Realizing the Potential of Information and Communications Technology for Improving Health Outcomes in Sindh

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Introduction

The role of information and communications technology (ICTs) is becoming increasingly important for the development in the modern world. Leveraging technological solutions for socio-economic development in developing countries can yield exponential gains in terms of improved outcomes. Government of Sindh can incorporate the successful ingredients from national and international best practices in the realm of ICTs to catalyze the socio-economic development of the province. This report will focus on the potential of ICTs to improve health outcomes in Sindh which can be replicated for innovative solutions across sectors.

Background

The instrumental role of ICTs cannot be overemphasized when it comes to achieving the socio-economic development goals of a country. Global consensus on the Sustainable Development Goals has renewed focus on the role of ICTs to facilitate designing and implementing evidence-based initiatives. In a world with about 5.1 billion unique mobile phone users and 4.4 billion internet users around the world, ICTs can be utilized in generating data points for cross-sectional, longitudinal studies and much more to inform decision makers. The scope of ICTs in helping achieve SDGs is unimaginable. With limitless opportunities associated with communications technology, this report will restrict focus to employing ICTs to improve health outcomes in the context of Sindh.

Implementation of ICT-based platforms in low-resource settings presents novel challenges that need cost-effective solutions. Mobile phones are often viewed as useful instruments to improve health outcomes through enhanced accessibility, outreach and efficiency of provided services. Employing cellular phones in the health sector is often categorized under the umbrella of Mobile Health/m-Health.

Global Examples

There are numerous examples of ICTs being used in the healthcare sector to improve efficiency, outreach and accessibility through m-Health, e-Health and Electronic Platforms. However, one must bear in mind that m-Health and e-Health tools cannot provide standalone sustainable health solutions. A more comprehensive policy framework requires cross-sector collaboration to have a far-reaching impact on the overall well-being of individuals and communities. The essence of SDGs lies in the inter-connectedness of the goals and targets. Aiming for lasting effects on the health of a community necessitates a concerted multi-disciplinary approach.

According to one WHO report, the most prevalent use of m-Health is in the categories of health call centers, emergency telephone services and telemedicine globally. The associated initiatives range from screening patients for disaggregated data, monitoring, treatment compliance and surveillance to health education, mobile money, emergency response and feeding real-time data to electronic platforms. There is limited evidence of the impact of ICTs on health outcomes over time due to a lack of longitudinal studies but cross-sectional data reveals improvement in immediate outputs. SMS Reminders have been shown to improve treatment compliance of HIV-infected adults and health workers' adherence to malaria treatment guidelines in Kenya. HP and mPedigree started an initiative that allows patients to check the authenticity of medicines, a common challenge, with the use of basic cell phones in Ghana, Nigeria and Kenya. Another example, mTrac, is used in Uganda to track disease outbreaks and keep stock of medicines through a network of community health workers and health facilities. These examples illustrate the effectiveness of ICTs in improving health outcomes within resource-constrained settings. Sustainable change warrants technological initiatives to be coupled with dynamic complementary policies.

National Examples

In Pakistan, both the public and private health sector has a long way to go in terms of embracing the ICTs to address the socio-economic challenges. In the private sector, a handful of hospitals have the Electronic Medical Records System to document the patients' records of visits. In public sector health facilities, the practice of basic electronic record-keeping is mostly missing. At the government level, District Health Information System (DHIS) is present as an electronic repository of public health facilities, but at an infancy stage. Few digital healthcare start-ups are present in Pakistan that are mostly grounded in providing medicinal

drugs or access to remote doctors to patients, but their scope is limited in terms of both services and geography.

A pivotal shift is required to harness ICTs for m-Health and e-Health solutions for the population at institutional level. Punjab Information Technology Board (PITB) can provide an imitable frame of reference in terms of realizing the potential of ICTs to improve health outcomes in Sindh. PITB has rolled out multiple ICT interventions in the realm of health that range from disease surveillance, dengue tracking, vaccinators tracking to drug inspection, medicine procurement, electronic medical records and hospital information management system. PITB has rolled out a tech incubator, Plan 9 to incentivize innovations from start-ups for scalable solutions. Furthermore, PITB has also developed Punjab IT Policy 2018 to serve as a roadmap for scaling IT innovations across different sectors of the province.

Way Forward for the Government of Sindh

From the perspective of Government of Sindh, the roadmap for ICT-driven solutions, pertaining to health and overall socio-economic development, should not be restricted to one-off interventions but should be embedded in an eco-system that connects the citizens to services and vice versa. GoS is cognizant of the importance of ICTs as they have engaged PITB for automation of Sindh Police systems that include human resource management information system, complaint management system, tenant registration system and facilitation centers. Sindh Government has also established a Sindh Public Service Delivery Cell for redressal of complaints received from the Pakistan Citizen's Portal initiated by Prime Minister's Delivery Unit. Citizen engagement should be the core tenet for the government in utilizing ICT solutions for continuous improvement in service delivery.

Within the realm of health, Sindh government has a few initiatives that include District Health Information System, Digital Immunization Registry, Hospital Management Information System & Electronic Medical Records under Public-Private Partnership and others. Although the aforementioned ICT initiatives are laudable, an integrated digital platform at government level can go a long way in terms of institutionalization of ICT for development solutions for the province.

There are numerous potentials avenues for improving health outcomes with innovations in ICT. For example, a simple short-message service (SMS) using automated systems can be used to remind the patient of their next scheduled visit to the health facility or to ensure treatment compliance. These messages can also be utilized to convey health awareness information across different themes as a behavior modification tool.

For improved outreach in remote areas with a lack of trained doctors and health personnel, the Tele-Health services can be effectively utilized for outreach of services using video consultations. Electronic reports of patient's vital statistics can be shared with specialists for treatment prescriptions. The role of telehealth and telemedicine can be instrumental in developing a network of health care professionals who can provide critical advice that can be life-saving for people living in remote areas with little or no access to quality healthcare services.

From the Government's point of view, rigorous monitoring and evaluation tools must be available for proactive actions by decision-makers at the district level to avoid epidemics. This needs to include private health facilities too to ensure a dynamic surveillance system is in place for early detection of outbreaks and preventive measures may be taken to curb transmission in the community. The tools may be integrated in an electronic dashboard that can help generate useful data analytics to help the competent authority in making evidence-based decisions to improve healthcare service delivery.

From a strategic standpoint, the role of Optimization Software can yield effective results that can equip the policymakers with the requisite tools for optimal resource allocation for the existing health programs and interventions. For example, the resources may be currently allocated for different interventions in nutrition on an ad-hoc basis. For allocative efficiency, the optimization tool can be used for resources to be optimally allocated across interventions such as vitamin supplementation, infant and young child feeding education, treatment programs, food fortification and other interventions. The optimization software incorporates significant predictors for optimal resource allocation for quantifiable targets in terms of reduction in the prevalence of stunting and malnutrition.

Healthcare Tech Start-ups can also be incentivized to design and share scalable solutions to address the healthcare challenges facing the province of Sindh. PITB's tech incubator Plan 9 can be used as a frame of reference for designing the a comprehensive interactive technical working groups to formalize public sector partnerships with academia, entrepreneurs, start-ups, healthcare experts and other relevant stakeholders. National Incubation Center in Karachi can serve as a starting point to forge linkages between the Government and Entrepreneurs that can translate into institutional arrangements for long-term collaboration.

With the recently developed Presidential Initiative for Artificial Intelligence and Computing Headquarters in Karachi, the time is ripe to introduce predictive analytics and machine learning into the health technological landscape. Predictive analytics and machine learning concepts can be incorporated into the public sector's electronic platforms to design evidence-based interventions and programs that can catalyze improve health service delivery and outcomes. A stylized example can be to incorporate significant predictors using machine learning in the program to predict the likelihood of an incoming patient dropping out of an immunization program or not adhering to treatment prescriptions. The significant predictors can be captured by the healthcare provider at the facility to

identify 'high-risk' patients to better target these individuals with proactive targeted behavior change interventions.

Monitoring and Evaluation Cell of the Planning and Development Department in Sindh has developed an Annual Development Plan (ADP) Progress Monitoring Dashboard to track and monitor the progress of the Development Schemes with electronic physical and financial monitoring reports. Such initiatives can be effectively utilized by the Government to make evidence-based decisions that foster the growth and development of Sindh. However, disintegrated and sporadic efforts might not serve the purpose of leveraging ICTs for improved service delivery and socio-economic outcomes. A good starting point is to devise a comprehensive Sindh IT Policy to develop a roadmap with a phase-wise approach prioritizing an integrated approach to ICTs across sectors with the ultimate goal of improving service delivery for the betterment of the population of Sindh.

Conclusion

Multi-pronged approach, that fosters collaborative efforts across sectors, may be the active ingredient in achieving the SDGs by 2030. Health of an individual is determined by various micro and macro level factors such as the socio-economic status, educational level, health systems, health coverage, inter-institutional linkages and macro-economic policies of the government. ICTs should not be viewed only as a tool for facilitating procedures, but a portal which provides an avenue for meaningful partnerships that translate into sustainable developmental solutions.

An unchartered territory in the realm of health-related ICTs is developing a broad-based system of linkages across sectors. One illustrative example is the crucial linkage between the financial and health sector. A meaningful collaboration between the financial and health institutions can translate into a tangible solution to address the demand-side budget constraints that prevent vulnerable populations from following through on health care activities and services. The underlying rationale is to incentivize intended health seeking and utilization behavior through conditional cash or credit transfers and ICTs can prove to be a crucial tool in providing an integrated platform to be used by both sectors.

A unified framework that links credit payments to healthy behaviors in low-resource settings can act as a way forward for improving health outcomes in the long-term through enhancement of capabilities. Tying credit eligibility to better health seeking and providing behaviors through ICTs can be used a social protection scheme. Different tiers of compliance can be linked to different sets of incentives. For example, small cash amounts can be paid to the parents for getting a child immunized for the first time. For timely immunizations, the household

becomes eligible for credit. Finally, for immunization completion, the household gets insurance coverage for its basic health needs. ICTs can be used to extract disaggregated data of the households for case detection and notification, monitoring and evaluation, SMS reminders, active surveillance for outbreaks, mobile money for cash transfers and pay-for-performance and credit ratings based on compliance level.

Within Sindh, the socio-economic registry of the Benazir Income Support Program can serve as an underlying platform for integrating with health and social protection schemes for end-to-end solutions for the population. This essentially means that the disaggregated citizens' data of the demographic characteristics can be utilized effectively to design rational interventions and programs. Multi-sectoral initiatives such as the Accelerated Action Plan for Reducing Malnutrition and Stunting and People's Poverty Reduction Program can benefit with an integrated digital platform that can be used to track, monitor and generate credible data along with automated reports to ascertain the effectiveness of overall program and stand-alone interventions.

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