Using digital tools to strengthen COVID-19 diagnosis and case management

Case studies from Nigeria, India, and Rwanda

ASLM-FIND webinar

13 May 2021
Today’s session agenda

- **Introduction**
  - Use of digital tools in the COVID-19 response
  - Context and objectives for the case studies

- **Country experiences on the use of digital tools for COVID-19:**
  - Case study 1: Insights from Nigeria
  - Case study 2: Insights from India
  - Interactive Q&A (1)
  - Case study 3: Insights from Rwanda

- **Key success factors identified by all three countries**

- **Interactive Q&A (2)**
As co-convener of the diagnostics pillar of the Access to COVID-19 Tools (ACT) Accelerator, FIND is working with partners to:

1. Generate evidence on the use of digital tools to strengthen COVID-19 diagnosis;
2. Support the design & implementation of digital solutions to facilitate decentralized testing.
Objective & context of the case studies

**Objective:** Promote knowledge exchange and highlight learnings and tools that may be useful for other countries.

**Methods:** Case studies were written by FIND in collaboration with government partners who provided inputs via interviews and questionnaires.

In this webinar, country representatives will present:

+ An overview of their digital systems for COVID-19 management
+ Operational approaches to implementing these systems
+ Key lessons learned, success factors & challenges
Using a central, comprehensive digital platform to capture and consolidate data, and support case management

Lois Olajide
National Coordinator, SORMAS, Nigeria CDC
Nigeria’s digital system for COVID-19 management is based on a pre-existing digital solution: SORMAS

- **SORMAS** – the Surveillance, Outbreak Response Management and Analysis System – is a comprehensive data management system integrating real-time surveillance and case management functions.

- Locally designed following the 2014 Ebola outbreak, it has been further expanded to respond to various epidemic outbreaks.
Key features of SORMAS

- **Widely accessible:** can be accessed by health workers at all levels of the system; works both online and offline.

- **End-to-end solution:** captures geocoded data across all steps of the Test-Trace-Isolate (TTI) cascade.

- **Process management support:** integrates feedback mechanisms to monitor if the care cascade is completed; enables real-time supervision.

- **Open-source** so can be adapted to other settings and countries (e.g. Ghana).

- **A module-based approach** allows for rapid addition of new data fields and case management functions.
Public-facing tools for COVID-19 linked to SORMAS

- **Self-assessment tools**: public-facing tools were developed for individuals to self-evaluate their risk factors for COVID-19 → all self-assessment data are captured in a central dashboard.

- **Referral system**: suspect cases are referred to the relevant disease control hotline based on their location for linkage to care → their details are then captured in SORMAS.
Real-time data is aggregated at national level and made publicly available via the NCDC website.
Practical steps to scale-up for COVID-19

- **Rapid scale-up of SORMAS was prioritized** at the start of the pandemic to ensure a data-driven response.

- **Additional personnel were deployed** at subnational level to support digital implementation & data management.

- **Collaboration with private sector** facilitated development of digital tools and coordination of service delivery.

- **System interoperability with DHIS-2** ensures COVID-19 data is fully integrated into broader health systems.

Deployment of SORMAS before and after COVID-19
(source: NCDC ‘One Year After’ report)
Key learnings from Nigeria’s experience

Success factors

- **Strong national ownership** and investment in the design and ongoing expansion of SORMAS have been important enablers.

- **Consolidating all data across the TTI cascade into one platform** has enabled a deeper understanding of the epidemic, e.g. symptom distribution among confirmed cases, and a more streamlined response.

Operational challenges

- **Underlying health system challenges**, such as inadequate human resource capacity for data entry, can reduce benefit of SORMAS.
  
  + NCDC is working to digitize and automate as many steps as possible, to reduce personnel time required.

- **Balancing software and hardware needs**: as SORMAS is updated, it may no longer function well on older devices.
India’s experience

Using digital tools and data science to inform targeted testing strategies for more efficient and timely interventions

K. VijayRaghavan
Principal Scientific Adviser to the Government of India

Lalitesh Katraggada
Co-creator, Aarogya Setu
India’s digital system for COVID-19 management

- **Aarogya Setu (Sanskrit for “Bridge to Health”)** is a public-facing mobile app that collects self-reported symptoms and Bluetooth proximity data to identify high-risk individuals.

- The IT-enabled Integrated Hotspot Analysis System (ITIHAS) integrates Setu data with additional geodata of confirmed cases to predict hotspots.

- To ensure that insights from Aarogya Setu are linked to follow-up interventions, India leveraged existing call center infrastructure at the National Health Authority’s healthcare scheme (Ayushman Bharat).
Bluetooth algorithm predicts risk level for individuals

- Individuals are assigned to 1 of 4 risk categories based on degree of contact (time and proximity) with any positive case who is also an app user, and self-reported symptoms.
- The app provides individuals with updates on their COVID-19 exposure and risk level, without revealing details of positive cases.
- Information on high-risk individuals is transmitted to local health authorities for follow-up to support linkage to testing and care.

COVID-19 testing outcomes in the early days of Aarogya Setu

Targeted testing leads to efficiency gains: in the first few months of the pandemic, positivity rate in the highest risk category was ~10x national positivity rate.

Source: Aalekh Sharan / Lalitesh Katraggada
Integrated Hotspot Analysis System (ITIHAS) predicts hotspots before a surge in cases observed

Method:
Predictions are based on the fusion of data from Aarogya Setu, with historic location data (from cellphone tower signals) of confirmed positive cases, to determine concentration of risk in surrounding area

Prediction accuracy:
>90%

Targeted interventions:
This information is shared with local health authorities to proactively deploy targeted interventions, if resources are available.
<table>
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<tr>
<th>MEASURES TAKEN</th>
<th>to protect user privacy in Aarogya Setu app</th>
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<td>Each user is assigned a De-identified ID to which their symptom and location data are linked, allowing for <strong>anonymized transmission of data.</strong></td>
<td><strong>Location data are stored in encrypted form</strong> on the device, and only downloaded when the person becomes a confirmed case or is identified to be at high risk of infection by the algorithm (only 1.5% of users have had their data downloaded).</td>
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<td>When providing information on high-risk individuals for follow-up, only mobile phone numbers, and not names, are used.</td>
<td>When high-risk individuals are alerted that they have been in contact with a confirmed case, they do not receive details on who the index case was.</td>
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**Legal stipulation were put in place** to explicitly limit the use of Aarogya Setu data to the COVID-19 response.
Key learnings from India’s experience

- **The use of digital tools and data science can greatly increase the efficiency of a COVID-19 response** – if uptake is sufficient and linked to responsive, adequately-resourced health systems to implement data-driven interventions.

- **Citizen collaboration was key to rapid development** of India’s digital architecture while maintaining technical rigor. Volunteer work by software engineers across the country supports ongoing maintenance and expansion of the software.

- **There is a need to address the limited capacity to use digital solutions at the lowest levels of care**, due to underlying health systems challenges such as inadequate technological infrastructure and/or scarcity of skilled personnel in the fields of digital tools and data.
Rwanda’s experience

Integrating data flow across multiple testing sites in public and private sector, and minimizing time required for data management and communication across the health system

Muhammed Semakula
Leader of Data Science & IT Solutions for COVID-19 Response, Rwanda Biomedical Centre
Overview of national digital system for COVID-19

In response to the pandemic, new tools were integrated into Rwanda’s pre-existing digital health architecture, including:

- Public-facing tools: for information and self-assessment
- Passenger locator form (PLF): stores traveller data and issues their unique health code for use upon arrival

Command Post connects patients and public with health providers.

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**PATIENT / PUBLIC FACING TOOLS**

- 114 USSD
  - Self-screen
    - Pos.
    - Neg.
  - Whatsapp
  - PLF
    - Self-screen
      - Pos.
      - Neg.
    - Traveller uploads PCR certificate
    - Unique health code issued
    - Present UHC on landing
    - Referred to testing
  - Weltel app
    - Survey to determine eligibility for HBC
    - Pos.
    - Neg.
    - Assigned to facility
    - Assigned to HBC
    - Monitored with EMR
    - Monitored remotely with Weltel

**PORTS OF ENTRY**

**TOOLS USED IN HEALTH FACILITIES**

- DHS-2
  - Unique health code issued to suspect cases
  - Specimen collected
  - Results transferred to DHS
  - Specimen data with UHC transferred to LIS
  - Results updated in LIS
- LIS
  - Specimen data with UHC transferred to LIS
  - Results updated in LIS

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Command Post
Facilities interaction between patients and providers
- All public-facing tools include phone numbers for individuals to contact the Command Post
- Weltel back-end is accessed by Command Post to supervise remote monitoring and identify where rapid deployment of interventions is needed
Integrated COVID-19 data management and flow
Minimizing time required to manage results

- With all tests registered in DHIS-2 and linked to the lab information system, results are uploaded in real-time.
- Using their unique ID and cellphone number, patients can directly access current and past results via an online portal.
- Negative results are sent to patients by an automated text message.
Expanding digital tools to support decentralized testing

- Community health workers (CHWs) are a key pillar of the national health system and have contributed substantially to active case finding in other disease areas such as tuberculosis and malaria.

- e-ASCov: a digital application developed locally to support CHWs in the screening and identification of suspect cases within the communities.
  - Provides clinical decision-making guidance (identifying who should be referred for testing), while offering real-time capture and transmission of data.
  - Planned expansion of eASCov will support further decentralization of rapid testing outside of health facilities.
All COVID-19 data is aggregated and mapped at national level, and publicly accessible via RBC website.
Key learnings from Rwanda’s experience

- Establishing an integrated digital system to capture all COVID-19 data in one place at the point of testing minimizes fragmentation, and reduces the time spent by health personnel on data management and transfer.

- Enabling patients to directly access their COVID-19 testing record further reduces strain on the health system with regards to communicating results and verified certificates, which can all be accessed through an online portal.

- Consistent investment in long-term strategies to improve digital health is needed to establish digital infrastructure at all levels of the health system that can be rapidly adapted for emergency responses.
Conclusion

Summary of key learnings across all countries, and opportunities to expand in future
To achieve optimal benefit from the use of digital tools and data science, health systems should be able to respond rapidly to the insights they generate.

Availability of skilled personnel is key for data capture, management and supervision, and to reduce the impact of personnel shortages, data transfer should be automated to the greatest extent possible.

Existing local infrastructures and capacity should be leveraged, including through public-private sector collaborations.

Long-term investment in digital health infrastructure, especially at the lowest levels of care, is key to rapid deployment of digital tools in an emergency context.

The full case study reports are available on FIND’s website: [https://www.finddx.org/covid-19/digital-health/](https://www.finddx.org/covid-19/digital-health/)
Several repositories of digital tools available for COVID-19 can be accessed online

- Longlist of solutions compiled via ICTworks – available [here](#)
- WHO Digital Health Atlas – available [here](#)
- European Investment Bank and others –”Africa’s digital solutions to tackle COVID-19”- available [here](#)
- Digital Square - Global Good Adaptations to COVID-19 - available [here](#)
- World Bank- Leveraging Digital Solutions to Fight COVID-19: Lessons from ASEAN Countries - available [here](#)
Opportunities for countries seeking operational support for deployment of digital tools

- The case studies illustrate that digital technologies are not in themselves a solution, but require robust and context-specific implementation strategies.

- For country partners seeking additional information on implementation of digital technologies in the COVID-19 response, please contact: digitalhealth@finddx.org

- Complete case study reports are available on FIND’s website: https://www.finddx.org/covid-19/digital-health/