

Improving Surveillance of Infectious Diseases in Developing Countries with Digital Media for Digital Health Records Management Systems

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Abstract

Prevention and control of infectious diseases outbreaks are of utmost concern at both national and international stages. Usage of disease surveillance systems has been recognized as an effective strategy for the prevention and control of infectious diseases. The World Health Organisation supports developing countries like Nigeria as well as developed countries across the world, to control the outbreaks by working with concerned national agencies to strengthen infectious diseases surveillance and response systems. But, the success or failure of all initiatives to prevent and/or control infectious diseases outbreaks depends on the real-time availability of reliable health data. This study reviews the readiness of Nigerians to embrace timely reporting of any observed symptoms of infectious diseases in their communities through digital media, using their preferred digital medium, towards improving the timeliness and availability of digital health records to manage infectious diseases in Nigeria. Investigations carried out with quantitative research method using both online and physical survey questionnaires as tools, and percentage frequency distribution as a method of analysis, show that large majority of the respondents are willing to report observed symptoms of infectious diseases in their communities via their preferred digital medium - like Whatsapp, SMS, Facebook, Twitter, among others, - thereby providing real-time data feeds into digital health records management systems for improved infectious diseases surveillance. Most respondents cited the ease of access of digital media via their mobile phones as the reason why they will embrace this mode of reporting.

Keywords: *Infectious Diseases, Surveillance, Health Records Management, Digital Media, Developing Countries*

Introduction

The historical and recent occurrences of infectious diseases like Ebola (EVD), Meningitis, Lassa fever and COVID-19 in developing countries like Nigeria are calling for improvement on the existing event-based surveillance systems being used in the country. Unlike the traditional paper-based health information processing system, advancements made on automation of health information processes have altered the approaches of gathering and processing data for event-based surveillance systems of infectious diseases. The more there are sources of data for Digital Health Records Management Systems (DHRMS) about occurrence and spread of infectious

diseases in a community, the better for medical professionals and policy makers to be equipped with reports to prevent further spread and control infectious diseases outbreaks. Sharareh, Bahaadinbeigy, Deldar, Gholamzadeh, Hajesmaeel-Gohari, and Ayyoubzadeh (2021) concluded that DHRMS with advance intelligence and capability is yet to be employed for the management of health-related crises, and real-time data supply is crucial to achieve such an improvement. Hence there is need to examine if there are more possibilities of sourcing infectious diseases related data for DHRMS to provide well managed information for healthcare workers and policy makers for prevention and control of infectious diseases.

In sourcing additional infectious diseases related data, mobile/ web app among other digital platforms/ media are taking central stages. Rodriguez, Sanz, Llano, Navarro, Parra-Lara, Krystosik, Rosso (2020) in its study in Colombia used a specially built mobile application, FeverDX, and concluded that the mobile application is helpful in detection and surveillance of diseases. Subair, et al. (2019) identified WhatsApp, Facebook, Instagram and YouTube as digital platforms/ media mostly used by Nigerian students. Talaue, Alsaad, AlRushaidan, AlHagail (2018) discovered that students of developing countries spend between 1 to 3 hours daily on their preferred digital platform/ medium. All these insights point to the necessity to study the possibilities of sourcing more infectious diseases related data via digital platforms/ media. This study may encourage healthcare providers, constituted healthcare authorities, agencies, and parastatals in developing countries to improve on their DHRMS with new feeds of real-time data, thereby creating a more efficient event-based infectious diseases surveillance system for infectious diseases control and prevention.

Objectives

The objective of this study is to examine the usage preferences of digital platforms/media (e.g: WhatsApp, Facebook, Instagram, customized mobile/web app, etc.) among the people of developing countries, as well as their willingness to use their preferred digital medium/platform to provide real-time data for DHRMS as a way of creating an improved version of event-based infectious diseases surveillance system for developing countries, using Nigeria as a case study.

Literature Review

Digital Health Records Management System (DHRMS) in Nigeria

“Prior to the Electronic Health Record (EHR), a patient’s medical records consisted of handwritten notes, typed reports, and test results stored in a paper file system.” (Ikonne, Madukoma, & Ogundele, 2021, p. 152). The challenges of using traditional paper record system in Nigerian health facilities necessitate the introduction of Digital Health Records Management System (DHRMS) in the country’s healthcare sector. DHRMS has been referred to with different names in different literatures, for example: Kiri and Ojule (2020) referred to it as electronic medical record system, Elikwu, Igbokwe and Emokhare (2020) named it electronic health information system, Ibrahim, Kani and Ahmed (2019) mentioned it as Electronic Health Record System, and Luz, Mussi, Dutra and Chaves (2021) made reference to it as health information systems. DHRMS is an application of computing and associated technologies to automate and manage processes and activities of medical services delivery for efficient and effective healthcare delivery.

In its work on the Nigerian health sector, Kiri and Ojule (2020) emphasized that the adoption of DHRMS is important across all medical facilities in the Nigerian health sector. Nwankwo and Sambo (2018) confirmed the importance of DHRMS when it explained that the delivery of medical services is gravitating towards data-driven preventive healthcare system across the world, as against curative/ reactive healthcare system. According to Elikwu, et al. (2020), DHRMS supports improved healthcare delivery services with prompt processing of medical information to generate reports which medical practitioners use for clinical decision making. Adegboyega and Musa (2019: 7) stated that “efficient management of health records will enhance the efficiency of medical practitioners, as well as welfare of patients.” Ibrahim, et al. (2019) confirmed that there is a consensus among Nigerian healthcare professionals about the efficacy of adopting DHRMS as a tool for improving healthcare service delivery. Hence, DHRMS is of importance in all areas of Nigeria healthcare delivery.

Infectious Diseases, Epidemic and Nigeria

“An infectious disease can be defined as an illness due to a pathogen or its toxic product, which arises through transmission from an infected person, an infected animal, or a contaminated inanimate object to a susceptible host” (van Seventer and Hochberg, 2017, p. 22). According to the World Health Organisation (2018), a prevalent infectious disease is categorized as epidemic if it is actively spreading in a community at a particular time. At different periods of history, Nigeria has been in the eyes of the storm of infectious diseases outbreaks. From Monkey-pox, Lassa Fever, Meningococcal Meningitis, Ebola Virus Disease, to Corona Virus (COVID-19) among other infectious diseases outbreaks, Nigerians and other citizens of the world have been plagued with health fears each time. The reality of the health fear forms the basis why the World Health Organisation (2018) believed that infectious diseases outbreaks deserve to be tackled with plans that would yield a long-lasting solution. One of such plans is how to source real-time data for monitoring transmission and progression of an infectious disease.

Importance of Real-Time Data in the Prevention and Control of Epidemics

Alwashmi (2020) explained that if the awareness about infectious diseases outbreaks in an affected community is delayed, the health of all members of the community and the world at large is at risk because infectious diseases outbreaks do not recognize national and international boundaries. Therefore, it is important for the Nigerian community to adopt DHRMS as a tool to prevent and control infectious diseases. Ojo (2018), using observations and past studies of different scholars, mentioned that the state of DHRMS in Nigeria is poor. Adegboyega and Musa (2019: 7) stated that the importance of “...accurate, comprehensive and objective management of health records cannot be over-emphasized”. Hence, it is safe to mention that there is need for improvement of DHRMS in Nigeria. The adoption of DHRMS is not enough a tool to prevent and control an infectious disease outbreak if there are no reliable real-time data to determine the transmission process of the infectious disease and the rate at which it is spreading. Availability of reliable real-time data for DHRMS of an infectious disease is important to plan how to forecast its spread, and how to stop its spread. Mohanty, et al. (2019) affirmed that the basic method to control epidemics is to detect an infectious disease outbreak early with an appropriate surveillance method. Digital platforms and applications such as mobile apps, social media

applications, web crawlers, and so on, offer a wide range of possible ways to gather real-time data for DHRMS, which will in turn generate reports for healthcare practitioners and healthcare policy makers to make crucial medical decisions. The real-time availability and management of digital health data about infectious diseases is pivotal to their prevention and control. With reliable real-time digital health data about infectious diseases symptoms observations gotten from people as part of surveillance effort, DHRMS efficiency can be improved, and swift important decisions on how to control and/ or prevent a spread of infectious diseases can be made at all levels of healthcare delivery in Nigeria.

Methodology

The study adopted a quantitative research method. An investigative design survey approach with a questionnaire was used for gathering data about the perception of respondents with regards to reporting of possible symptoms of infectious diseases in their communities with their preferred digital platform/ medium for improved surveillance. The questionnaire consists of both open-ended and close-ended questions. The questionnaire was administered in both online format and physically printed format. The respondents were those who completed the online questionnaire posted randomly among various fora of Nigerians on digital media, and those who completed the physical questionnaire at various training sessions of a business school held all the six geo-political zones of Nigeria. A total of 212 respondents completed the questionnaire. The data were extracted, mostly in quantitative terms, into a spreadsheet; and subsequently analysed using the percentage frequency distribution.

Results

Demographic Data of Respondents

Table-1 contains the summary of the respondents' attributes. The age of the respondents ranges between 20 and 64 years. The age cluster with the highest frequency among respondents was 35 – 39 years, it constitutes 35.85%. Most of the respondents, 37.26 % of them, have Bachelor's degree as their highest educational qualification. With regards to living modes, most respondents (56.13%) live with 2 – 5 people. Gainfully employed respondents account for 46.70% of the total number of respondents.

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Table-1: Demographic data of the respondents

		Number of Respondents	Percentage (%) in 2 decimal places
Age (Years)	20 - 24	21	9.91
	25 - 29	21	9.91
	30 - 34	28	13.21
	35 - 39	76	35.85
	40 - 44	29	13.68
	45 - 49	21	9.91
	50 - 54	6	2.83
	55 - 59	7	3.30
	60 - 64	3	1.42
Education	Secondary School and Below	17	8.02
	Ordinary National Diploma	11	5.19
	National Certificate in Education	9	4.25
	Higher National Diploma	13	6.13
	Bachelor's Degree	79	37.26
	Master's Degree	58	27.36
	PhD	16	7.55
	Others	9	4.25
Living Modes (Persons)	Alone	22	10.38
	With only 1	35	16.51
	With only 2 - 5	119	56.13
	With more than 5	26	12.26
	Others	10	4.72
Employment	Student	25	11.79
	Unemployed	32	15.09
	Under-employed	42	19.81
	Gainfully employed	99	46.70
	Retired	3	1.42
	Others	11	5.19

Presentation and Discussion

Below in Table-2 is the presentation of responses to questions on the usage preferences of digital platforms/media among the respondents and their willingness to use their preferred digital medium/platform to provide real-time data for DHRMS whenever any infectious disease symptom is observed in a community. This is to help improve event-based infectious diseases surveillance system for developing countries:

Table-2: Responses on digital media/platforms preferences and use to report infectious disease symptoms

		Number of Respondents	Percentage (%) in 2 decimal places
Have you ever reported any observed infectious disease incidence in your community via any means?	Yes	23	10.85
	No	189	89.15
How likely are you to report observed infectious disease in your community via a website?	Very likely	59	27.83
	Likely	37	17.45
	Not sure	65	30.66
	Unlikely	22	10.38
	Very unlikely	29	13.68
How likely are you to report observed infectious disease in your community via a mobile app?	Very likely	85	40.09
	Likely	37	17.45
	Not sure	48	22.64
	Unlikely	20	9.43
	Very unlikely	22	10.38
Which technological application/medium will you prefer to use in reporting observed infectious diseases in your community?	SMS	47	22.17
	Email	12	5.66
	WhatsApp	99	46.70
	Twitter	18	8.49
	Facebook	21	9.91

	Instagram	6	2.83
	Telegram	6	2.83
	Others	3	1.42

With the current rage of COVID-19 and several previous outbreaks of Ebola (EVD), Lassa fever, Meningitis, etc.; in Nigeria, only 10.85% of the respondents has ever reported symptoms of infectious diseases via any means before this survey, 89.15% has never reported anything related to infectious diseases and their symptoms. However, a large majority of the respondents are willing to provide data about any observed infectious disease symptoms via a digital medium/ platform. 27.83% and 17.45% are likely to report observed infectious disease in their community via a website, giving a total of 45.28%. 30.66% are not sure if they would report observed infectious disease in their community via a website. 40.09% and 17.45% are likely to report observed infectious disease in their community via a mobile app, giving a total of 57.54%. 22.64% are not sure if they would report observed infectious disease in their community via a mobile app. On the digital medium/ platform preferences of the respondents to provide real-time data for DHRMS about observed infectious disease symptoms, the top three preferred options are WhatsApp, SMS, and Facebook, with 46.70%, 22.17%, and 9.91% of the total responses respectively. Other preferred digital media/ platforms are Twitter (8.49%), Email (5.66%), Instagram (2.83%) and Telegram (2.83%). 1.42% mentioned that they would prefer a customized mobile app specifically built for the purpose of reporting any observed infectious disease symptoms.

Conclusion

This study examines the willingness of people in developing countries to report observed symptoms of infectious diseases in their communities via a digital medium/ platform. In addition, it studies the preferences of digital medium/ platform among the respondents, and the particular medium/ platform that each of them would prefer to use to report observed symptoms of infectious diseases in their communities. It is safe to conclude from the results presented and discussed above that a large majority of the respondents are willing to report observed symptoms of infectious diseases in their communities via a digital medium/ platform, thereby providing a

real-time data for DHRMS for improved infectious disease surveillance. Among the digital media/ platforms available in the developing countries, the descending order of preference in using them to report observed symptoms of infectious diseases in the communities is WhatsApp, SMS, Facebook, Twitter, Email, Instagram / Telegram (both have the same figure), and customized mobile app for reporting.

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