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Using SORMAS Data to Understand the Attributable Fraction of COVID-19 in Nigeria

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Abstract **Original Research Article**

Public Health Emergency Operation Centers are established to coordinate COVID-19 disease and other public health threats. Surveillance is pivotal in enabling countries to monitor disease patterns and trends, and the use of a Surveillance Outbreak Response Management and analysis system (SORMAS) helps with real-time cases. SORMAS users can notify health departments about new cases of epidemic-prone diseases, detect outbreaks, and simultaneously manage outbreaks. SORMAS is a management process system that supports supervisors to validate cases and control the spread of disease. These SORMAS features enable data analysis for stakeholders, local responders, and policymakers to analyze disease data and make informed decisions for efficient and effective responses. This paper examined national data on COVID-19. We computed the proportion of patients with COVID-19 disease in Nigeria and the 95% confidence interval (CI) for the COVID-19 attributable fraction. This study shows that the proportion of patients who had COVID-19 lies between 6.35% and 6.39%. The SORMAS platform has increased Nigeria's capacity for accurate and timely data reporting and response.

Keywords: COVID-19, 95% Confidence interval, SORMAS data, attributable fraction, FMOH.

INTRODUCTION

The Federal Ministry of Health (FMOH) has developed programs for eliminating, eradicating, preventing, and controlling communicable diseases. Notably, the Nigeria Centre for Disease Control (NCDC) was established by Act in November 2018 as an agency of FMOH to lead the prevention, preparedness, detection, and response to communicable diseases.

Disease surveillance is critical in helping countries monitor and evaluate emerging patterns and disease trends. The resultant effect of poor surveillance systems in countries is poor control measures which result in high mortality, morbidity, and disability. The Integrated Disease Surveillance and Response (IDSR) was adopted to integrate multiple surveillance systems to use human and other resources more efficiently and effectively. Capacities have also been built across all the levels to detect, confirm and respond to public health threats to improve health security in Nigeria.

Surveillance Outbreak Response Management and Analysis System (SORMAS) is an electronic tool of IDSR. It is an open-source mobile and web application software to notify new cases of epidemic-prone diseases, detect outbreaks, and simultaneously manage outbreak response. Surveillance data are captured and stored on SORMAS. However, healthcare workers and policymakers need to understand how to analyze and interpret SORMAS data for effective and efficient disease response and emergency preparedness to promote a resilient health system. This paper aims to evaluate the proportion of patients with COVID-19 disease and the 95% confidence interval (CI) for the COVID-19 attributable fraction in Nigeria. The primary data was generated from NCDC reported data.

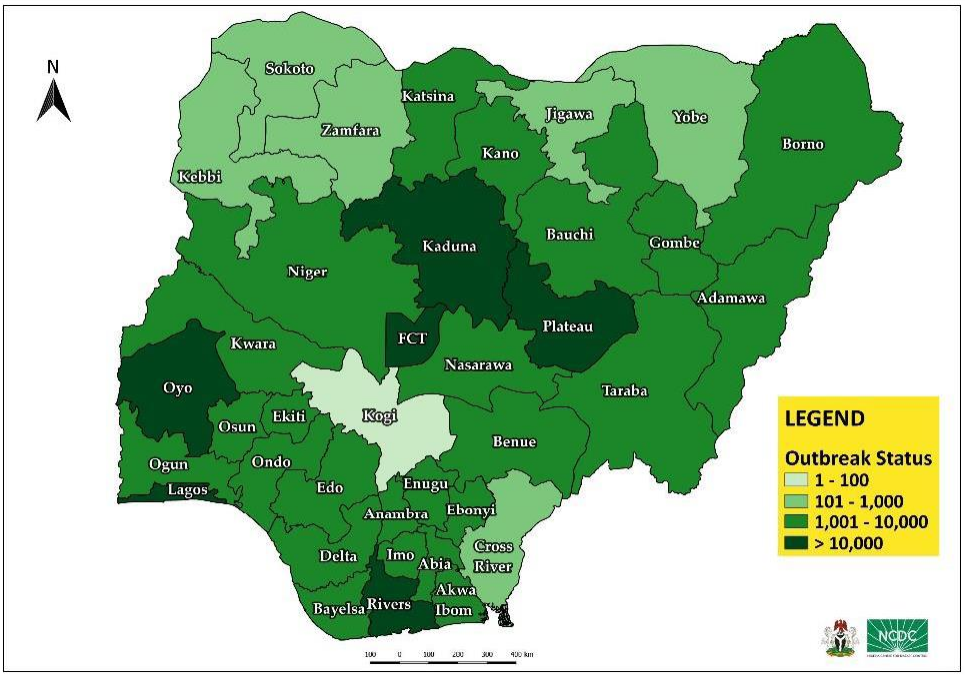

Fig-1: Distribution of cumulative cases as at Epi Week 1, 2022

METHODS

In Statistics, a confidence interval is a kind of interval calculation, obtained from the observed data that holds the actual value of the unknown parameter. It is associated with the confidence level that quantifies the confidence level in which the interval estimates the deterministic parameter. Also, we can say, it is based on Standard Normal Distribution, where Z value is the z-score.

The confidence level represents the proportion (frequency) of acceptable confidence intervals that contain the true value of the unknown parameter. In other terms, the confidence intervals are evaluated using the given confidence level from an endless number of independent samples. So that the proportion of the range contains the true value of the parameter that will be equal to the confidence level.

Mostly, the confidence level is selected before examining the data. The commonly used confidence level is 95% confidence level. However, other confidence levels are also used, such as 90% and 99% confidence levels.

$$The\ 95\%\ CI = \hat{p} \pm Z_{\left(1-\frac{\alpha}{2}\right)}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

RESULTS AND DISCUSSION

In Week 01 of 2022, the number of new confirmed cases decreased to 4,862 (8.5%) from 5,889 (10.4%) reported in week 52 of 2021. These were reported in 30 states and FCT.

Table-1: COVID 19 Statistics

No of Samples Tested	No of Confirmed Cases	No of Active Cases	No Discharged	Number of Death
3,933,209	250,628	23,768	223,765	3,095

As of Monday, 8:00 am 17th January 2022, 3,933,209 samples have been tested, and 250628 cases have been confirmed positive to COVID-19; 223,765 cases have been discharged.

The number of active cases was 23,768, and 3095 deaths have been recorded in 36 states and the Federal Capital Territory. The proportion of patients who tested positive to COVID-19 among the samples tested was 0.0637 (6.37%). Kogi state has recorded two deaths, the least number of deaths due to COVID-19 amongst the 36 + 1 states in Nigeria, followed by Zamfara and Yobe states with nine deaths each. Lagos State has recorded 761 deaths, followed by Edo State with 314 deaths, and the federal capital territory (FCT) with 241 deaths. The average number of death per state for covid-19 is 83.6 deaths.

$$The\ 95\%\ CI = \hat{p} \pm Z_{\left(1-\frac{\alpha}{2}\right)}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$= 0.0637 \pm 1.96\sqrt{\frac{0.0637 * 0.9363}{3933209}} = 0.0635 \leq \hat{p} \leq 0.0639$$

The 95% confidence interval was computed for the COVID- 19 attributable fraction. We are 95% confident that the proportion of patients who had COVID-19 lies between 6.35% and 6.39%

CONCLUSION

NCDC has demonstrated capacity for disease outbreak response management. This is evident in terms of data capturing using Case Investigation Forms (CIFs), data reporting using SORMAS platform, and disease response using the Rapid Response Team (RRT), with a well-established Public Health Emergency Operation Centre (PHEOC). All the stakeholders should support NCDC by bringing in context-oriented ideas to promote health security.

RECOMMENDATIONS

All stakeholders should understand COVID-19 data and other health service data in their context to promote broader perspectives on disease response.

Data analysis, interpretation, and feedback mechanisms should be encouraged at all levels to ensure a resilient health system. Collaboration should be strengthened amongst actors at various levels to ensure emergency preparedness and health security. Risk communication should be contextualized and targeted especially to the non-health sector domain.

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