Implementing Real-time Disease Surveillance in the Democratic Republic of the Congo (DRC) Using the DHIS2 Platform, 2021–2024

Bona Ngoyi,[1] Faustin Etonye,[2] Igor Gamanyo,[3] Ashleigh Howard,[4] Francois Xavier Kalamba,[1] Eric Katanga,[3] Osborn Kitsuimi,[5] Antoine Legrand,[5] Richard Luce,[6] Norbert Soke,[6] Aline Nkulu,[1] Jose Nyamusore,[6] Kristen Stolka,[1]* Aruna Abedi,[7] Felix Mulangu,[7] Eileen Reynolds[1]

[1]RTI International, Research Triangle Park, NC, USA; [2]Provincial Health Office, Haut Katanga Province, Lubumbashi, DRC; [3]Division of the National Health Information System (DSNIS), Ministry of Public Health, Hygiene and Prevention, Kinshasa, DRC; [4]Independent consultant, Alexandria, VA, USA; [5]BAO Systems, Washington, DC, USA; [6]Division of Global Heath Protection, Centers for Disease Control and Prevention, Atlanta, GA, USA; [7]Directorate of Disease Surveillance, Ministry of Public Health, Hygiene and Prevention, Kinshasa, DRC

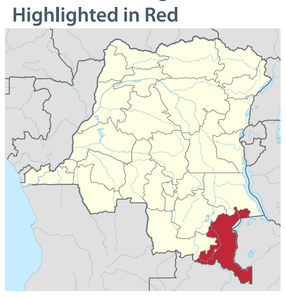
Introduction

- The Democratic Republic of the Congo (DRC), the fourth largest country by population in Africa, routinely experiences epidemics including 13 outbreaks of Ebola Virus Disease, the largest of which had 3,317 cases and 2,287 deaths. For example, in 2023 DRC had:
  - 41,351 cases and 352 deaths from cholera,
  - 313,732 cases and 5,855 deaths from measles, and
  - 14,434 cases and 728 deaths from Mpox.
- The 2018 Joint External Evaluation of International Health Regulation capacity recommended the use of electronic integrated disease surveillance and response (eIDSR) systems.
- DRC's notifiable disease surveillance system (routine weekly reports from health facilities on priority diseases and immediate individual case reports) relies on paper reports and manual data compilation and lacks a systematic approach for capturing laboratory results.

Context and Aim

- To address the challenges, we are testing the use of the DHIS2 software for aggregate weekly and case-based surveillance in Haut Katanga Province (pop. 7,751,217) to improve the timeliness, quality, availability, and use of surveillance data to detect outbreaks and respond effectively (see Exhibit 1).
- The current analysis aims to present and share results and lessons learned to inform current and future efforts to strengthen disease surveillance via eIDSR.

Exhibit 1. Map of the DRC With Haut Katanga Province Highlighted in Red



Methods

- We provided tablets, internet access, and training to head nurses and assistant nurses in 235 responsible health centers and hospitals (a responsible health center gathers data for facilities in its health area) in 15 of 27 health zones in Haut Katanga Province on the DHIS2 Android application to submit immediate case notifications (Exhibit 2) and weekly aggregate surveillance reports.
- We also trained data managers from the public health laboratory in Haut Katanga on how to enter laboratory results for cases notified in the eIDSR.
- Because of resource constraints, we were not able to equip and train all health zones in the province; however, to help the province have a complete data set we trained health zone data managers to enter the data for their health areas in DHIS2 in the remaining 12 non-pilot health zones and provided a tablet and internet to facilitate this.
- The 15 pilot health zones began using the system to transmit weekly epidemiological reports and immediate case notifications of priority diseases in October 2022 and in the 12 remaining health zones in March 2023.
- The Provincial Health Office (DPS) and Health Zone Offices in the 15 pilot health zones were also trained on how to analyze their data in DHIS2 including identifying data quality issues during the initial training in September 2022 and in May 2024.
- We conducted supervision visits to the 15 pilot health zones from February to August 2023 and continue to provide remote and in-person support to users in all 27 health zones and the provincial health office through staff based in Kinshasa and Haut Katanga.
- We gathered the quantitative data for this analysis from the eIDSR DHIS2 system and qualitative data from supervision visits conducted from February to August 2023.

RTI and Health Zone Staff During Supervision Visit

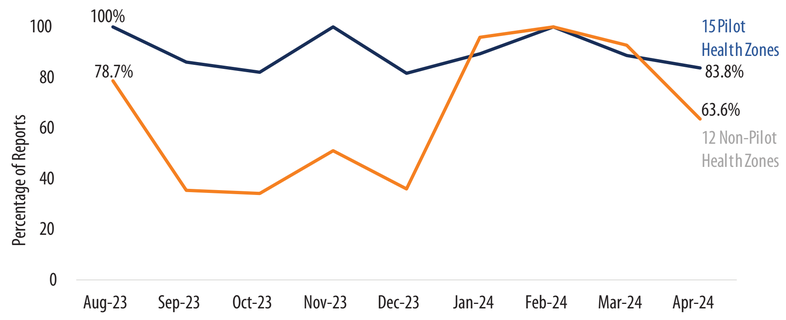
Exhibit 2. Immediately Notifiable Diseases/Syndromes in eIDSR

Acute Flaccid Paralysis	**Measles**
Cholera	**Yellow Fever**
COVID-19	**Viral Hemorrhagic Fever**
Guinea Worm	

Findings

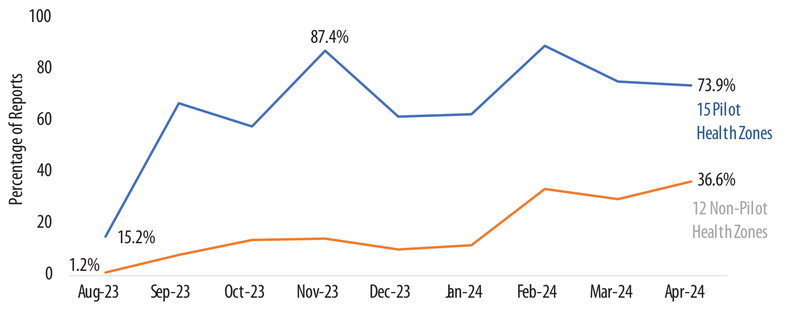
Among the 15 pilot health zones where health facilities reported their weekly epidemiological data using the DHIS2 Android application on tablets, on average 93% of expected reports were submitted. For the 12 non-pilot health zones that had to compile and enter all the data for their health areas, an average of 65% of expected reports were submitted (completeness) from August 2023 to April 2024 (Exhibit 3).

Exhibit 3. Average Completeness of Weekly Reports, 15 Pilot and 12 Non-Pilot Health Zones, August 2023–April 2024



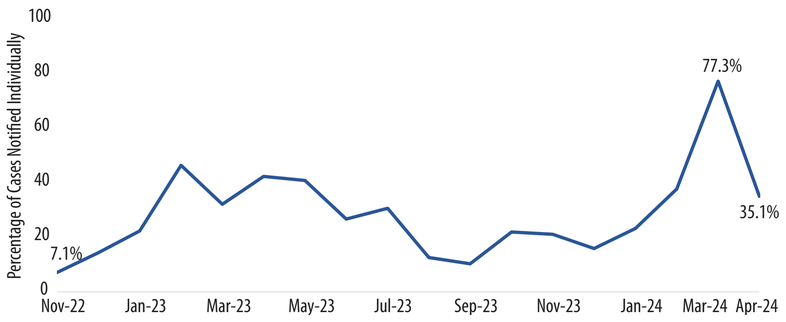
For the 15 pilot health zones, 76% of weekly reports were submitted on time, compared to 18% for the 12 non-pilot health zones (timeliness) from August 2023 to April 2024 (Exhibit 4). The health worker strike from August to October 2023 negatively impacted reporting.

Exhibit 4. Average Timeliness of Weekly Reports, 15 Pilot and 12 Non-Pilot Health Zones, August 2023–April 2024



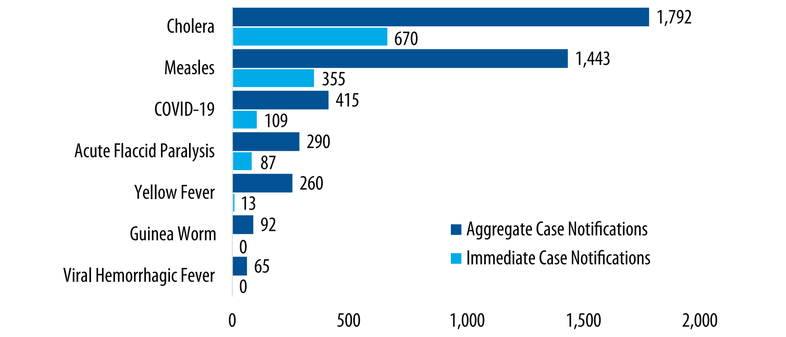
In the 15 pilot health zones, immediate notification of priority diseases using an individual case form averaged 29% of the number of cases notified in the aggregate weekly report (Exhibit 5). To support the cholera outbreak from January to March 2024, we worked intensively to increase the number of cases individually reported. In some health zones, more cholera cases were notified by individual case form than in the weekly aggregate report.

Exhibit 5. Percentage of Immediately Notifiable Diseases Entered in eIDSR Using Individual Case Form Compared to Cases Reported in Weekly Aggregate Report, 15 Pilot Health Zones, November 2022–April 2024



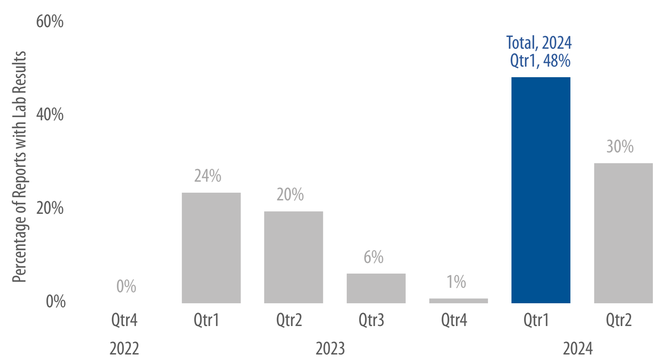
The cholera outbreak and response efforts in January–March 2024 led to cholera being the condition with the highest number of individual case reports in the eIDSR (Exhibit 6).

Exhibit 6. Number of Immediate Case Notification Forms Compared to Aggregate Cases Entered in eIDSR, 15 Pilot Health Zones, by Disease, November 2022–April 2024



To support the cholera outbreak from January to March 2024 we worked intensively to increase the number of cases individually notified that had laboratory results. This resulted in an overall increase in laboratory reporting in February 2024 (Exhibit 7).

Exhibit 7. Percentage of Cases With Laboratory Results in eIDSR for Individually Notified Cases in the 15 Pilot Health Zones, November 2022–April 2024



Findings *(continued)*

Challenges

- Parallel reporting of weekly aggregate data in eIDSR and the existing surveillance system burdens health workers and makes uptake of the eIDSR system more difficult.
- Nurses not entering case notification forms for immediately notifiable diseases or entering them late.
- Laboratory results in eIDSR not matching number of cases with lab tests. Reasons include inadequate staffing and oversight to ensure lab results are entered, use of older versions of case forms for acute flaccid paralysis (polio), and not including the unique identifier from eIDSR on case reports accompanying lab samples.
- Lack of eIDSR data analysis and review at health zone and provincial levels. Lack of timely and complete data for the 12 non-pilot health zones made it difficult to analyze data in eIDSR for the entire province. In addition, data errors were not corrected in some cases.
- Health worker strike, lack of motivation, and turnover of personnel leading to new staff not trained on the eIDSR system.
- Ongoing provision of internet credits and replacement of tablets to sustain the system post-project.

Opportunities

- Leveraging the CDC GHS laboratory-strengthening project led by ICAP to strengthen laboratory results reporting. ICAP's training of health personnel on collecting, packaging, and transporting laboratory samples will include instructions on completion of the eIDSR case notification with the unique identifier to facilitate laboratory results reporting.
- Engagement by DPS leadership can improve reporting in the eIDSR, as demonstrated recently when the DPS issued a letter to all health zones to report their data in the eIDSR system.
- As eIDSR data become more complete and timely, opportunities to transition from the existing manual system to eIDSR increase.

Innovative Contribution to Policy and Practice

- The eIDSR system integrates laboratory results with case data to strengthen surveillance and response.
- The DPS used the eIDSR system during the recent cholera outbreak to generate line lists automatically, demonstrating its utility over the current system.
- Use of electronic reporting from responsible health centers in the 15 pilot health zones improved the timeliness of surveillance data compared to the 12 non-pilot health zones that had to compile and enter data for their health facilities.
- Use of dashboards in the eIDSR helped draw attention to health zones and areas with excellent and low reporting (Exhibit 8).
- The eIDSR system is integrated in the national DHIS2 platform and is used nationally in DRC. It could be scaled up to additional provinces. The collection of surveillance data using DHIS2 that connects directly to the national health information system is an innovation that could help DRC improve its health security by ensuring the availability of timely, quality data for public health decision making.

RTI, Provincial Health Office, and Health Zone Personnel During Supervision Visit

Exhibit 8. Excerpt of Dashboard in eIDSR, Completeness and Timeliness of Weekly Reports by Health Zone

Taux de rapportage de la surveillance - Haut Katanga 15 eSIMR ZS — Last week	eSurveillance Hebdomadaire-Edition 2022 - Reporting rate	eSurveillance Hebdomadaire-Edition 2022 - Reporting rate on time
hk Kambove Zone de Santé	100	100
hk Kampemba Zone de Santé	78.6	78.6
hk Kapolowe Zone de Santé	100	88.2
hk Katuba Zone de Santé	93.8	87.5
hk Kenya Zone de Santé	100	90.9
hk Kikula Zone de Santé	61.5	53.8
hk Kipushi Zone de Santé	100	94.1
hk Kisanga Zone de Santé	85.7	66.7
hk Likasi Zone de Santé	100	100
hk Lubumbashi Zone de Santé	95.8	95.8
hk Mumbunda Zone de Santé	41.4	41.4
hk Panda Zone de Santé	81.8	72.7
hk Ruashi Zone de Santé	96.2	92.3

Acknowledgments

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More Information

RTI International
3040 E. Cornwallis Road
P.O. Box 12194
Research Triangle Park, NC 27709

***Presenting author:**
Kristen Stolka
kstolka@rti.org

www.rti.org