

Impact of a Free Health Care Policy in the Democratic Republic of the Congo during an Ebola outbreak: An interrupted time-series analysis

This document is part of a series that describes how routine data were used in research and evaluations of health programs and projects. Data for Impact (D4I) has compiled these examples from its own work and the work of others found through a literature review—and consultation with the original authors—to compare ways routine data can be appropriate for evaluations and to shed light on its benefits and shortcomings for evaluation.

A companion guidance document compiling these lessons is available at the [D4I website](#). This suite of materials may be useful for others contemplating using available and routine data in their own work.

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Program Description

In 2018, the Democratic Republic of the Congo (DRC) experienced two separate outbreaks of Ebola virus disease (hereafter, Ebola). During past outbreaks of Ebola in West Africa, the use of health services greatly declined (Jones, et al., 2016; McQuilkin, et al., 2017; Wilhelm & Helleringer, 2019). Some studies suggest that fear and mistrust of the health system deterred health-seeking behaviors (McLean, et al., 2018; Morse, et al., 2016). These disruptions of health-seeking behaviors persisted for several months after the outbreak (Delamou, et al., 2017; Wagenaar, et al., 2018). Responding to Ebola outbreaks is vital and strategies to reduce its impact should be a priority. In order to encourage early identification and treatment of Ebola, the Congolese Ministry of Public Health implemented a free healthcare policy (FCP) in the affected and neighboring areas.

The implementation efforts were supported by the Health System Strengthening for Better Maternal and Child Health Results Project, funded by the World Bank. The temporary FCP was implemented in three affected health zones and four neighboring health zones in the Equateur Province of the DRC between June and September 2018, thereby removing a major barrier to health service use in a country where more than 60 percent of people live in poverty (Laokri, et al., 2018).

The impact evaluation outlined in this technical brief examined the effect of the temporary FCP on the health service utilization at primary health centers in the Equateur Province, using routinely collected administrative data. It used a retrospective, interrupted time-series study design.

Rationale for the Use of Routine Data

Data were extracted from the national Health Management Information System (HMIS), based on the District Health Information Software, version 2 (DHIS2) platform, wherein district health offices enter data on monthly health service use from monthly reports completed by the health facilities. Several efforts have been implemented to improve the quality of HMIS data (MEASURE Evaluation, 2019)—these including quality assessment activities and incentives for report completion and submission. The decision to use routine data was based on the availability of data that allowed for nearly real-time investigation and, secondly, because HMIS

data has been used retroactively in other studies with similar objectives (Delamou, et al., 2017; Ruton, et al., 2018; Sochas, et al., 2017; Wagenaar, et al., 2018).

Evaluation Questions

The study used routine data to answer these questions:

1. **Impact of FCP on overall service utilization in the general population:** Does the FCP increase the level and trend in the number of clinic visits?
2. **Impact of FCP on common child health services:** Does the policy increase the level and trend of the use of common child health services (e.g., treatment of malaria, diarrhea, and pneumonia)?
3. **Impact of FCP on maternal health service utilization:** Does the policy increase the level and trend of the use of maternal health services?
4. **Impact of FCP on vaccination service utilization:** Does the policy increase the level and trend of the use of vaccination services?

Data Description and Data Management

Data used for the analysis were collected from public health centers in Ebola-affected health zones (Bikoro, Iboko, and Wangata), which all received the FCP, and in neighboring health zones that also received the FCP but did not experience cases of Ebola. The remaining health zones in Equateur Province served as compassion areas. The FCP was in effect from from June to September 2018.

The data of nine health services at public health centers were extracted from the monthly HMIS data. Data collected were: total clinic visits; utilization of maternal health services (first and fourth antenatal care visits, institutional deliveries, and postnatal care visits within six days of birth); vaccination service use (Diphtheria-Tetanus-Pertussis vaccine); and utilization of common infectious diseases services (e.g., visits for uncomplicated pneumonia, diarrhea, and malaria). These indicators represented the majority of health services delivered (79% of total visits) and had the highest level of data completeness.

Data were retroactively collected from the HMIS in early 2019 and were organized into three time periods: January 2017 to March 2018 (pre-FCP intervention), April to September

2018 (during the Ebola outbreak and FCP intervention), and October 2018 to January 2019 (post-FCP intervention). These periods were based on the timing of the outbreak and the FCP intervention.

In total, data from 306 public health facilities in 17 health zones were included in the final sample. Data extraction was conducted by Bluesquare,¹ which established a pipeline into the national HMIS system that mapped all needed data sources from study health facilities and generated data in a format that the researchers could use. Data were from the “Rapport Mensuel du Centre de Santé” monthly forms, which are completed locally at health facilities.

Assessment of Usability and Quality of Data

Prior to analysis, details about the dates and specifics of the FCP implementation were confirmed with provincial administrators and local healthcare workers in Equateur Province. Qualitative interviews with frontline health workers in Equateur Province were also collected in early 2019 to confirm further details of the FCP and to gather additional perspectives on the policy.

Data from public health centers were excluded from each analysis if data were missing for two or more consecutive months in either the pre-FCP implementation time period or during the FCP implementation time period. In addition, public health centers were excluded for specific indicators if their reported data exceeded eight standard deviations from the mean time trend (<0.5% of the sample). During analysis, we excluded the first two months of the Ebola outbreak (April and May), which predated the FCP, because this time period was too short to assess time trends.²

Data Analysis Methods Used

Data analysis compared the pre-FCP, FCP, and post-FCP intervention periods in the three Ebola-affected zones, four neighboring health zones, and control health zones. Population estimates (reported in the HMIS) for each facility catchment area were used to convert the count data from the HMIS into rates. To evaluate the impact of the FCP, an interrupted time-series analysis with two-level mixed-effects negative binomial regression models were used to assess whether the FCP was associated with the change in the rates of services used during the policy and afterward. The regression models included random intercept terms and adjusted for the clustering of observations

1 A Belgian technology firm that has experience working with data collection and DHIS2.

2 See “Impact of a free health care policy on the utilization of health services during an Ebola outbreak in the Democratic Republic of the Congo: an interrupted time-series analysis (forthcoming in the BMJ Global Health)” for detailed information on the missing data.

from the same health centers over time and corrected for over-dispersion. A separate analysis was conducted for each outcome indicator. These analyses assessed the level and slope over time, changes in level and slope in the intervention period and post-intervention period, and the interaction of these changes in the study groups (Ebola and FCP; FCP only; or neither).

Limitations in Using Routine Data for Evaluation

The study experienced a number of limitations in using routine data. First, the analysis was constrained to the variables available in the HMIS database and those that had sufficiently complete data for analysis. Second, the analysis sample only included health centers and excluded health posts (limited reporting), hospitals (too few to include in the analysis), and private facilities (they don't report to HMIS). Some of these facilities did not provide many of the health services of interest or had limited reporting of routine health data. Lastly, the amount of missing data slightly increased during the first few months of the Ebola outbreak, specifically for vaccination and malaria diagnosis. Thus, the sample size for the analysis of these two indicators was reduced. The sample did not include all the Ebola health zones and the findings may not be generalizable to the entire Ebola outbreak area.

What Worked Well?

This study demonstrated that HMIS data could be used in nearly real-time to analyze the impact of an Ebola outbreak and a FCP intervention on the use of health services in Equateur Province, a very remote region of the DRC where alternative data collection methods are challenging. The same system was subsequently used to support analyses of the outbreak of Ebola in Eastern DRC that began in late 2018 and the COVID-19 outbreak that began in May 2020. As of early June 2020, a new outbreak of Ebola had been declared in Equateur Province and the data systems established with this research project will once again be utilized to inform the ongoing response.

Conclusion

Overall, the available routine data was used to demonstrate that FCP increased the use of health services in Ebola-affected health zones. While not all indicators in the HMIS database were of sufficient completeness to be analyzed in this study, the indicators that were analyzed—which represented the majority of health services delivered in the DRC—were of sufficient quality and completeness to be useful for this method. As a

further note, this work would not have been possible without the longstanding working relationship that Bluesquare has had with the Ministry of Public Health in the DRC and with the academic research community.

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