

**Learning question:** How have systems thinking approaches and tools been incorporated in activities to improve health equity? Were these approaches useful in achieving health equity goals? If so, what are the pathways by which these approaches helped to address the root causes of inequity?

# Harnessing the Power of Technology in Emergency: Experience Implementing the Digital Health Activity through a Global Pandemic



## HEALTH SYSTEMS STRENGTHENING ACCELERATOR

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### Context

- The COVID-19 pandemic exposed critical limitations across health systems, and created increased strain on many countries, particularly across the global south.
- With a population of over 110 million, Ethiopia is ranked 6 in highest COVID-19 infection rates per country, in the world.
- Ethiopia's early COVID-19 initiatives were hampered by:
  - Limited testing capacity;
  - Weak health system infrastructure;
  - Limited resources;
  - Inability to capture quality data and support a rapid response;
  - Lack of community awareness of effective prevention methods; and
  - Vaccine supply chain limitations.
- In response to the pandemic, in March 2020, the Ethiopian Ministry of Health (MOH) launched the national Emergency Operations Center (EOC) under seven pillars: digital response being one of the pillars.



Figure 1. Phases of public health emergency response in Ethiopia

### Activity Description

- USAID's Digital Health Activity (DHA), implemented by JSI and launched in 2019, supported the MOH, the Ethiopian Pharmaceutical Supply Service (EPSS), the Ethiopian Food and Drug Authority (EFDA) and the Ethiopian Public Health Institute (EPHI), in leveraging existing digital tools and developing new technologies to enhance the nation's COVID-19 public health emergency management (PHEM) response.
- The PHEM involved four interrelated phases: preparedness, early warning and surveillance, public health emergency response, and recovery.

#### Toward preparedness, DHA:

- Created Vitas, an upstream supply chain tool, and mBrana, a downstream supply chain tool. These tools helped in forecasting and distributing COVID-19 supplies and commodities, provided logistic management information to decision makers, and visibility in supply chain movement to the last mile health facilities.
- Customized the electronic regulatory information system (eRIS) to fast-track imported prevention equipment, such as face masks, hand sanitizers, goggles, and other supplies which were in short supply in Ethiopia at the start of the pandemic.

#### Early Warning and Surveillance

- A CommCare application was customized for use by community health workers in house-to-house case detection surveys.
- Expanded use of the DHIS2-based COVID-19 tracker to track suspected cases, capture symptoms, and profile suspects based on risk factors.
- Trained and deployed HIS data clerks to provide surveillance, case tracking, and contact tracing.

#### Public Health Emergency Response

##### Prevention and control support:

- Developed a hand sanitizer quality control digital tool. The tool, used by EFDA, monitors and controls hand sanitizer quality, as part of the eRIS that facilitates registration and import approval for food and medicines.
- Used social media platforms such as Telegram, WhatsApp, SMS and toll-free shortcodes, to disseminate COVID-19 and vaccine information to communities.
- Customized DHIS2 to track individuals who tested positive, clinically, for home-based isolation and follow-up.
- An existing facility level warehouse management software, Dagu, was upgraded and used to inform distribution of personal protective equipment and related products at facilities.
- Developed a queue management system to track and locate ventilators to ensure availability with critically ill patients. At the peak of the pandemic, the queue management system helped establish equitable access to ventilators.

##### COVID-19 vaccine distribution and utilization

- Used Vitas to track COVID-19 vaccine data from pre-shipment to medical stores at central and regional distribution points.
- Used mBrana for vaccine logistics management at woreda (district) level.
- DHA integrated Vitas and mBrana to provide end-to-end visibility of COVID-19 vaccine distribution.
- DHA customized the DHIS2 tracker to record individual level information about COVID-19 vaccination status.
- Developed a mobile application to track adverse events following immunization (AEFI).

##### Strategic information for decision makers:

- Used DHIS2 to report and receive aggregate reports to inform vaccine distribution, prevention and control decisions.
- Customized existing supply chain dashboard, Fanos, to provide critical summary information about COVID-19 supplies and vaccine procurement, distribution, utilization and side effects

##### Collaboration:

- DHA collaborated with stakeholders to customize and roll-out the different digital tools used for prevention and control.
- Worked closely with the MOH, EPSS, EFDA and EPHI in leveraging digital tools in the national digital health architecture.
- Collaborated with the University of Oslo Health Information Systems Program team in customizing DHIS platform and its maintenance.
- Received technical and financial support from USAID.

### Activity Impact

- Data from Vitas helped forecast COVID-19 supplies required at national level and quantified national level vaccine demand. Over 80 manufacturers and importers were registered to supply items such as PPE, vaccines, and medical equipment.
- The eRIS helped manufacturers and importers adequately supply items for COVID-19 prevention and control in a timely manner (e.g., face masks, hand sanitizers, goggles and other critical supplies).
- EFDA managed production and distribution of quality hand sanitizers. It also helped manufacturers track quality of their products.
- CommCare was used to capture high-quality surveillance data for real-time analysis and use at the national and regional levels to make informed decisions about what interventions were needed to curb the pandemic.
- Information about COVID-19 prevention and control methods including vaccination were successfully disseminated to the community using toll free codes, SMS, and social media platforms.
- The DHIS2 tracked individuals testing positive and given home-based isolation recommendations measures, and was then upgraded further to screen, register, and track travelers.
- DHA's mechanical ventilator queue management system helped establish equitable access and use of life saving mechanical ventilators at COVID-19 treatment centers.
- The woreda level aggregate DHIS 2-based reporting tool and DHIS tracker created efficient and real-time management of the pandemic. Reporting rate was consistently monitored and presented to the national taskforce for the emergency response.
- Vitas and mBrana allowed safe, efficient, and equitable rollout of the COVID-19 vaccination program.
- Fanos and mBrana provide information on COVID-19 vaccine stock status analysis, which includes vaccine shipments orders and received, total consumption, months of stock, ending balance, and potential expiry. Data from Vitas helped forecast supplies required at national level and quantified national level vaccine demand.
- AEFI enabled collection and real-time reporting of adverse reaction to vaccines and these reports were shared with manufacturers to enhance safety standards and practices.

### Evidence

- Digital tooling boosted Ethiopia's response to COVID-19, by easing accurate communication on preventive behavior to a wide network of Ethiopians, through an enhanced digitized information system enabling real-time data to inform where services and products were most needed; and through an agile supply chain system which further enabled vaccine access equity.
- More than 1.3 million people received health information about COVID-19 and vaccination through toll free codes, SMS and social media platforms. Over 10,000 rumors were reported, which were used to inform correct and consistent messaging.
- More than 4,000 health workers were trained to effectively use the system and tools.
- A total of 500,899 confirmed COVID-19 cases were identified and 7,574 (1.51%) individuals died of COVID-19-related complications. These data were captured and reported through customization of DHIS2.
- Through CommCare, about 1 million people were screened by health workers and tracked at home to ensure isolation protocols were followed, and more than 3 million households were surveyed during home-to-home visits.
- Imported vaccines worth more than USD \$97 million were managed through eLMIS
- mBrana is now deployed in 570 woredas providing woreda-level visibility to COVID-19 vaccine supply chain data. As of may 30, 2023:
  - More than 54 million vaccine doses were administered.
  - Almost 44 million people have taken at least one dose.
  - More than 36 million people were fully vaccinated.
- Using the AEFI tool, a total of 9,600, 2,500, 9,000 and 560 cases of adverse events following AstraZeneca, Janssen and Sinopharm vaccines, respectively, were reported back to the pharmaceutical companies. The most commonly reported adverse events include headache (20%), fever (14%), pain/erythema/swelling at injection site (12%), malaise (10%), arthralgia/myalgia (7%).

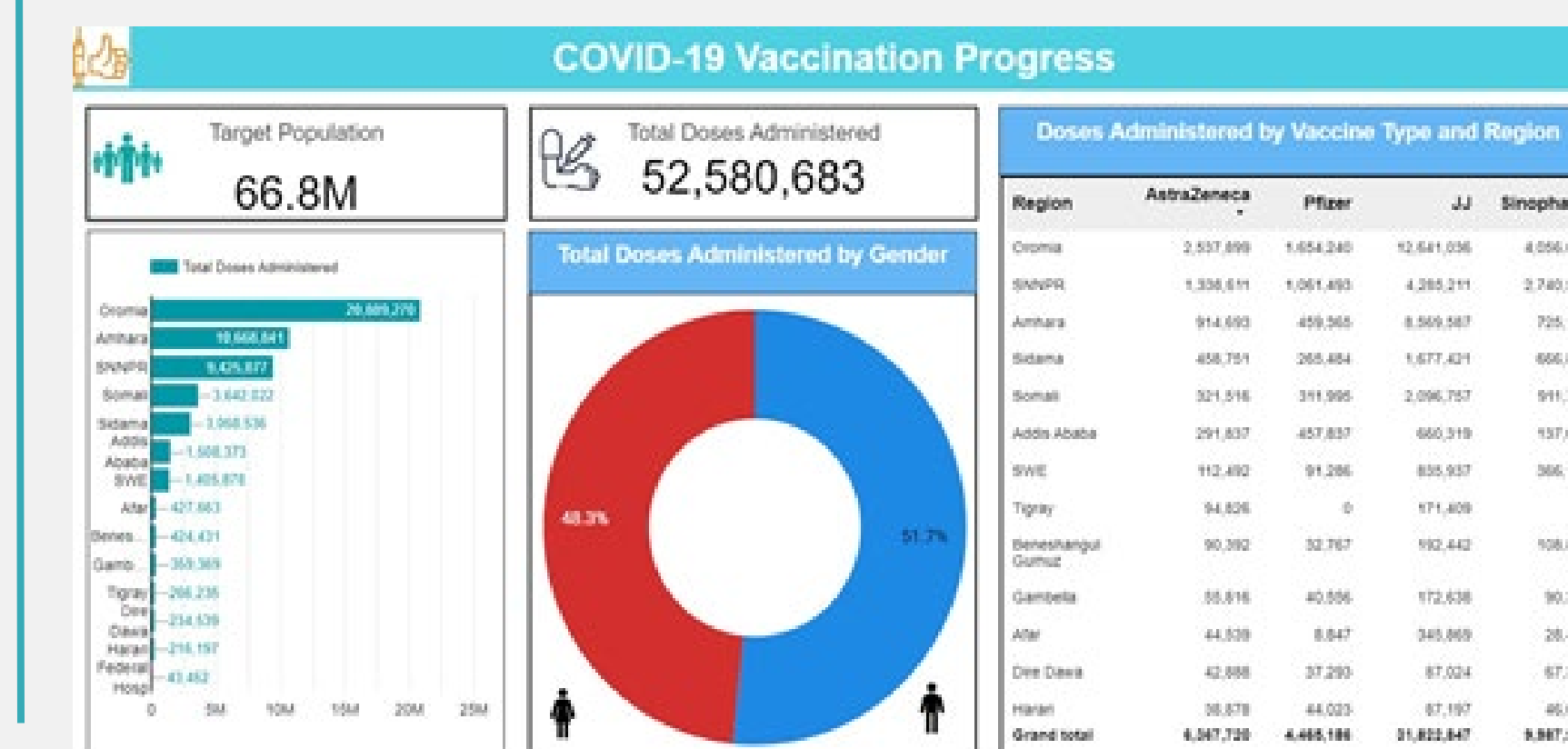


Figure 2: Sample dashboard used to track regional distribution of COVID-19 vaccines

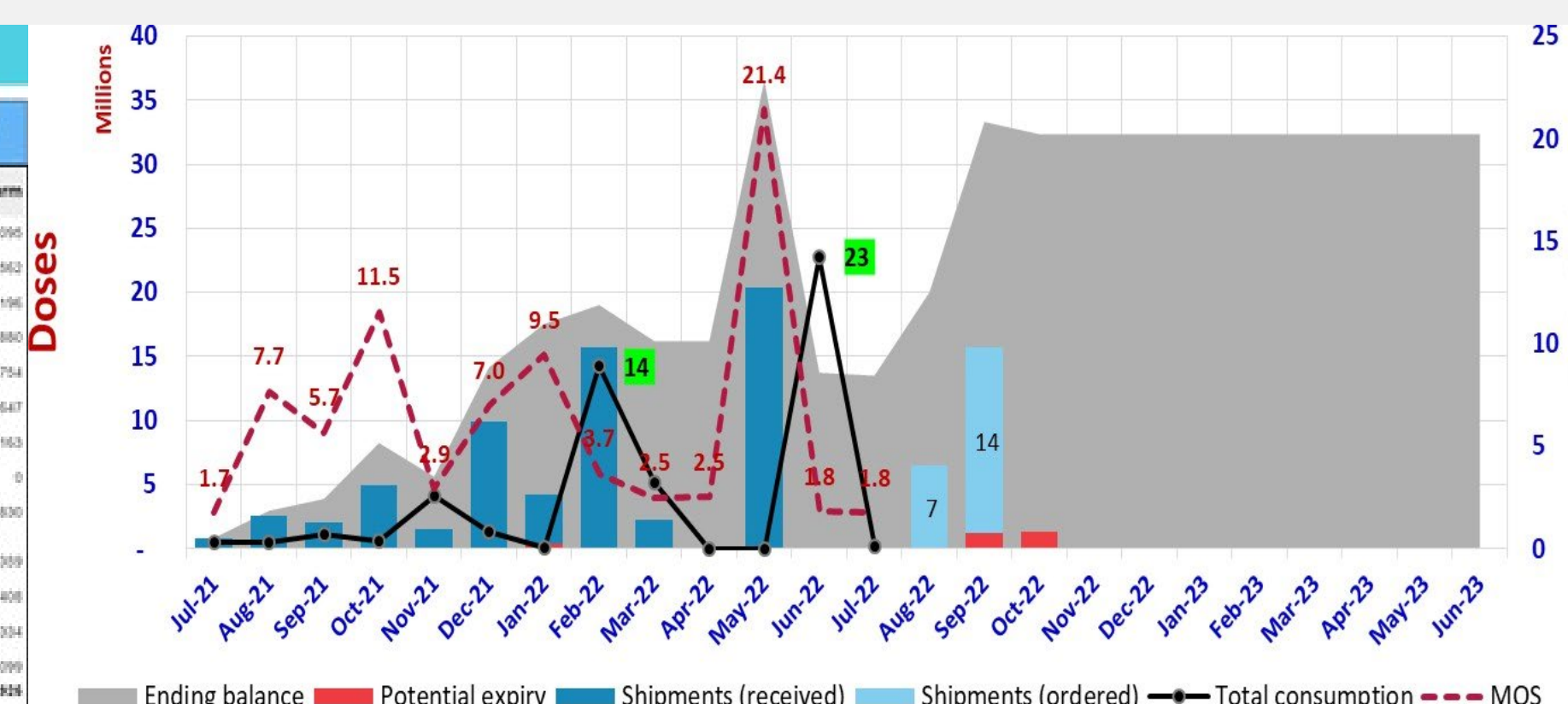


Figure 3: Sample dashboard developed by DHA showing stock status of COVID-19 vaccines



### Facilitators

- Government commitment: the government rapidly mobilized financial, human, and other resources, including digital platforms, which paved the way for a timely, coordinated, and robust emergency response.
- Collaboration of different sectors: the rapid, organized, data driven, and seamless collaboration among different actors, including those in private sectors, enabled relief throughout this pandemic response.
- Existing digital tools: Previous digital health investments played a critical role and served as a springboard. Many of these investments allowed us to adapt instead of reinvent the wheel.



### Challenges

- Poor infrastructure, challenged testing, treatment and prevention efforts.
- Resource constraint: preventive measures, such as contact tracing and isolation of infected individuals, are cost-consuming and national resource constraints became an issue in seeing these measures through.
- Poor community awareness: community misinformation led to non-compliance with preventive measures and reluctance to get vaccinated.
- Social media disinformation: misinformation and conspiracy theories about the virus, its origins, and potential treatments, spread rapidly on social media platforms and led to confusion and mistrust among the public.



### Lessons Learned

- Government led: The government's commitment and consideration of the pandemic as a health, social, economic, and political priority paved the way for a swift response.
- Demand for digitization: The panic and the complexity surrounding possible COVID-19 transmission in paper-based information exchange accelerated the digital tool adoption.
- Resource allocation: The shifting of already limited resources by the government, partners, the private sector, and communities to prevent and control COVID-19 was crucial to fighting the pandemic's spread.
- Building on existing investment: Previous and ongoing digital health investments played a critical role in serving as a springboard in responding to public health emergencies. Vitas, mBrana and DHIS2 tracker were investments made before the occurrence of the COVID-19 pandemic. The MOH and DHA were then able to customize these tools to meet the needs of the COVID-19 response.
- One plan, one budget, one report: The government-led one plan, one budget, and one report approach augmented a rapid mobilization of resources, including digital platforms for timely, coordinated, and robust emergency response.