, 2020), "India becomes third worst affected country by coronavirus, overtakes Russia", Deccan Herald, New Delhi, Retrieved from: https://www.deccanherald.com/national/india-becomes-third-worst-affected-country-by-coronavirus-overtakes-russia-857442.html

[17] Banerjea, A.(April, 2020), "Govt launches 'Aarogya Setu', a coronavirus tracker app: All you need to know", Livemint, Retrieved from: https://www.livemint.com/technology/apps/govt-launches-aarogya-setu-a-coronavirus-tracker-app-all-you-need-to-know-11585821224138.html

[18] Nandi, A. (2019), Artificial Intelligence in Education in India: Questioning Justice and Inclusion, Global Information Society Watch, Artificial intelligence: Human rights, social justice and development. Retrieved from: https://defindia.org/wp-content/uploads/2019/12/gisw2019_web_india_anu.pdf

[19] Bhatia, G.(May, 2020), The Mandatory Imposition of the Aarogya Setu App Has No Legal or Constitutional Basis, The Wire, Retrieved from: https://thewire.in/law/the-mandatory-imposition-of-the-aarogya-setu-app-has-no-legal-or-constitutional-basis

[20] Bhatia, G.(May, 2020), The Mandatory Imposition of the Aarogya Setu App Has No Legal or Constitutional Basis, The Wire, Retrieved from: https://thewire.in/law/the-mandatory-imposition-of-the-aarogya-setu-app-has-no-legal-or-constitutional-basis

[21] Sebastian, M.(May, 2020), Aarogya Setu's 6 Major Privacy Issues Explained, Huffpost, Retrieved from: https://www.huffingtonpost.in/entry/aarogya-setu-app-privacy-issues_in_5eb26c9fc5b66d3bfcddd82f

point; Aarogya Setu app collects multiple data points for sensitive information thereby increasing privacy risks[22].

Aarogya Setu's code is not open source which means that it cannot be easily reviewed by third parties, the MIT Technology Review says[23]. There is also no check on whether the government deletes personal information of people in stipulated time[24]. Basically, there is no transparency in auditing what the app is doing in the backend. The terms and conditions of the app further exempt the government from liability in the face of "any unauthorized access to the (user's) information or modification thereof" which means that the government holds no responsibility if personal information of users get leaked[25]. Besides, mobile applications like the Aarogya Setu app depends on the information which a user provides about his health that might be faulty, as corona infected people already face a lot of stigma in the society.

India currently lacks regulations on data protection and the draft data protection bill which is currently tabled before the parliament does not have specific provisions on algorithmic decision making, which would ideally include the right to be informed of one's existence and the right to opt out, quiet unlike the European Union's General Data Protection Regulation (GDPR)[26]. Most mobile applications are pilot projects, providing only initial evidences of feasibility. According to the studies conducted on m-health, only around 20% of the apps have a design which facilitated some evaluation of the suggested interventions[27]. For the sustainability of these applications the makers need to upgrade and follow proper guidelines for ensuring equity, ethics and safety regulations in the m-health sector.

The studies on m-health are scattered, lack quality and have unfocused evidence based research[28]. However, the gathered information suggests that majority of these m-health applications target non-communicable diseases[29]. Research also suggests that 40% of these mobile applications target tertiary healthcare delivery.[30] [31] Mobile health and telemedicine facilities have limited use in improving medical supplies, governance or the financial system in healthcare. Besides, most of these studies have been conducted in the southern parts of India- Tamil Nadu, Karnataka, Andhra Pradesh and Telangana. In fact Kerala is at the forefront with e-governance and m-governance which exhibits higher level of internet penetration as compared to rest of India[32]. Data from Jammu and Kashmir and North Eastern states were absent.[33]

Rural areas are expected to be the most benefitted by m-health applications

Mobile phones are also powerful tools to disseminate health related information to enable people in terms of self-monitoring and self- care.

[22] Aarogya Setu: Govt's coronavirus tracker app gets 5 crore users in 13 days(April, 2020), Livemint, Retrieved from: https://thewire.in/law/the-mandatory-imposition-of-the-aarogya-setu-app-has-no-legal-or-constitutional-basis

[23] Howell O'Neill, P.(May,2020), India is forcing people to use its covid app, unlike any other democracy, MIT Technology Review, Retrieved from: https://www.technologyreview.com/2020/05/07/1001360/india-aarogya-setu-covid-app-mandatory/

[24] Is Aarogya Setu privacy-first? Nope, but it could be– If the government wanted. #SaveOurPrivacy, Internet Freedom Foundation, Retrieved from: https://internetfreedom.in/is-aarogya-setu-privacy-first-nope-but-it-could-be-if-the-government-wanted/

[25] Sebastian, M.(May, 2020), Aarogya Setu's 6 Major Privacy Issues Explained, Huffpost, Retrieved from: https://www.huffingtonpost.in/entry/aarogya-setu-app-privacy-issues_in_5eb26c9fc5b66d3bfcddd82f

[26] Das, S. (July,2018), 8 differences between Indian data protection bill and GDPR, CIO & Leader, Retrieved from: https://www.cioandleader.com/article/2018/07/30/8-differences-between-indian-data-protection-bill-and-gdpr

[27] Bassi, A., John,O., Praveen, D., Maulik, P.K., Jha,V.(2016), Mhealth Interventions for Health System Strengthening in India, A Scoping Study Report; The George Institute for Global Health India. Retrieved from: https://www.georgeinstitute.org.in/sites/default/files/scoping_health_report_final_uploaded.pdf.

[28] Bassi, A., John,O., Praveen, D., Maulik, P.K., Panda,R., Jha,V. (Oct, 2018), Current Status and Future Directions of mHealth Interventions for Health System Strengthening in India: Systematic Review, Journal of Medical Internet Research, Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6229512/

[29] Bassi, A., John,O., Praveen, D., Maulik, P.K., Jha,V.(2016), Mhealth Interventions for Health System Strengthening in India, A Scoping Study Report; The George Institute for Global Health India. Retrieved from: https://www.georgeinstitute.org.in/sites/default/files/scoping_health_report_final_uploaded.pdf.

[30] Bassi, A., John,O., Praveen, D., Maulik, P.K., Jha,V.(2016), Mhealth Interventions for Health System Strengthening in India, A Scoping Study Report; The George Institute for Global Health India. Retrieved from: https://www.georgeinstitute.org.in/sites/default/files/scoping_health_report_final_uploaded.pdf.

[31] Tertiary care is usually for inpatients, who upon getting a referral from a primary or secondary health professional seek advanced medical investigation and treatment.

[32] Prasad, K.(2012), E-Governance Policy for Modernizing Government through Digital Democracy in India, Journal of Information Policy , Vol. 2, pp. 183-203, Penn State University Press, Retrieved from: https://www.semanticscholar.org/paper/E-Governance-Policy-for-Modernizing-Government-in-Prasad/a8b3ca2e893db594649d507872923cc37d79e1b0

[33] Bassi, A., John,O., Praveen, D., Maulik, P.K., Jha,V.(2016), Mhealth Interventions for Health System Strengthening in India, A Scoping Study Report; The George Institute for Global Health India. Retrieved from: https://www.georgeinstitute.org.in/sites/default/files/scoping_health_report_final_uploaded.pdf.

since they face the biggest scarcity of health manpower. However a shortage in accessibility to internet and electricity often makes this facility irrelevant for them. India has the second highest number of internet users in the world, and yet only 27.57% of the rural population has access to it, while the urban net penetration stands at an astounding 104.25%[34]. The SMS based information might be effective but they face difficulty in using the applications which provide a wider scope for treatment solutions. Language and literacy level might be the barriers to understanding the operability of mobile applications (will be explained later in the article).

The lockdown induced by COVID-19 situation led to many migrant workers losing their job[35]s. As a result there was a large scale exodus of workers from the urban to rural areas. Transportation facilities had ceased to operate in order to stop the infection from spreading, but the general agony that had spread among the workers couldn't be stopped.

Inadequate food and lodging arrangements made by the centre and state governments forced them to leave for their homes on foot/cycle/tricycle[36] [37] [38]. However on reaching their homes the biggest challenge awaited them i.e. discrimination or ostracisation from the community[39]. This discrimination was made considering migrant workers as COVID-19 carriers. In some cases migrants and their families were singled out even after the migrant completed his/her/their 14 day quarantine period[40]. It is here that role of m-health and telemedicine facilities should be highlighted. Through m-health and telemedicine the government and non-government agencies have made an effort to bust myths about novel coronavirus. These facilities have relentlessly tried to spread information about novel coronavirus[41] and ways to prevent it from spreading through SMS services, COVID-19 information as caller tune etc.[42]. In grim times like these when our public healthcare system is under pressure, preventive measures can go a long way in saving people's lives.

Basic Literacy is further an essential pre requisite for using Internet. India is far from achieving its goal of universal literacy and the growth rate is sluggish. Kerala has a literacy rate of 93.91% which explains its higher level of internet penetration.[43] However the disparity in literacy not only varies from state to state, but also varies depending on gender, caste, economic class and the rural/urban setting. In 2011 the effective female literacy rate stood at 65.46% as opposed to effective male literacy rate at 82.14%.[44] This disparity reflects

The m-health industry faces huge challenge of privacy breaching and in turn threatening the security of people since it requires sensitive information from the users to extend any health related advises

[34] "The Indian Telecom Services Performance Indicators" (PDF), TRAI, Retrieved from: https://www.trai.gov.in/release-publication/reports/performance-indicators-reports

[35] Biswas, S.(March, 2020), "Coronavirus: India's pandemic lockdown turns into a human tragedy", BBC News, Retrieved from: https://www.bbc.com/news/world-asia-india-52086274

[36] Bajwa, H. (May, 2020), "COVID-19: Migrant workers in Punjab crosses rivers on foot to get home", The New Indian Express, Retrieved from: https://www.newindianexpress.com/thesundaystandard/2020/may/17/covid-19-migrant-workers-in-punjab-crosses-rivers-on-foot-to-get-home-2144248.html

[37] Barik, S.(April, 2020), "Migrant worker cycles 1,700 km from Maharashtra to reach home in Odisha", Retrieved from: https://www.thehindu.com/news/national/other-states/migrant-worker-cycles-1700-km-from-maharashtra-to-reach-home-in-odisha/article31317053.ece

[38] Tanzil, A.(May, 2020), "11-Year-Old Gets Parents Home Amidst Lockdown by Pedalling Tricycle Cart for 600 kms", Retrieved from: https://thewire.in/rights/lockdown-tricycle-cart-boy-parents-home

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[40] Kumar, C., Mohanty, D.(May, 2020), "Migrant workers battle stigma, bias back home", Retrieved from: https://www.hindustantimes.com/india-news/migrant-workers-battle-stigma-bias-back-home/story-0uuRSEZfoick-V0rPU2agGL.html

[41] Singh, M.(March, 2020), "Telecom operators in India warn people of coronavirus outbreak, share tips", Retrieved from: https://techcrunch.com/2020/03/08/telecom-operators-in-india-warn-people-of-coronavirus-outbreak-share-tips/

[42] Agarwal, S.(April, 2020), "Govt launches AarogyaSetu mobile app to track spread of coronavirus" , Retrieved from: https://economictimes.indiatimes.com/tech/internet/govt-launches-mobile-app-aarogyasetu-to-track-spread-of-covid-19/articleshow/74952335.cms?from=mdr

[43] "Tripura beats Kerala in literacy" (Sept, 2013), The Times of India, Retrieved from : https://timesofindia.indiatimes.com/home/education/news/Tripura-beats-Kerala-in-literacy/articleshow/22416019.cms#:~:text=India's%20northeastern%20state%20of%20Tripura,chief%20minister%20Manik%20Sarkar%20announced.

[44] Engelman, R.(2009), "The State of World Population 2009" (PDF), Retrieved from: https://www.unfpa.org/sites/default/files/pub-pdf/state_of_world_population_2009.pdf

on each gender's understanding of technology driven devices and applications. Besides, the world of ICT is driven my men and the algorithms reek of gender bias.[45] Similarly the understanding of ICT is a privilege of the more powerful sections of the society in terms of caste and economic class too.

Our rural and urban areas have a huge wealth gap.[46] The rural society also represents rigid caste and gender structures. All of this affects the dissemination of technology because it has direct correlation to literacy. The problem of low penetration therefore not only lies on the supply side of things but also on how effectively the supply is being used. The Internet further establishes linguistic and cultural divide[47], since these mobile applications had their origin in the developed countries and many are still operated by their foreign masters. Even the indigenous apps don't provide services in all 22 languages listed in the Eighth Schedule of the Indian Constitution. This is important since m-health apps target maximum outreach which cannot be brought about without dissolving the barriers to bringing inclusivity.

When we talk about minorities who are deprived of the very basic health facilities, we have to address sexual minorities with the transgender population being at the forefront of attention, the tribal population with grave socio-economic disadvantages, the sex workers, the elderly, the children, basically all those who are marginalized and need special care. It can be understood that one mobile application cannot encompass the issues of all these sections, but various apps can be generated by public as well as private stakeholders to address the problems of each separately. Ultimately if the aim is to reach out to every single one of them, the system has to be made more inclusive.

[45] For example, an algorithm will not know someone's gender, but it may know you are a primary school teacher - a female-dominated industry. Historic data, most controversially in crime and justice, may be drawn from a time when human decisions by police or judges were affected by somebody's gender/race. The machine learns and replicates conclusions from the past that may be biased. Retrieved from: https://www.bbc.com/news/business-50432634

[46] The per capita income for 2011-12 in the country for urban areas was Rs 1,01,313 and for rural areas it was Rs 40,772. Retrieved from: https://economictimes.indiatimes.com/news/politics-and-nation/big-gap-in-per-capita-income-in-urban-and-rural-areas/articleshow/52208067.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

[47] Prasad, K.(2012), E-Governance Policy for Modernizing Government through Digital Democracy in India, Journal of Information Policy , Vol. 2, pp. 183-203, Penn State University Press, Retrieved from: https://www.semanticscholar.org/paper/E-Governance-Policy-for-Modernizing-Government-in-Prasad/a8b3ca2e893db594649d507872923cc37d79e1b0

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