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An Analysis of COVID-19 Statistics in Rivers State, Nigeria: A Study of Demographic Patterns, Geographic Distribution, and Prevalent Symptoms from April 2020 to March 2021

Modupeoluwa Omotunde Soroye [a,b*], Golden Owhonda [c], Ifeoma Nwadiuto [d], Tonye Livingstone [d], Soter Ameh [e], Best Ordinioha [a] and Patricia Adetokunbo Akeredolu [f]

[a] School of Public Health, College of Health Sciences, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria.
[b] Department of Community Dentistry and Periodontology, Faculty of Dentistry, University of Port Harcourt, Rivers State, Nigeria.
[c] Department of Epidemiology, Ministry of Health, Port Harcourt, Rivers State, Nigeria.
[d] Department of Public Health, Ministry of Health, Port Harcourt, Rivers State, Nigeria.
[e] Department of Epidemiology, University of Calabar, Cross-River State, Nigeria.
[f] Department of Restorative Dentistry, Faculty of Dental Sciences, University of Lagos, Lagos State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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**Corresponding author: E-mail: docdupe@yahoo.com;*

ABSTRACT

Introduction: Coronavirus disease (COVID-19) is an acute infectious disease caused by the SARS-CoV-2 virus which is characterized mainly by fever and cough and is capable of progressing to severe symptoms and in some cases death.
Aims: To analyze COVID-19 statistics in Rivers State, Nigeria, during the specified period to contribute to the broader understanding of the epidemiology of COVID-19 in the region.
Methodology:
Study Design: A cross-sectional study was conducted involving the retrieval of secondary data.
Place and Duration of Study: The study was carried out at the Epidemiology Division of the Rivers State Department of Public Health, Ministry of Health, in December 2022.
Participants: A total of 6,299 patients recorded between April 2020 to March 2021 in the Epidemiology Unit were included in the study. Patients with incomplete data were excluded from the analysis.
Data Collection and Analysis: Secondary data recorded in Excel format was retrieved from the Epidemiology Unit of the Rivers State Ministry of Health. The data was then exported to IBM Statistical Product and Service Solutions (SPSS) version 25 for analysis. Frequencies were generated and reported in tabular format.
Ethical Considerations: Ethical approval for the study was obtained from the Ethics Committee of the State Ministry of Health Board, Port Harcourt, ensuring compliance with ethical standards in research and the University of Port Harcourt Ethics Committee to the State Hospital Board.
Results: The mortality rate stood at 1.4%. Port Harcourt Local Government Area (LGA) accounted for approximately two-thirds of all infections, while nearly one-third originated from Obio/Akpor LGA. Among those infected, 17.4% reported a history of travel, while 1% had attended a burial before contracting the virus. Symptomatic presentation was prevalent, with four out of every five confirmed cases (76.9%) experiencing various symptoms, with sore throat emerging as a common presentation alongside fever and other symptoms.
Significant disparities were observed concerning the sex and age distribution of infections ($p < 0.0001$). Males were more affected than females, and individuals within the age groups of 31-40 and 41-50 constituted three-fifths of the total infections.
Conclusion: As the COVID-19 pandemic unfolded, a notable shift in infection rates emerged, highlighting a trend where younger demographics, notably women, became increasingly susceptible. Despite initial perceptions of heightened severity and mortality among older males, nuanced analysis revealed diverse vulnerabilities across gender and age spectrums. Occupational exposures, biological variations, and behavioural disparities all contributed to the observed gender discrepancies in infection rates and outcomes. Furthermore, the urban landscape, with its higher population density and increased mobility, served as a catalyst for the rapid spread of the virus, albeit impacting genders in differing proportions.
Moreover, the varied presentation of symptoms, with sore throat emerging as a prevalent feature alongside fever and other manifestations, underscores the necessity for tailored public health interventions.

Keywords: Common symptoms; COVID-19; demographics; geographic spread.

1. INTRODUCTION

The World Health Organization (WHO) declared the novel coronavirus outbreak in Wuhan, China, a global emergency on January 20, 2020 [1]. They acknowledged its potential to cause a pandemic worldwide on February 24, 2020, and declared the COVID-19 pandemic on March 11, 2020 [1] From a scientific standpoint, rarely has a single pathology required the mobilization of so much effort and resources as COVID-19 [2]. Globally, as of January 9, 2023, 20.5 million cases of COVID-19 had been confirmed worldwide, and 182,000 deaths were reported to the World Health Organization [1]. In addition, a total of 5.51 billion people worldwide have had a dose of a COVID-19 vaccine (71.8% of the world population [3,4]. In Africa as of January 9, 2023, there were 12, 216,748 confirmed cases, 256,542 deaths, and 801 million vaccine doses were administered with 25.6% of Africans fully vaccinated [2,4-6]. The COVID-19 infection was first reported in Nigeria on February 27, 2020 and as of January 9, 2023, there were 266,463

confirmed cases, 3155 deaths and 28.1% of the population fully vaccinated [4,7-11].

By April 21, 2020, the race to develop the COVID-19 vaccine started and by May 10, 2022, more than 5.16 billion (67.2%) people worldwide have been reported to have received at least a dose of the COVID-19 vaccine.[12] By that time in Nigeria, less than 35% of the population had taken at least one dose of the COVID-19 vaccine and only 7.4% had been fully vaccinated [12].

Despite the devastating effects of the COVID-19 pandemic on many countries all over the world, the impact in some parts of Africa was less [2,13]. The pandemic effects in the African continent, Nigeria inclusive, had not been as devastating as in other continents despite the prediction that it would be the most vulnerable and worst affected continent [13-17]. Thus, many public health experts were puzzled because Africa reported fewer cases and deaths from COVID-19 than predicted [13]. Furthermore, most of the identified cases of COVID-19 in Africa were imported from Europe and the United States, rather than from the original COVID-19 epicenter China [18].

Since the rapidly evolving COVID-19 pandemic placed a heavy burden on healthcare systems, it was projected that the pandemic would be worse in low- and- middle-income countries (LMICs) because of weak healthcare systems, scarce financial resources, inadequate protective equipment, poor testing and treatment capacities, and lack of research funding [19]. However, this was not been the case as the mortality rate was low in the LMICs.

Men seem to exhibit a heightened susceptibility to COVID-19, possibly due to a less robust immune response, leading to more severe clinical outcomes and an increased risk of thromboembolism. Among the elderly, who often experience inflammation, sex disparities in mortality rates following SARS-CoV-2 infection become more pronounced. Elderly men, in particular, appear to be at a greater risk of severe COVID-19 due to factors such as increased susceptibility to infections, diminished immune defense, and a heightened thrombotic state compared to women [20].

There is a paucity of data in South-South on the pattern and presentation of COVID-19 cases in Rivers State. Moreso, what is the demographic of those infected in Rivers State between April 2020 to March 2021, where was the disease concentrated and how did it present? This study answered these questions.

2. METHODOLOGY

This is a retrospective cross-sectional study involving the retrieval of secondary data. This study is a report of the COVID-19 cases during the peak period (April 2020 to March 2021) of the pandemic in Rivers State, Nigeria. The secondary data was retrieved from the Epidemiology Division of the Department of Public Health Services, Rivers State Ministry of Health, in December 2022.

Data was entered on Microsoft Excel 2010 (Microsoft Corp, Washington, USA) and analyzed with the Statistical Product and Service Solutions (SPSS) version 25 (IBM, Armonk, New York, USA). Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the data. The association between participants' characteristics was analyzed using the chi-square test. Results were presented in tables.

The inclusion criteria were the complete secondary data of those identified, diagnosed, monitored, and managed for COVID-19 between April 2020 to March 2021 while the exclusion criteria were incomplete data.

3. RESULTS

Table 1 shows the demographics of the patients who had COVID-19 in Rivers State. Of the seven thousand and thirty-eight data (7083) patients, only six thousand, two hundred and ninety-nine (6299) had complete data. More males were infected than females with a M: F of 3:1. 57% of those infected were in the fifth and sixth age group and 70.8% had at least a post-secondary education. Three-fifths were diagnosed at home and 85.8% were diagnosed at the Rivers State University Teaching Hospital (RSUTH) COVID-19 center. COVID-19 mortality in Rivers State was 1.4%.

Table 2 shows that 1 out of 3 men who were infected were in the 31-40 age group and 3 out of 10 men were in the 41-50 age group, while for women, 1 out of 5 and 1 out of 4 women who were infected were in the 21-30 and 31-40 age groups respectively. The association between age and sex was statistically significant.

Table 1. Demographics of those infected with COVID-19 between April 2020 to March 2021

Variables	Frequency	Percentage
Gender		
Male	4817	76.5
Female	1482	23.5
Age group		
1-10	96	1.5
11-20	515	8.2
21-30	907	14.4
31-40	2060	32.7
41-50	1655	26.3
51-60	738	11.7
61-70	237	3.8
71-80	68	1.1
81-90	21	0.3
>90	2	0.0
Education		
No formal	1296	20.6
Nursery	18	0.3
Primary	289	4.6
Secondary	236	3.7
Post-secondary	3330	52.9
Tertiary	1130	17.9
Diagnostic Centers		
Rivers State University Teaching Hospital (RSUTH)	964	13.9
The University of Port Harcourt Teaching Hospital (UPTH)	344	4.9
Other health facilities	1575	22.7
Home	4070	58.5
Hospitalization		
Yes	1395	22.1
No	4904	77.9
Laboratory centers		
Rivers State University Teaching Hospital (RSUTH)	5403	85.8
The University of Port Harcourt Teaching Hospital (UPTH)	424	6.7
SPDC Molecular lab	218	3.5
INDORAMA Molecular lab	83	1.3
Other government-approved labs	171	2.7
Mortality		
Alive	6211	98.6
Dead	88	1.4
Total	**6299**	**100.0**

Mean age= 38.63±13.37 years, Median = 38 years, SEM = 0.17, V = 178.67

Table 2. Association between sex and age group of all infected with COVID-19 between April 2020 and March 2021

Variables Sex	Frequency Male	Percentage	Frequency Female	Percentage	Frequency Total	Percentage	*P*
Age groups (years)							**<0.001**
1-10	57	1.2	39	2.6	96	1.5	
11-20	267	5.5	248	16.7	515	8.2	
21-30	604	12.5	303	20.5	907	14.4	
31-40	1675	34.8	385	25.9	2060	32.7	
41-50	1412	29.3	243	16.4	1655	26.3	
51-60	578	12.0	160	10.8	738	11.7	
61-70	171	3.6	66	4.5	237	3.8	
71-80	42	0.9	26	1.8	68	1.1	
81-90	11	0.2	10	0.7	21	0.3	
>90	0	0.0	2	0.1	2	0.0	
Total	4817	100.0	1482	100.0	6299	100.0	

Table 3. Some signs and symptoms presented by those infected with COVID-19 between April 2020 to March 2021

Variables	Frequency	Percentage
Symptoms		
Yes	4843	76.9
Abdominal symptoms		
Yes	6	0.1
Dysphagia		
Yes	1976	31.4
Chest pain		
Yes	73	1.2
Chills/Sweats		
Yes	11	0.2
Confusion		
Yes	3	0.0
Dry cough		
Yes	1289	20.5
Cough + sputum		
Yes	391	6.2
Cough+ blood		
Yes	46	0.7
Fever		
Yes	604	9.6
Headache		
Yes	270	4.3
Bleeding gum		
Yes	1976	31.4
Joint pain		
Yes	7	0.1
Lung fluid (auscultation and x-rays)		
Yes	5	0.1
Malaise		
Yes	1976	31.4
Stiff neck		
Yes	61	1.0
Hematemesis		
Yes	77	1.2
Loss of appetite		
Yes	1976	31.4
Vomiting		
Yes	39	0.6
Conjunctivitis		
Yes	5	0.1
Acute respiratory syndrome		
Yes	16	0.3
Loss of taste		
Yes	5	0.1
Loss of smell		
Yes	378	6.0
Enlarged lymph nodes		
Yes	47	0.7
Wheezing		
Yes	37	0.6
Inability to walk		
Yes	36	0.6
Flail Chest		
Yes	36	0.6
Oxygen saturation less than 94		
Yes	1978	31.4
Total	**6229**	**100.0**

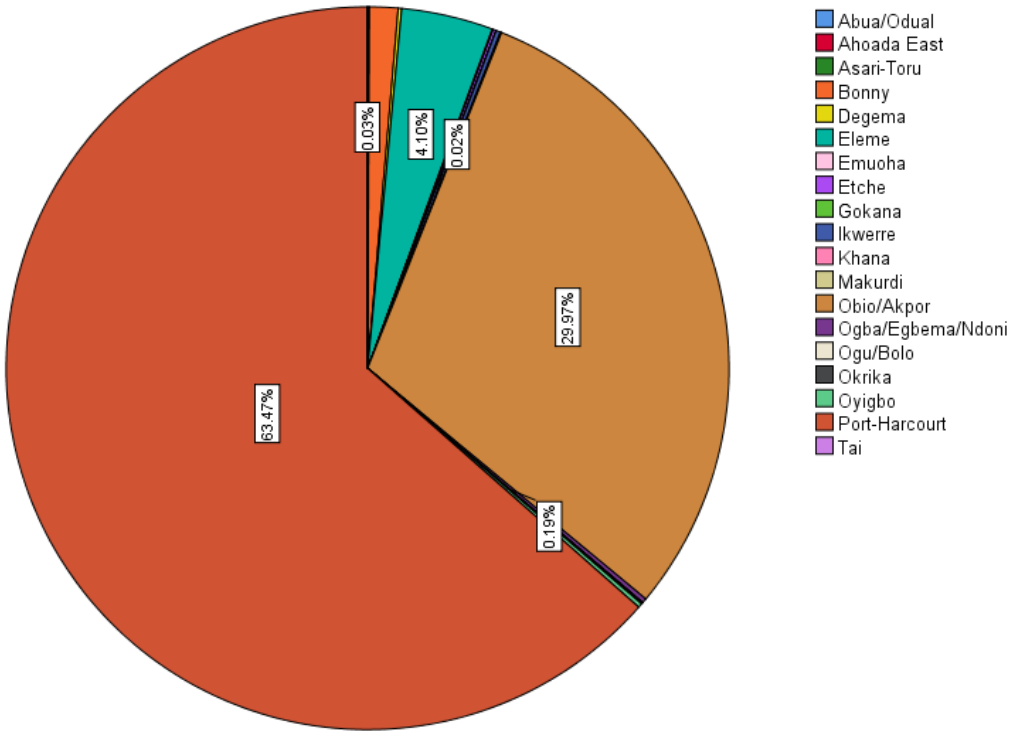

Fig. 1. Geographic spread of those infected with COVID-19 between April 2020 to March 2021

Fig. 1 shows the pie chart of the geographic distribution of those infected with COVID-19.

Table 3 shows some of the symptoms presented by those infected. 76.9% of the patients presented with at least one sign/symptom. One-fifth presented with dry cough, a tenth with fever, and a third with dysphagia, bleeding gum, malaise, and anorexia. 6% had amsonia.

4. DISCUSSION

It has been said that pandemics are not gender-neutral [21-23]. The demographics of those infected with COVID-19 changed as the pandemic progressed. There was a shift from the older age group to the younger ones. A study done in the United Kingdom reported an increase in excess hospital admissions since Aug 1, 2020, among women aged 20–40 years old.[24] Of the female patients admitted to the hospital, 49 (12·0%) were aged 21–30 years, versus 33 (8·1%) aged 41–50 years, and 35 (8·6%) aged 61–69 years. Of males admitted to the hospital, only 17 (3·7%) were in the 21–30 years age bracket [24]. Studies have shown that severe disease and mortality have been overall greater among males, aged>60 [25]. The one-year report of those infected with COVID-19 in Rivers State, Nigeria showed that of the women who were infected, 303 (20.5%) were aged 21–30 years, versus 243 (16.4%) aged 41–50 years, and 66 (4·5%) aged 61–70 years. As regards the males who were infected, 604 (12.5%) were in the 21–30 years age bracket.

The Rivers State COVID-19 report showed a mean age of 38.63±13.37 and that males were 3 times more infected than females. This could be attributed to the fact that many men are breadwinners and move around a lot, have lower rates of hand washing, and have underlying conditions [26]. This can also be due to the biological differences between the 2 sexes, as studies have shown that women have stronger immune systems than males [27]. Studies done in other parts of the world also reported male dominance [28-32]. A study that reported COVID data in 10 European countries observed that women diagnosed with COVID-19 outnumbered men while considering people of working age with a reversal in pattern around retirement [33]. It further reported that the infection rates of women in the age group 60-69 reduced and resulted in a cross-over with infection rates among men. Furthermore, the relative disadvantage of women peaked at ages 20-29, while those of men peaked at ages 70-79 [34]. The elevated infection rates among women of working age were attributed to the likelihood of

their higher share in health- and care-related occupations in prime working ages [35]. The same factors that determine women's higher life expectancy account for their lower fatality and higher male disadvantage at older ages [33].

Just like in other countries, most of those infected came from urban areas. COVID-19 started in the urban communities before spreading to the rural areas [34]. This can be attributed to their lifestyles and wealth. Many can afford to travel to other countries and in fact, some were trapped in those countries during the pandemic [35,36]. Also, urban areas are high-density areas with many recreation centers and clubs [37]. Thus, the ease of spread was rapid among them.

The Rivers State Covid data showed that 31.4% of those infected presented with a sore throat, bleeding gum, malaise, and loss of appetite. 9.6% presented with a fever. The commonest symptom presented in the state was sore throat. This compares to the study done in China by Guan et al that reported the same [38]. Other studies reported varying types of symptoms. A study done among 41 patients in China reported that 98% and 76% had fever and cough respectively [39]. Another study reported 26% fever and 17.4% sore throat among the participants [40]. Jin-jin Zhang et al reported 917% fever and 75% cough among participants [41].

5. CONCLUSION

The discourse on the impact of pandemics, particularly evident in the case of COVID-19, emphasizes its non-gender-neutral nature. As the pandemic evolved, demographic shifts in infection rates emerged, with younger age groups, particularly women, increasingly affected. Despite initial observations of higher severity and mortality among older males, nuanced patterns revealed varied vulnerabilities across genders and age brackets.

Factors such as occupational exposure, biological disparities, and behavioral differences contribute to the observed gender discrepancies in infection rates and outcomes. Additionally, urban settings, characterized by higher population density and increased mobility, facilitated the rapid spread of the virus, affecting both genders albeit with differing proportions.
Furthermore, the manifestation of symptoms varies, with sore throat emerging as a common presentation alongside fever and other symptoms. Such insights underscore the importance of tailored public health interventions considering gender-specific vulnerabilities and symptomatology.

As we continue to navigate the complexities of the pandemic, understanding these nuanced dynamics is crucial for devising effective strategies to mitigate its impact on diverse populations, ultimately fostering resilience and health equity across genders and demographics.

6. RECOMMENDATION

About 10% of the data collected during the COVID-19 pandemic in Rivers State between April 2020 and March 2021 was missing. Poor and incomplete data collection can lead to a loss of revenue and inaccurate decision-making so there is a need to put in place effective data collection tools and procedures

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CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The ethical approval was obtained from the Rivers State Ministry of Health Board's Ethics Committee and the University of Port Harcourt Ethics Committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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