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Original Research Article

Factors influencing collaboration for Surveillance Outbreak Response Management and Analysis System (SORMAS) in COVID-19 response in Anambra state: Sub-national Spectrum

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Surveillance outbreak response management analysis system (SORMAS) has introduced a real time digital surveillance that helps in early detection and outbreak response management in our health sector. Stakeholders and local respondents have built several partnerships to reinforce leadership on incident and pandemic response at the sub-national level using SORMAS. This study explored factors influencing collaboration for SORMAS in Anambra state: Sub-national spectrum. The study was carried out in Anambra State, Nigeria. The sixty primary respondents were the surveillance actors who are directly involved in the use of SORMAS for disease surveillance. This study adopted a qualitative methodology. There were more female than male of 65.0% and 35.0% respectively, of the total respondents, 48.0% were within the age range >45 years was the highest while the least 6.6% of the respondents fall within the age range of <25 years.. 98% of the respondents highlighted that leadership and governance is a key factor for improvement of SORMAS. 99% of the respondents stated that sustainable collaboration and partnership at the sub-national level depend on three crucial elements: multisectoral intervention, inclusivity, and comprehensive supportive supervision. In order to have a health system that can withstand challenges and emergencies, effective leadership and governance that is well-coordinated, combined multiple sectors involvement and feedback mechanisms is crucial.

Keywords: Sub-national, surveillance, outbreak, response, collaboration

INTRODUCTION

Disease surveillance and response improve the flow of surveillance information to monitor disease spread and evaluate the effectiveness of control and preventive measures. Integrated Disease Surveillance and Response (IDSR) tool and Surveillance Outbreak Response Management and Analysis System (SORMAS) capture all the surveillance data on COVID-19 and other Vaccine prevented Diseases (VPD) in Nigeria (Akpa et al, 2022).

SORMAS is an open-source digital disease surveillance and outbreak management system designed to support public health authorities in detecting and controlling disease outbreaks. SORMAS was developed by the Helmholtz Centre for Infection Research (HZI) and the German Federal Ministry of Health in collaboration with other partners (Fähnrich et al., 2019).

SORMAS provides a range of features that help health authorities to monitor and respond to disease outbreaks in real-time. These include case and contact management,

data visualization and analysis, outbreak investigation tools, and communication and reporting capabilities. SORMAS can be used on mobile devices as well as desktop computers, making it a flexible and mobile tool for disease surveillance (Olaleye et al., 2018).

SORMAS has been used in a number of countries to support disease surveillance and outbreak response, including in Nigeria during the 2018 Lassa fever outbreak and in Germany during the COVID-19 pandemic. The system is designed to be adaptable to different public health contexts and can be customized to suit the needs of individual countries and regions (Kostkova et al., 2020).

COVID-19 (Coronavirus disease 2019) is a viral illness caused by the SARS-CoV-2 virus that emerged in Wuhan, China, in December 2019. It is a respiratory illness that can range from mild to severe, and it primarily spreads through respiratory droplets when an infected person talks, coughs, or sneezes (WHO 2021). COVID-19 has had a significant impact on global health and the economy, with many countries experiencing widespread outbreaks and implementing measures such as lockdowns and travel restrictions to slow the spread of the virus. The pandemic is ongoing, and its full effects on society and the global economy are still not fully understood. Globally, The Corona virus (COVID-19) pandemic has led to a dramatic loss of human lives worldwide and presents an unprecedented challenge to public health, food systems and the entire economic sector. The economic and social disruption caused by the pandemic is devastating. Tens of millions of people are at risk of falling into extreme poverty (WHO, 2020).

Millions of enterprises faced an existential threat and are at risk of losing their livelihoods. Informal economy workers are particularly vulnerable because the majority lack social protection and access to quality health care and have lost access to productive assets, without the means to earn an income during lockdown (UNDP, 2020).

The International Health Regulations (IHR) Emergency Committee of the World Health Organization (WHO) advised that all nations should take necessary measures to prevent and control the spread of COVID-19, including active surveillance, early detection, isolation and case management, contact tracing, and prevention of onward transmission of the virus. High-risk individuals should receive mandatory vaccinations, and countries must be willing to share complete data with the organization (Booking, 2020). Integrated Disease Surveillance and Response (IDSR) tool and Surveillance Outbreak Response Management and Analysis System (SORMAS) capture all the surveillance data on COVID-19 and other Vaccine prevented Diseases (VPD) in Nigeria (Akpa et al., 2022). Disease surveillance is critical in helping countries monitor and evaluate emerging patterns and disease trends.

The Nigeria government has implemented several measures to control the spread of COVID-19 virus in the country. These include social distancing, constant washing of hands, mandatory wearing of face mask, lockdown and restricted movement. In the hospitals, the government has ensured provision of personal protective equipment (PPE) for health workers, establishment of isolation wards equipped for treatment of COVID-19 patients, establishment of Polymerase chain reaction (PCR) laboratories for prompt diagnosis and creation of various disease infection prevention and control committees in the hospitals. These committees are responsible for setting up local guidelines concerning COVID-19 diagnosis, isolation of patients, treatment, prophylaxis and providing epidemiological statistics to Nigeria Centre for Disease Control (NCDC). The impact of lockdown made several agencies to shutdown including the national orientation camps.

NCDC being the national coordinating body for disease and pandemic response in Nigeria, provided support to the NYSC which led to the safe re-opening of orientation camps across the country after the outbreak of COVID-19 pandemic. The measures adopted before camps re-opening included effective guidelines on national orientation camp activities, webinar interaction with prospective members on COVID-19 preventive measures, formation of COVID-19 vanguards within the camp environment, deployment of Infection Prevention and Control (IPC) measures, formation of surveillance teams, mandatory Rapid Diagnostic Tool (RDT) screening for all camp participants, and later vaccination for Youths corps members. (NCDC, 2020). The commencement of the orientation camp involves several activities, such as arranging interactive sessions, offering guidance, designating COVID-19 advocates, implementing infection prevention and control measures, establishing a monitoring team, and conducting rapid diagnostic tests.

To ensure continued COVID-19 response, the NYSC has assigned young corps members to work alongside Local Government Area (LGA) Disease Surveillance and Notification Officers (DSNO) in their offices. Their primary role is to enhance surveillance activities using the Surveillance Outbreak Response Management and Analysis System (SORMAS), which enables real-time case tracking. With SORMAS, health departments can be quickly notified of new cases of diseases that are prone to epidemics, and outbreaks can be detected and managed simultaneously. SORMAS is a management tool that assists supervisors in verifying cases and preventing disease transmission (Gidado, 2021).

This study seeks to explore the factors influencing collaboration for SORMAS amongst sub-national actors in disease surveillance and emergency preparedness in Anambra state, Nigeria.

METHODS

Study Area

This study was carried out in July, 2021 in Anambra State. Anambra situates in the south-eastern region of Nigeria, with a population of over 4 million residents (NPC), with Awka as its capital. There is one Orientation camp in

Anambra state, located at Umuawulu in Awka South LGA; under the leadership of the State Coordinator and other officials. SORMAS has also been deployed across the 21 LGAs including the orientation camp in the state.

Study participants

The primary respondents were the Youths corps members who supports surveillances activities and their mentors, Disease Surveillance and Notification Officers (DSNOs), State Epidemiologist and Directors of health at the LGA level. The inclusion criteria for selection of the respondents are their current position and involvement in disease surveillance and reporting including the post camp SORMAS activities of the NYSC in Anambra state.

Study design and study population

This research adopted a qualitative methodology. The qualitative features utilized Key Informant Interviews (KII) and Focus Group Discussions. We deployed Key Informant Interview (KII) and Focused Group Discussion (FGD) to provide a means to understand the resources or opportunities presented by collaboration and partnership that will enable the officials gain context specific perspectives.

The study population includes the following categories of critical actors at the sub-national and local levels:

1.Youth corps members and their supervisors: This group of respondents are the serving Corps member who supports surveillances activities and their mentors in their respective local government areas (LGAs) 21 respondents.

2.Local Government Area (LGA) stakeholders: Directors of health and Disease Surveillance and Notification Officers (DSNOs), (21 respondents).

3.State-level stakeholders: State epidemiologist, State Disease Surveillance Notification officer (SDSNO) and the officials of NYSC (partnering organization) (18 respondents).

Sample size determination and sampling

This study deployed a purposive sampling approach to select respondents for the key informant interviews and the focus group discussions. Sixty (60) respondents which include Youth corps members involved in SORMAS surveillance activities, state epidemiologist, Disease Surveillance and Notification Officers, directors of health per senatorial zone and NYSC officials were selected. The purposive sampling technique was aimed at ensuring that all research participants are well-suited to discuss and offer valuable insights to address the study's objectives.

Key Informant Interview (KII)

A total of sixty (60) KIIs with critical state actors and stakeholders in Anambra state included Youth corps members, State Epidemiologist, SDSNOs and LGA DSNOs was conducted.

Focused Group Discussions (FGD)

Two Focus Group Discussions (FGDs) of 10 respondents each, were carried out with DSNOs and NYSC officials, which included the State Coordinator, Zonal Inspectors (ZI), Local Government Area (LGA) Inspectors (LIs), and Schedule Officers.

Development of Instruments: Interview Guides and Survey Questionnaires

The tools for this study were developed based on the study objectives and expected outcomes. A section of the questionnaire described socio demographic distributions while the other section highlighted factors influencing collaboration for SORMAS at the sub-national level. The guides were developed to capture contextual issues related to sub-national collaboration on Surveillance Outbreak Response Management Analysis System (SORMAS) in Anambra state.

Data collection methods

Five data collectors familiar with the subject matter and context were trained on survey questionnaire use, research ethics, and electronic data collection. Pre and post test scores were used to select the best four data collectors for this engagement. They were considered because they demonstrated capacity and the requisite skills to deliver on this engagement. They possessed skills to manage stakeholders and also have understanding of terrain in the state.

The interview guide was developed and coded into electronic data collection form. Data collectors were hired to administer the survey after being pilot tested.

The data collectors were deployed into two teams to administer the questionnaire. Each study team, on arrival at the respective LGAs, paid a courtesy visit to the LGA DSNO, who had been informed of the study and administered the LGA level questionnaires. In consultation with the DSNO in each LGA, the contact details of the Youth corps members was provided, and was contacted for interviews. FGD was also conducted with officials of the National Youths Service Corps (NYSC) to elicit information on sub-national collaboration for SORMAS.

Data analysis

Qualitative data were transcribed verbatim and cleaned in preparation for data analysis. A data analysis framework was developed based on survey questions, and thematic area content analysis was conducted to draw out patterns and recurrent issues using Statistical Package for Social Sciences (IBM-SPSS) for Microsoft Window version 21.0

Table 1. Socio-demographic characteristics of respondents

Parameters	Frequency (N = 60)	Respondents Percentage (%)
Gender		
Female	39	65.0%
Male	21	35.0%
Total	**60**	**100.0%**
Age Group (years)		
<25	4	6.6%
25-34	17	28.4%
35-44	10	16.6%
>45	29	48.4%
Total	**60**	**100.0%**
Profession		
Corps Members	21	35.0%
NYSC Staff	12	20.0%
Directors of Health	3	5.0%
DSNOs/State Epidemiologist	24	40.0%
Total	**60**	**100.0%**
Educational Level		
Bachelor	35	59.0%
Masters	14	23.0%
Doctorate	11	18.0%
Total	**60**	**100.0%**

software.

a.Cleaning and collating the data in readiness for analysis. Members of the data analysis team also read the data in its entirety to allow each team member to familiarize themselves with the data.

b.Domains were identified from the research questions to form the initial framework for analysis. A constellation of sentences or paragraphs containing aspects related to each other and those answering the questions set out in the study objectives were also identified.

c.For each domain, a detailed analysis/write-up of each domain was done to determine the "story," i.e., establish a sequence of events and identify related areas in the data set.

d.This final phase involved combining narrative and data findings and contextualizing the analysis with the existing literature.

RESULTS

Socio-demographic characteristics of respondents

The study analyzed a total of 60 questionnaires, as all respondents returned their KII questionnaires in full. Table 1 shows the socio-demograhic characteristics of the respondents. There were more female than male of 65% and 35% respectively, 48% of the respondents were within the age range > 45 years was the highest while the least 6.6% of the respondents fall within the age range of <25 years. 59.0% of the respondents had bachelor degree, 23.0% master degree while 18.0% had doctorate degree as their highest educational qualification.

FINDINGS

The outcome of the survey shows that there is need for effective coordination on disease surveillance through multi-sectoral collaboration, reporting and feedback mechanism amongst stakeholders at sub-national level. The respondents identified leadership and governance, one health approach, monitoring and supervision as critical factors influencing collaboration for SORMAS at the sub-national level.

Leadership and Governance

98% of the respondents highlighted that leadership and governance is a key factor for improvement of SORMAS and surveillance activities. Leadership and governance are also one of the health systems building blocks.

Effective leadership and governance will be crucial in enhancing collaboration for SORMAS and surveillance activities. KII respondents.

"Sometimes we report our challenges to our supervisors but we hardly get feedback. We expect that our leaders should be of help and available to help us'' - KII respondent.

''Our main challenge is data for internet. We need data from government or development partners'' FGD respondent

One Health Approach

99% of the respondents indicated that multi-sectoral involvement is an essential factor for collaboration for SORMAS at the sub-national level. Inclusiveness and trans-disciplinary approach with the goal of achieving optimal health outcomes recognizing the interconnection between

people, animals, plants, and their shared environment is a critical factor for collaboration of SORMAS at the sub-national level.

"We need other line ministries and private sector to support us on SORMAS. We can't do it alone. Health is every bodies business" - KII respondent.

Our Corps members are posted to all the LGAs, there is no community that you will not see them in teaching in their schools. We deploy our Corps members to both rural and urban areas. - FGD respondent.

Monitoring and Supervision

98% of the respondents agreed that monitoring and supervision is critical factor that influences collaboration for SORMAS.

"We believe that we can improve surveillance if we have routine supportive supervision. SORMAS is a new technology and it is evolving, so we need updates as its being generated. Each version of SORMAS comes with an improve interface, so we need supportive supervision". - KII respondent

96% of the respondents pointed out that it improves the knowledge gap of health workers, through training, supervision, and on-the-job training. Immediate notifications and actions were taken on diseases and conditions of public health concerns at the grassroots level.

Effective monitoring and supervision play a crucial role in managing and enhancing collaboration and partnerships at the sub-national level. - KII respondents

SORMAS improves d the disease surveillance system, increase the flow of data, and improve the early detection and investigation of diseases and conditions of public health concerns. - FGD respondents

Major achievements of SORMAS in Nigeria

97% of the respondents said; it helped in the instant notification of cases that led to the investigation and appropriate public health interventions. 93% of the respondents claimed, it brought line managers closer to surveillance happening at the peripheral level. 99% of the respondents agreed that major achievements included the illustration of how mobile technology can be used to report alerts of SORMAS cases, data collection can occur at facilities and be readily available at all level, and dashboards for the ministry of health. It can be used to show data in real-time, and alerts can be generated to inform the leadership of potential disease outbreaks. 94% of the respondents said that surveillance data will be easily accessed with SORMAS than the traditional method of reporting.

Data reported through the traditional system can be altered along the channel of reporting due to manual compilation. - KII respondent.

It has contributed a lot in identifying and reporting priority diseases and other conditions of public health concern to the responsible authorities, for prompt intervention. FGD respondent.

According to the respondents, their perception of the results of using SORMAS is that it has enhanced timely reporting and eliminated the occurrence of missing reports, in relation to the level of effort invested in the system.

SORMAS saves our time and put full stop to missing reports. – KII respondents

SORMAS ensures that the Local Government Area (LGA) and state are notified promptly about diseases that require immediate reporting.

The system prompted me to verify cases from sources before sending them to a higher level for action. - KII respondents.

The system helped me to participate more actively in surveillance activities in my LGA. - KII respondents.

DISCUSSION

Effects of Leadership and Governance on SORMAS

The respondents highlighted that leadership and governance will be a key factor for improving collaboration for SORMAS and surveillance activities. Leadership and governance are one of the building blocks health systems, therefore, sub-national actors building on the existing governance structure to ensure coordination and partnership is essential. This is in alignment with Allen et al. (2021) and colleagues, in their publications that key challenges of national health systems were country leadership, contextual evidence and information-sharing, dependence on external funding that impede funding and coordination. They further stated that, countries that tailor and adapt programs to suit their governance processes and meet their specific needs and capacities are better able to achieve sustainability. This implies that quality leadership and governance require synergy and progressive partnership to deploy SORMAS and disease surveillance at all levels. The officers of NYSC, DSNOs, Directors of health and data clerk and liaison officers are building synergy by organizing Corps members so that they would work together, properly and support disease surveillance and reporting using SORMAS at the community, districts and state levels.

Effects of One Health Approach on using SORMAS for surveillance

The responses shows that there is limited inclusiveness and multisectoral, and trans-disciplinary approach at the sub-national levels to support collaboration. The goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment. This is in agreement with Machalaba and colleagues (2021) stating that multidisciplinary and multisectoral approaches such as One Health and related concepts offer opportunities for synergistic expertise to

address complex health threats. The connections between humans, animals, and the environment necessitate collaboration among sectors to comprehensively understand and reduce risks and consequences on health and wellbeing. One Health approaches are increasingly emphasized for national and international plans and strategies related to zoonotic diseases, food safety, antimicrobial resistance, and climate change, but to date, the possible applications in clinical practice and benefits impacting human health are largely missing (Machalaba et al., 2021).

Effects of Monitoring and Supervision on SORMAS and surveillance activities

Respondents agreed that monitoring and supervision are critical in the management and improvement of collaboration and partnership at the sub-national level. This is in line with Hosseinpoor et al. (2018), who argued that capacity building for health inequality monitoring among countries is a critical step for strengthening equity-oriented national health information systems and eventually tackling health inequities. However, the Corps members have been submitting monthly reports to the DSNOs, put the data clerk and local government inspector in copy, for review and assessment of quality, performance and feedback. Providing feedback requires comprehensive understanding of databases, personnel and materials that are organized to collect data which are utilized for informed decision making for development (Lar et al., 2013). SORMAS has contributed to the strengthening of the public health system in Nigeria by providing a platform for capacity building, data analysis, and monitoring and evaluation of public health programs (Akande-Sholabi et al., 2019).

The results of our pilot showed that there was an improvement in the level of supportive supervision to the operational level. This is in agreement with previous studies have stated that, and this finding aligns with their results that SORMAS provides a platform for easy communication between healthcare workers and public health authorities. This allows for quick sharing of information on suspected cases of disease and facilitates more efficient and effective outbreak response (Schaumburg et al., 2020). The use of SORMAS for the supervision might have contributed to the improvement because each site visited was recorded and transmitted in real-time to higher levels (Olu et al., 2018). The importance of supportive supervision cannot be overemphasized, as this is the basic element for the improvement of work performance through watching, directing, and guiding what the individual is doing or how a task should be done (Oladeji et al., 2020). The ultimate aim of supervision is to sustain good quality services, identify problems, decide what has caused a problem, and develop feasible solutions. The additional training for the supervisors might have contributed to improving their work performance and commitment (Kieny et al., 2018).

Achievements of SORMAS on surveillance:

Respondents indicate that SORMAS helped increase disease reporting activity in the LGAs where it was piloted. SORMAS also helped to increase the number of disease surveillance reports received. Respondents report that SORMAS helped them report and analyze disease data faster. Results reveal that most of the respondents indicate that helped them improve data interpretation and response to disease outbreaks. This is in agreement with previous studies which stated that SORMAS provides a range of analytical tools that can be used to identify patterns and trends in disease data. This enables public health authorities to quickly identify and respond to outbreaks (Olayinka et al., 2019). SORMAS provides a platform for monitoring and tracking disease reporting compliance, enabling public health authorities to identify areas where reporting may be lagging and to take appropriate measures to improve reporting rates (Fall et al., 2018). SORMAS can increase disease surveillance reporting by providing a standardized, efficient and effective digital platform for real-time data collection, communication, analysis and compliance monitoring

Respondents indicate that disease surveillance activities are better in Anambra State, where the DSNOs program was piloted than in other LGAs in Anambra State. Majority of the respondents agreed that they prefer the use of SORMAS over the use of paper tools for data entry. Respondents indicate that SORMAS has helped improve disease surveillance by ensuring timely notification and enabling real time analysis of the data received. This is in agreement with the previous study that stated SORMAS allows for real-time data collection by enabling healthcare workers to quickly and accurately report suspected cases of disease to public health authorities. This means that data is available for analysis and response in a timely manner (Niedrig et al, 2019). They also reported that the use of SORMAS has reduced the possibility of making mistakes or omitting information during the data entry process, data can be analyzed easier and respondents do not need to spend their money-making photocopies. Some respondents however still use the paper SORMAS tools for archiving purposes or compliance with mandatory paper documentation. The results of this study are consistent with what has been previously reported in the literature which stated that SORMAS also provides standardized data collection forms, reducing the chance of errors and inconsistencies in data reporting. This ensures that data is accurate, complete and can be analyzed more efficiently (Otu et al., 2016).

Policy implication

This study provided evidence on factors influencing collaboration for Surveillance Outbreak Response Management and Analysis System (SORMAS) on COVID-19 pandemic in Anambra state. It is expected that government

and stakeholders will leverage on the recommendation to develop policies that will promote collaboration amongst players at the sub-national level.

Recommendation

Sub-national actors should ensure collaboration at the local and sub-national levels to promote emergency preparedness and pandemic response.

Collaboration of NCDC, the national coordinating body for disease and pandemic response in Nigeria and NYSC should leverage on the local resources to improve on and expand disease surveillance, hence, quick detection and reporting of events of public health concern can make a whole world of difference in the country's response to and managing of disease outbreaks.

Leadership and governance should be institutionalized at the sub-national level to promote resilient health system and health security.

Sub-national actors should build the capacity of local responders to sustain health system strengthening for emergency preparedness.

The activities of NYSC should be sustained and re-positioned to contribute to the country's public health architecture by leveraging on the distribution of Corps members of different disciplines, capabilities and abilities across the country.

CONCLUSION

Resilient health systems require coordination, leadership, and effective governance. To bolster emergency preparedness, it is important to enhance the commitment of sub-national actors to collaborate across sectors and form partnerships. In order to leverage the diverse capabilities and abilities of stakeholders throughout different localities, actors should maintain their engagement with critical partners.

Declaration

We hereby declare that there is no conflict of interest amongst the authors. We have unity of purpose in this research work and have demonstrated commitments.

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Ethics approval and consent to participate

Ethical clearance for this study was obtained from the Research and Ethics Committee of Anambra State Ministry of Health, Awka. Written informed consent was obtained and confidentiality ensured.

Competing interests

The authors declare that they do not have any conflicts of interest.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Authors' contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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