Understanding the Unique Challenges & Opportunities of Combating COVID-19 in LMICs

June 15, 2020
Agenda

● Brief introduction to AMIA’s Webinar Series, the role of Global Health Informatics, and moderators:
  ○ **Carl Leitner**, PhD, Technical Director, Digital Square at PATH Member, AMIA Global Health Informatics Working Group
  ○ **Hamish Fraser**, MD, MBChb, MSc, FACMI, Associate Professor of Medical Science, Brown Center for Biomedical Informatics, Brown University
  ○ **Theresa Cullen**, MD, MS, FAMIA, Director of Public Health, Pima County, Arizona, and Affiliate Scientist, Regenstrief Institute

● Introduction to the panelists:
  ○ **Carol Kamasaka**, Division of Health Information Management, Uganda Ministry of Health
  ○ **Trad Hatton**, MA, MHS, Country Director for PATH in the Democratic Republic of the Congo (DRC)
  ○ **Jacob Odhiambo**, The Palladium Group, Deputy Chief of Party, KeHMIS
  ○ **Ashish Joshi**, PhD MBBS MPH, Senior Associate Dean of Academic and Student Affairs, and Professor, Population Health Informatics Graduate School of Public Health and Health Policy, City University of New York

● Audience Q&A
Presenters

John W. Loonsk, MD, FACMI  Adjunct Associate Professor, Johns Hopkins Bloomberg School of Public Health & Consulting Chief Medical Informatics Officer, Association of Public Health Laboratories

Laura A. Conn, MPH  eCR lead, Public Health Informatics Office, Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention

Steven R. Lane, MD, MPH, FAAFP  Clinical Informatics Director, Privacy, Information Security & Interoperability Sutter Health, Clinical Professor, Family & Community Medicine University of California San Francisco

Catherine Staes, RN, MPH, PhD, FACMI Professor & Director, Nursing Informatics, College of Nursing, University of Utah
Health Informatics is the science of how to use data, information, and knowledge to improve human health, including the execution of scientific research, the delivery of health care services, and the promotion of public health. AMIA is the multi-disciplinary, inter-professional home for 5,400+ health informatics experts.

Digital Square is a partnership of the world’s leading digital health experts from 40+ organizations and countries working together to strengthen digital health systems in emerging economies. We support co-investment into scalable technology solutions and create the environments in which they can be sustained. Digital Square is led by and housed at PATH, the leader in global health innovation.
Working Groups of AMIA

Biomedical Imaging Informatics
Clinical Decision Support
Clinical Information Systems
Clinical Research Informatics
Consumer and Pervasive Health Informatics
Dental Informatics
Education
Evaluation
Bioinformatics
Ethical, Legal and Social Issues
Genomics and Translational Global Health Informatics
People and Organizational Issues

Clinical Research

Consumer Informatics

Intensive Care Informatics
Knowledge Discovery and Data Mining
Knowledge Representation and Semantics
Nursing Informatics
Open Source Student
Pharmacoinformatics
Primary Care Informatics
Public Health Informatics
Regional Informatics Action
Visual Analytics
Natural Language Processing

AMIA | COVID-19 Webinar Series | Public Health Informatics
To highlight how our members and the broader informatics community is addressing this global pandemic we are launching the AMIA COVID-19 Webinar Series.

We will look at the pandemic through a health informatics lens and is designed to share informatics responses to the COVID-19 pandemic. Panelists will share their specific domain expertise, including clinical informatics, public health informatics, translational bioinformatics, clinical research informatics, and consumer health informatics.

We will also have special emphasis webinars covering topics related to global health, telemedicine, and public policy during the COVID-19 pandemic. These webinars are open to all at no cost.
COVID-19 CHALLENGES AND OPPORTUNITIES

EXPERIENCES FROM UGANDA
# UGANDA COVID-19 STATISTICS

<table>
<thead>
<tr>
<th>Total confirmed cases: 696</th>
<th>Total repatriations: 125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total recoveries: 240</td>
<td>Self –exit: 33</td>
</tr>
<tr>
<td>Admissions: 456</td>
<td></td>
</tr>
</tbody>
</table>
COVID-19 RESPONSE STRUCTURE

- NATIONAL TASK FORCE
  - INCIDENT MANAGEMENT TEAM
    - ICT, INNOVATIONS AND STRATEGIC INFORMATION
    - COORDINATION
    - LABORATORY
    - LOGISTICS
    - RISK COMMUNICATION AND COMMUNITY ENGAGEMENT
    - SURVEILLANCE
    - HUMAN RESOURCE
    - MENTAL HEALTH AND PSYCHOSOCIAL SUPPORT
    - RESEARCH, THERAPEUTICS & VACCINES
• **Disruptions in continuity of other healthcare services**  “Between January and April 2020, the cases of malaria diagnoses increased by 56%. Health facilities' delivery has decreased by 15%. The number of children receiving Immunisation services (DPT3) dropped by 20%.” ~ Dr. Jane Ruth Aceng, 13th June 2020

• **Paucity of infrastructural and human resources**

• **Social Distancing Vs the socio-ecological-economic environment.**

Humans are social beings but key to defeating the COVID-19 pandemic is social distancing, confinement, and self-quarantine, public health measures that have been met with resistance.
• Infrastructural boost eg increased connectivity of health services delivery points to the national internet backbone

• Strengthening of private-public partnerships for better healthcare delivery

• Leveraging of Information technology to combat covid-19 with sustainability of solutions beyond COVID-19 in mind
ICT, INNOVATIONS AND STRATEGIC INFORMATION PILLAR

**ICT AND INNOVATION**

Interoperable secure digital health solutions adhering to existing legal frameworks

**DATA MANAGEMENT**

Data access and data quality

**DATA ANALYTICS**

Foster data use through provision of timely data analytics

**SUB-COMMITTEES**
• Ensuring systems alignment with the ehealth policy and other existing legal frameworks
• Systems deployed are speaking to pillar needs
  o Certification guidelines
• Systems integration
• Training and capacity building in the approved systems
A variety of integrated systems have been deployed. These include:

eiDSR (electronic Integrated Disease Surveillance System based on DHIS2)

Case Investigation and Points of Entry Management

Go.Data

Contact Listing and Follow Ups
Laboratory Information Management Systems
The various testing laboratories had already approved LIMS that they have integrated with eIDSR for seamless information flow

Results Dispatch System( Both Web and SMS based)
Used for disseminating COVID-19 test results
SYSTEMS UNDER USE FOR COVID RESPONSE

Restrack
Tracking samples from points of collection to the laboratory

Integrated Alerts System
Picks alerts from call centers across the country in addition to other alerts approved systems like the USSD based *260# and the android application(Call the Doctor)
Other categories of systems include:

- Contact tracing applications (Both based on Bluetooth and Ultrasound)

- Risk Communication and Community engagement applications (SMS, Web and USSD)
THANK YOU!
The Role of Digital Health Tools and Approaches for COVID 19 Response in the Democratic Republic of Congo

Trad Hatton
Country Director
PATH-DRC
Today, PATH is harnessing the power of digital tools and fostering innovation in communities everywhere to bring good health within reach of more people faster.

Digital Health accelerates health equity.

PATH’s Vision

PATH envisions a world where innovation ensures that Health is within reach for everyone.

Digital Health Mission

Ensure digital innovations improve health.

Guiding Principles

We will:
- Put the user first.
- Collaborate for impact.
- Focus on sustainability
- Uphold country ownership
- Evaluate and evolve solutions.
PATH is uniquely positioned in the global digital health space and in DR Congo.
PATH’s donors in the DRC

- Bill and Melinda Gates Foundation (BMGF)
- United States Agency for International Development (USAID)
- Centers for Disease Control (CDC)
- Resolve to Save Lives (RTSL)
- Global Fund
- Goldsmith Foundation

Selected PATH Projects in DRC

- Digital Health in DRC
  - Support development of the National Digital Health Strategy in, Operationalization of the National Agency for Clinical Engineering, Information and Health Informatics (ANICiIS)

- Global Health Security Agenda
  - Establishment of DRC’s first Emergency Operations Center for epidemic response

- COVID19 Data Architecture and Systems Development for DRC National Response

- COVID19 Investigation and Rapid Response in Kinshasa
Democratic Republic of the Congo

Problems/Challenges
- Population of 80 million served by a largely broken health system with under-trained and underpaid health care workers
- Poor infrastructure including road infrastructure, health facility infrastructure, IT infrastructure
- Human resources concentrated in the urban centers with few skilled health care workers in rural areas

Opportunities
- Private sector mobile telephone operators are expanding coverage rapidly in DRC.
- Leadership from among President and MoH leadership for Digital Transformation
- Digital solutions are a way to leapfrog structural issues
“Congolese Digitalization will be a lever for integration, good governance, economic growth and social progress”. (Translation from French)

Son Excellence Felix Antoine Tshisekedi Tshilombo
3 Tools and Approaches

- ANICIIS – Digital Health Agency of DRC
- Mobile Emergency Operations Center
- Digitization of COVID-19 data collection, integration, and analysis
MoH established ANICiiS to promote and coordinate the digital health transformation in the DRC aligned with

ANICiiS coordinates the development, adoption and maintenance of digital technologies and biomedical equipment for the delivery of quality health care services, the management of the health system and the sharing of health information.

- Design and implement digital health programs
- Harmonize multiple digital health investments in country
ANICiiS Support to COVID19 Response

- Coordination and technical support for identification of architecture for COVID19 data management system
- Chat bot named Doctor ANICiiS to provide population with accurate data and information on COVID. Contributes to fight against misinformation.
- ANICiiS COVID19 SMS channel sends prevention messages to all Congolese with cellphone
- ANICiiS COVID19 web page on freebasix

https://www.stopcoronavirusrdc.info/
Mobile Emergency Operations Center in DRC

Combines all digital capacity and makes mobile via 4x4 which can be deployed to outbreak areas for first response.

Mobile Emergency Operation Centers are a transformational tool for epidemic response, particularly in remote rural areas which lack connectivity and strategic expertise in response such as is the case of COVID, Ebola, measles outbreaks in DRC.
An integrated COVID data system, developed within the national DHIS2 infrastructure, that allows all the different stakeholders involved in the COVID detection and case management to report and access the data relevant for the case follow up. Monitoring teams have access to all the data through dashboards.
Portail public

https://www.stopcoronavirusrdc.info/

Stop Coronavirus COVID-19 RDC
Site officiel d’informations et de conseils

Situation Épidémiologique en RDC
Mis à jour le 04.05.2020

<table>
<thead>
<tr>
<th>Confirmons</th>
<th>Actifs</th>
<th>Guéris</th>
<th>Décès</th>
</tr>
</thead>
<tbody>
<tr>
<td>705</td>
<td>581</td>
<td>90</td>
<td>34</td>
</tr>
</tbody>
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Données officielles validées par le comité technique.
Dashboards to be used by Decision Makers
Leveraging Cross Border Digital Health Solution for COVID-19 Response

Steven Wanyee | swanyee@intellisoftkenya.com
CB-DHS

High level architecture

OpenHIE Component Layer

Interoperability Services Layer

Interoperability Layer

Authentication
Interlinking Service
Entity Mapping

Point of Service

Mobile System
Electronic Medical Record
OpenHIE Component Layer

CB-DHS Regional Shared Resources

Interoperability Services Layer

Business Domain Services

OpenSHR
Shared Health Record

HMIS
Health Management Information System

Registry Services

OCL
Open Concept Lab
Terminology Service

OpenEMPI
Client Registry

iHRIS
Healthcare Workers Registry

Authentication
Interlinking Service
Entity Mapping

OpenHIM
Patient visits facility. They are first searched in in the EMR which consults the Client registry (ex. EMPI/MedicCR/OpenCR). If new, the patients are added in the client registry.
Patient encounter details are entered in EMR and saved on the Shared Health Record. During visits, Health care workers are validated through the Health care workers registry.
Reporting on lab results. Lab results definition verifies in the terminology service to ensure unambiguous interpretations of the concepts.
The Cross Border Digital Health Solution is part of the USAID funded Cross Border Health Integrated Partnerships Program (CB-HIPP - https://www.fhi360.org/projects/cross-border-health-integrated-partnership-project-cb-hipp) implemented by FHI360. IntelliSOFT Consulting Limited is sub-contracted by FHI360 to develop and implement the Cross Border Digital Health Solution (CB-HIPP).
SMAART: A Population Health Informatics framework to address COVID-19

Ashish Joshi PhD, MBBS, MPH
Senior Associate Dean of Academic and Student Affairs and Professor
City University of New York, Graduate School of Public Health and Health Policy
New York
ashish.joshi@sph.cuny.edu
Overview

- Need for a population health informatics framework
- SMAART informatics framework and its applications
- Adapting SMAART Informatics framework to address COVID-19
- Work in progress
Number of Internet Users globally
4.54 billion
Penetration: 59%

Unique Mobile Phone Users globally
5.19 billion
Penetration: 67%

Active Social Media Users globally
3.8 billion
Penetration: 49%
What Happens in an Internet Minute?

1,572,877 GB of global IP data transferred

- 10 Million ads displayed
- 347,222 Tweets
- 3.3 Million pieces of content shared
- 3.3 Million messages sent
- Netflix + YouTube = more than ⅓ of all traffic

And Future Growth is Staggering

- By 2017, mobile traffic will have grown 13X in just 5 years
- In 2017, there will be 3X more connected devices than people on Earth
- All digital data created reached 4 zettabytes in 2013
Need for a Human Centered Informatics Aid

INFORMATION lost

(Temporal) When

Data
Multi-dimension, Multi-faceted, Multi-level

Attribute (Who, What, How)

Spatial (Where)

Human Mind Processing Data

INFORMATION retained

KNOWLEDGE creation

Impact Decision-Making

Influence Programs and Policies
Need for Human centered, Data driven, Evidence based, Transformative shifts, Integrated approaches, and New solutions to enhance population health outcomes and well-being across diverse settings
SMAART: A Human Centered Informatics Platform to support Population Health Interventions globally

- SMAART: A Human Centered Informatics Platform to support Population Health Interventions globally
- SMAART: Sustainable, Multisector, Accessible, Affordable, Reimbursable, Tailored

Population Health Informatics (PopHI) framework
- Technology enabled internet, or standalone
- Collect process and present population health data (meaningful and contextual relevance)
- Inform design, development, implementation and evaluation of human centered interventions
- Facilitate data driven, evidence based policy making.

Community based surveillance
Population health dashboards
Consumer health information platforms
Human Centered and Grounded theory approach
- Active involvement and understanding of users
- Understanding task requirements
- Appropriate allocation of function between user and system,
- Iteration of design solutions
- Multidisciplinary design teams.

Cognitive Fit Theory
- Identifies appropriate representation for a given task performed by users

Information processing theory
- Facilitates presentation of information as a meaningful unit.

Learning behavioral and humanistic theories
- Information highly interconnected, relevant to learner, multiple content formats and feedback given based on responses
Application of SMAART INFORMATICS framework to enhance population health

Programs, Policies, Interventions

Community based
SMAART DIGITAL HUB

Human Centered approach

Humanistic, Behavioral, Learning and Self-Efficacy theory

Research enabled Action oriented Policy Interventions driven by Data

Information Processing Theory

Data, Information Knowledge approach
Adapting SMAART Informatics framework to address COVID-19

How wealth of COVID-19 data can be used by policymakers in evidence-based decision making?

Navigating a path out of this pandemic crisis will require effective integration of data into decision making

(April 1 2020 World Economic Forum).
Data Challenges

Volume of Data
Scale of Data

Variety of Data
Different forms of Data

Velocity of Data
Speed with which data is generated

Veracity of Data
Uncertainty of data

Wearable sensors
Increased digital data
Increased mobile phones

Too Much Information
Too much relevant information too quick

Difficult to distinguish which information is reliable and helpful

? VALUE
MEANINGFUL DATA
CONTEXTUAL & CULTURAL RELEVANCE
Technological challenges

- Access to technology
- Lack of awareness
- Technology skills
- Privacy and Quality
- Financial barrier
- Technical barrier
SMAART RapidTracker
A Global Policy Informatics Tool to Track COVID-19 Outbreak

Research enabled Action oriented Policy Interventions driven by Data

• Global Policy informatics platform

• Tracks geospatial spread of COVID-19 outbreak and policy actions globally

• Designed and developed using SMAART informatics framework
SMAART Informatics framework

DATA

POLICY

SMAART INFORMATICS

Data driven, Evidence-based solutions into Practice

©SMAART Rapid Tracker 2020
SMAART RapidTracker
A Global Policy Informatics Tool to Track COVID-19 Outbreak

Data Module
TRACK COVID-19 data
- World
- Country
- States (India and US)

Policy Module
TRACK Covid-19 Advisories and Policies
- Geographic coverage
- Trends
  - Track Spatial Temporal trends
  - Data recorded
    - COVID-19 Total cases
    - COVID-19 New cases
    - COVID-19 Total fatality
    - COVID-19 New fatality
    - COVID-19 Recovered cases
  - Variables derived
    - Per million
    - Daily rate of change
    - 7-day average change
  - Advisories issued
  - Policies implemented

Features
- Compare
- Select
- Rank

Data Sources
Up to date collection of data from publicly reliable available sources of information

Digital Resource Module
Repository of evidence based digital COVID-19 resources (e.g. WhatsApp groups, apps, screening tools)

Insights Module
Generate meaningful trends and present findings in an interactive format using maps, charts, graphs

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SMAART RAPID TRACKER AS A DECISION AID TOOL: COUNTRY VIEW

STATEWISE DATA AS ON 14TH JUNE 2020

Select states to compare data

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>TOTAL CASES</th>
<th>NEW CASES</th>
<th>TOTAL RECOVERED</th>
<th>TOTAL FATALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maharashtra</td>
<td>104568</td>
<td>3427</td>
<td>49346</td>
<td>3830</td>
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<tr>
<td>Tamil Nadu</td>
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<td>23409</td>
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<td>Gujarat</td>
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<td>15883</td>
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<td>Uttar Pradesh</td>
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<td>Rajasthan</td>
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<tr>
<td>Madhya Pradesh</td>
<td>10641</td>
<td>198</td>
<td>7377</td>
<td>447</td>
</tr>
</tbody>
</table>

NEW CASES PER MILLION FOR VARIOUS STATES

STATE COMPARISON

POLICIES IMPLEMENTED

HELPLINE
**United States – Spatiotemporal Trends of COVID-19**

**Policy reclassification**
1. Care Management
2. Communication
3. Community mitigation
4. Epidemiological measures
5. Federal initiatives
6. Financial Assistance and funding
7. General business Guidance
8. Healthcare Professional & facility Recommendations
9. Testing
10. Vulnerable Population
11. Industry specific guidance
12. Lifestyle and coping
13. Monitoring and Control measures
14. Prevention
15. Research
16. Resource Allocation
17. Schooling and Child care
18. Travel guidance
19. Other, please classify
DATA SOURCES

World Data
World Data (total cases, new cases, total fatality, new fatalities, when countries became positive)
World Country Advisories and Policies
Australia
Belgium
Italy

Source
WHO situation reports
Government website
Government website
Government website

Link
www.australia.gov.au
www.belgium.be/en
www.belgium.be/nl
www.vlaanderen.be
www.wallonie.be/fr/be.brussels/over-het-gewest/Gewestelijk-overheidsdienst-brussel
www.salute.gov.it
www.protessionechevile.it
www.governo.it/it

INSIGHTS

COVID-19 Infections among South American Countries
By SRT Team | June 7th, 2020

COVID-19 Infections in Gulf Cooperation Council Countries
By SRT Team | May 27th, 2020

Countries with highest COVID-19 cases and fatality per million
By Aashish Joshi | May 9th, 2020

India’s Response to COVID-19 Outbreak
By Aashish Joshi | April 27th, 2020

COUNTRIES WITH HIGHEST COVID-19 CASES AND FATALITY PER MILLION AS ON 15TH JUNE 2020

DIGITAL RESOURCE

COVID-19 APPS IN GLOBAL SETTINGS

Australia: COVIDSafe app
The COVIDSafe app speeds up contacting people exposed to coronavirus (COVID-19). This helps us support and protect you, your friends and family.

Bulgaria: VirusSafe app
VirusSafe is a mobile application, created to assist society and governmental institutions in the fight against COVID-19, approved by the Bulgarian Ministry.

China: Chinese Health Code System
Drawing on the experience of promoting health codes in Zhejiang and other places, and helping to classify and resume work...

INSIGHT MODULE

6/17/2020
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Work in Progress

Challenges

• Data updates at different time points
• Each country not releasing the same data at the same time
• No consistent classification of advisory and policy recommendations.
• Some of the links to the data sources not working or broken.

Opportunities

• Modular, flexible, data driven tool
• Develop global policy database to track government responses to COVID-19 pandemic.
• To be a decision aid tool for governments, policy makers, and researchers for informed policy making.
SMAART RAPID TRACKER
An opportunity of Virtual Experiential Learning during COVID-19

115+ students engaged

7 countries
- Australia
- Bangladesh
- India
- Indonesia
- Ireland
- United States
- United Kingdom
“Obstruction is Opportunity and Innovation is Struggle”  
Ashish Joshi

Email: ashish.joshi@sph.cuny.edu
Webpage: smaartrapidtracker.org
Several additional webinars are being planned to highlight members of AMIA and the wider informatics community.

Visit [AMIA.org/COVID19](https://AMIA.org/COVID19)
Audience Q&A