

Development of an open-source, rapidly-scalable, low-cost, and reproducible COVID-19 dashboard in deriving epidemiologic intelligence for Public health action

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ABSTRACT:

Introduction: The transmission of COVID-19 has led to more than 535 million cases and 6 million deaths globally as of May 2022. There are questions about whether variation in the preparedness and capacity of countries has affected the global pandemic response. Innovations in analysing, presenting, and translating data into an evidence base for decision-making may result in better responses. We aimed to develop an open-source, rapidly scalable, low-cost, and reproducible solution to improve epidemiologic intelligence. This solution included a data collation system, an analytic platform, and a dashboard to visualise epidemiological indicators better.

Methods: A five-tiered workflow was utilised and included: i) data acquisition, ii) data processing, iii) databasing, sharing, and version control, iv) data visualisation, and v) deployment and monitoring. A web crawler collated data from press releases from the Director-General of Health, Ministry of health infographics, and public instant messaging channels between October 2020 and July 2021. Data from the Ministry of Health GitHub portal was used when it became available. Important epidemiologic indicators were tabulated or visualised, including the incidence and mortality rates, instantaneous reproductive number, and test positivity ratio. A dashboard was deployed using open-source hosting solutions to illustrate epidemiological indicators deemed essential to influence policy responses. An iframe allowed for dashboard access from a department website. Dashboard use statistics were collected using google analytics and were periodically monitored.

Results: The dashboard featured cards, histograms, and line charts on separate pages. The dashboard was deployed in October 2020. Based on previous monitoring and evaluation activities, extended functionalities were integrated into the dashboard beginning in May 2022, with alpha deployment in June 2022. A total of 919 views of the dashboard were reported from 1 October 2020 to 7 June 2022. A total of 11.4%, 21.0%, 22.7%, 17.8%, 10.9%, 9.9%, and 6.1% of views were reported in October-December 2020, January-March 2021, April-June 2021, July-September 2021, October-December 2021, January-March 2022, and April-June 2022, respectively. The data from April-June 2022 was incomplete at the time of reporting. A total of 96% of all views originated in Malaysia between October 2020 and June 2022.

Conclusion: The COVID-19 pandemic has had diverse consequences at every level of society. Data innovations are critical in ensuring our responses to the pandemic remain optimal. Innovative and frugal solutions can be critical in crises such as COVID-19. This open-source, rapidly-scalable, low-cost, and reproducible dashboard may be useful in many countries, especially countries with low-resource settings. However, they may be extended beyond this to function in other health- and healthcare-related scenarios, especially in automating data collation, processing and reporting that are central to healthcare and public health. There remains a need for more collaboration in strengthening workflows such as this to allow more rapid adoption of dynamic reporting systems in the health sector.

KEYWORDS: