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# Health Point Prevalence of Sars CoV-2 Antibodies Among Asymptomatic Subjects in Delta State

**[1]Tarurhor, Love Eguonor , [2]Prof Jemikalajah D. Johnson, [3]Prof Ehwarieme Ayobola D.**

1Email: tarurhoreguonor@gmail.com.
Phone No: +2348069415788.
2Email: jemikalajahjohnson@gmail.com.
Phone No: +2347032222372.
3Email: ayoboladaniel@gmail.com.
Phone No: +2347039507492

**[1, 2, ] Department of Medical Laboratory Science, Delta State University, Abraka**
**[3] Department of Microbiology, Delta State University, Abraka**

***ABSTRACT:*** ***Background:*** *SARS-CoV-2 seroprevalence studies provide critical insights into the true burden of infection, particularly in settings where diagnostic testing was limited. Delta State, Nigeria, reported substantial community transmission during the COVID-19 pandemic, yet the extent of asymptomatic infections has remained unclear.* ***Methods:*** *A cross-sectional study was conducted among asymptomatic, unvaccinated individuals attending healthcare facilities across three major locations—Warri, Ughelli, and Asaba—between January and December 2023. Ten millilitres of venous blood were collected from each participant (n = 154), and sera were analyzed for total SARS-CoV-2 antibodies using ELISA. Data were summarized using descriptive statistics, and associations between seropositivity and demographic variables were assessed using Chi-square tests ($p < 0.05$).* ***Results:*** *The overall seroprevalence of SARS-CoV-2 antibodies was 63.64%, indicating a high burden of past asymptomatic infection. Seropositivity varied across locations: Ughelli (75.47%), Warri (60.78%), and Asaba (54.00%). Age-specific distribution showed the highest seroprevalence among individuals aged 31–45 years (76.47%), while no positives were detected among participants ≥61 years. Gender distribution revealed seropositivity of 36.36% in males and 27.27% in females, though the association between age, gender, and antibody status was not statistically significant ($\chi^2 = 8.43$, $df = 4$, $p > 0.05$). Location-based variations were also statistically non-significant ($\chi^2 = 5.39$, $df = 2$, $p > 0.05$).* ***Conclusion:*** *The findings demonstrate a high prevalence of SARS-CoV-2 antibodies among asymptomatic individuals in Delta State, underscoring widespread undetected infections during the pandemic. Although demographic and geographical differences were observed, these were not statistically significant. The high seroprevalence highlights the importance of continuous surveillance and supports the need for strengthened public health preparedness in similar under-resourced settings.*

**Keywords:** Health point prevalence, SARS, CoV-2 antibodies, asymptomatic subjects, gender

## 1.0 Introduction

The coronavirus disease 2019 (COVID-19) pandemic, caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has posed an unprecedented global health challenge since its emergence in late 2019 (WHO, 2020). Characterized by a broad spectrum of clinical manifestations—from asymptomatic infection to severe respiratory distress and death—COVID-19 has significantly strained healthcare systems and disrupted socioeconomic structures worldwide (Guan et al., 2020; Tarurhor & Tarurhor, 2022).

SARS-CoV-2 is a highly transmissible RNA virus of the Coronaviridae family that spreads primarily through respiratory droplets and aerosols, with transmission possible even in asymptomatic individuals (He et al., 2020; Oran & Topol, 2020). Consequently, asymptomatic transmission has complicated containment efforts, particularly in resource-limited settings where widespread testing and contact tracing are constrained.

In response, serological testing for SARS-CoV-2-specific antibodies has emerged as a vital tool for evaluating the true extent of viral spread. These antibodies, produced following infection, serve as biomarkers of prior exposure—even in individuals who never exhibited symptoms (Long et al., 2020). Accordingly, measuring seroprevalence provides critical insights into the hidden burden of infection, especially in communities where diagnostic testing was limited or delayed during peak transmission periods (Gudbjartsson et al., 2020).

Seroprevalence studies are particularly important in under-resourced regions such as sub-Saharan Africa, where chronic underreporting, limited diagnostic capacity, and persistent healthcare inequities obscure the pandemic's actual impact. In line with this, recent investigations have emphasized the need for reliable regional data to inform evidence-based public health policies (Bobrovitz et al., 2021; Madhi et al., 2021; Rostami et al., 2021; Uyoga et al., 2021).

This study therefore aims to determine the health point prevalence of SARS-CoV-2 antibodies among asymptomatic, unvaccinated patients attending clinics in Delta State, Nigeria. Delta State, located in southern Nigeria, is characterized by heterogeneous population dynamics and a mix of urban and rural settlements (Deinne & Ajayi, 2018; Nwaki, 2022). By focusing on this diverse population, the research seeks to quantify undetected infections and provide evidence to guide targeted public health interventions in the region.

Building on the need to quantify the hidden burden of SARS-CoV-2 in under-resourced settings, this study employed a cross-sectional design to assess antibody prevalence among asymptomatic, unvaccinated individuals attending healthcare facilities in Delta State. Specifically, the investigation focused on three strategically selected locations—Warri, Ughelli, and Asaba—to capture the diversity of urban and rural populations within the state. In doing so, the study aimed to generate robust, regionally representative seroprevalence data capable of informing targeted public health interventions and guiding ongoing COVID-19 monitoring efforts in similar settings.

## 2.0 Materials and Methods

### 2.1 Ethical Considerations

The study was conducted in accordance with internationally accepted ethical standards for research involving human participants, as outlined in the Declaration of Helsinki. Ethical approval was obtained from the Delta State University Ethical Approval Committee. Informed consent was obtained from all participants prior to sample collection, and participants' confidentiality was maintained throughout the study.

### 2.2 Study Design and Participants

A cross-sectional design was employed to assess SARS-CoV-2 antibody prevalence among asymptomatic individuals from three geographic locations—Warri, Ughelli, and Asaba—representing the three senatorial districts of Delta State, Nigeria. Participant recruitment was carried out between January and December 2023.

Inclusion criteria comprised individuals aged 10 years and above who were asymptomatic, had not received COVID-19 vaccination, and had no history of COVID-19 infection or related medication. Exclusion criteria included individuals under 10 years of age, those exhibiting COVID-19 symptoms, those with a recent positive COVID-19 test, or those who had received any COVID-19 vaccination.

### 2.3 Sample Collection

A 10 mL blood sample was obtained from each participant using standard venipuncture techniques. Samples were immediately centrifuged to separate serum for analysis. To ensure accuracy and reliability, quality control measures were implemented at each stage, including the use of sterile, single-use equipment to prevent cross-contamination. Demographic data, including age and gender, were recorded alongside sample collection.

### 2.4 Antibody Detection

Total SARS-CoV-2 antibodies in serum were detected using enzyme-linked immunosorbent assay (ELISA) kits, following the manufacturer's protocol. The assay employed a mammalian cell-expressed double-antigen sandwich format with RBD-based recombinant antigens used as both capture and HRP-conjugated detection elements, consistent with previously established methodologies (Kubina and Dziedzic, 2020).

### 2.5 Statistical Analysis

Data were analyzed using SPSS version 20. Descriptive statistics summarized demographic variables such as age and gender using frequencies and percentages. Associations between categorical variables, including gender and COVID-19 seropositivity, were evaluated using the Chi-Square Test of Independence. Statistical significance was set at $p < 0.05$, and 95% confidence intervals were computed to assess the strength of associations, with a 5% margin of error.

## 3.0 Results

### 3.1 Distribution of Study Participants

A total of 154 participants were enrolled across three locations in Delta State: Warri (33.12%), Ughelli (34.41%), and Asaba (32.47%) The distribution of subjects across the study sites shows a relatively even representation from Warri, Ughelli, and Asaba. (Table 1).

**Table 1. Distribution of Study Participants Across the Three Study Sites in Delta State**

| STUDY AREA | NUMBER TESTED (N) | PERCENTAGE (%) |
|---|---|---|
| WARRI | 51 | 33.12 |
| UGHELLI | 53 | 34.41 |
| ASABA | 50 | 32.47 |
| **TOTAL** | **154** | **100** |

### 3.2 Seroprevalence of SARS-CoV-2 by Study Site

Overall, 63.64% (98/154) of participants tested positive for SARS-CoV-2 antibodies (Table 2). Seropositivity was highest in Ughelli (75.47%), followed by Warri (60.78%) and Asaba (54.00%). However, as indicated by the Chi-square analysis ($\chi^2 = 5.39$, df = 2, $p > 0.05$), differences in seroprevalence across the three sites were not statistically significant, suggesting that prior SARS-CoV-2 exposure was relatively uniform across Delta State (Table 4).

### 3.3 Seroprevalence by Age Group

Participants were predominantly adults, with the largest proportions in the 31–45-year age group (44.16%) with the highest prevalence rate of 33.77% and followed by 19–30-year (31.17%) age groups (Table 3).

Seroprevalence increased with age, reaching a peak of 88.46% among those aged 46–60 years, while no seropositivity was detected in participants aged 61+ years (Table 5). This distribution indicates that working-age adults were the most frequently exposed population, possibly due to higher mobility and social interaction.

### 3.4 Seroprevalence by Gender

Among the 98 seropositive participants, 56 (36.36%) were male and 42 (27.27%) were female (Table 5). Despite slight differences in prevalence between genders, Chi-square analysis ($\chi^2 = 8.43$, df = 4, $p > 0.05$) indicated no statistically significant association between gender and seropositivity. This suggests that SARS-CoV-2 infection occurred broadly across both sexes.

**Table 2: Distribution of COVID-19 Seropositivity across Location**

| STUDY AREA | NUMBER TESTED (n) | NO. OF POSITIVE CASES (%) | NO. OF NEGATIVE CASES (%) |
|---|---|---|---|
| WARRI | 51 | 31 (60.78) | 20 (39.22) |
| UGHELLI | 53 | 40 (75.47) | 13 (24.53) |
| ASABA | 50 | 27 (54.00) | 23 (46.00) |
| **TOTAL** | **154** | **98 (63.64)** | **56 (36.36)** |

**Table 3: Distribution of COVID-19 seropositivity across Age groups**

| AGE GROUPS (YEARS) | TOTAL NUMBER TESTED (n) | PERCENTAGE/FREQUENCY (%) |
|---|---|---|
| 10 -18 | 6 | 3.90 |
| 19 - 30 | 48 | 31.17 |
| 31 - 45 | 68 | 44.16 |
| 46 - 60 | 26 | 16.88 |
| 61 + | 6 | 3.90 |

| | | |
|---|---|---|
| **TOTAL** | **154** | **100** |

**Table 4 Health Point Prevalence of SARS-CoV-2 Antibodies among suspected subjects in the study**

| Study Area | Number tested (n) | No of Positive Cases (%) | No *of* Negative Cases (%) | Prevalence Rate (%) | $X^2$ | P-Value |
|---|---|---|---|---|---|---|
| Warri | 51 | 31 (60.78) | 20 (39.22) | 20.13 | | |
| Ughelli | 53 | 40 (75.47) | 13 (24.53) | 25.97 | 5.39 | P>0.05 |
| Asaba | 50 | 27 (54.00) | 23 (46.00) | 17.53 | | |
| **Total** | **154** | **98 (63.64)** | **56 (36.36)** | **63.64** | | |

df =2; t- critical = 5.99; P < 0 > 0.05

**Table 5: Comparative Age- and Gender Distribution of Sars CoV-2 Antibodies in the study.**

| | | No. of SARS COV-2 Positive (%) | | | | | |
|---|---|---|---|---|---|---|---|
| **Age group (years)** | **No Tested (n)** | **Males** | **Females** | **Total** | **Prevalence rate (%)** | **$X^2$** | **P-value** |
| 10-18 | 6 | 1 (16.67) | 1 (16.67) | 2 (33.333) | 1.30 | | |
| 19-30 | 48 | 14 (29.17) | 7 (14.58) | 21 (43.75) | 13.64 | | |
| 31-45 | 68 | 29 (42.65) | 23 (33.82) | 52 (76.47) | 33.77 | **8.43** | **P>0.05** |
| 46-60 | 26 | 12 (46.15) | 11 (42.31) | 23 (88.46) | 14.94 | | |
| 61+ | 6 | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0.00 | | |
| **Total** | **154** | **56 (36.36)** | **42 (27.27)** | **98(63.63)** | **63.63** | | |

df =4; t- critical = 9.49 P < 0 > 0.05

**4.0 Discussion**

The present study revealed a high seroprevalence (63.64%) of SARS-CoV-2 antibodies among asymptomatic, unvaccinated individuals attending clinics in Delta State, Nigeria. In line with recent national-level data, this finding suggests widespread unrecognised SARS-CoV-2 transmission across different settings in Nigeria (Kolawole *et al*., 2022). Indeed, a multicentre survey conducted across multiple Nigerian states reported seroprevalence as high as 78.9% during a similar period of limited vaccination uptake (Kolawole *et al*., 2022).

**4.1 Comparison with Other Seroprevalence Studies in Nigeria and Africa**

Our seroprevalence estimate accords with recent findings from other Nigerian settings: for instance, a study among unvaccinated populations in Osun State reported a 58.0% seroprevalence. Similarly, although data from a different region (Kaduna State) in a prior survey (late 2021) showed lower seroprevalence — 43.7% overall — the authors noted substantial under-ascertainment of infections compared to PCR-confirmed case counts.

At the continental level, a meta-analysis of standardized seroprevalence studies in Africa estimated a pooled seroprevalence of ~65.1% by Q3 2021, up from around 3.0% in Q2 2020, reflecting the rapid and widespread transmission of SARS-CoV-2 across the

region. Thus, our findings appear consistent with temporal and regional trends showing substantial increases in seroprevalence over time, underscoring the gap between reported case counts and the true infection burden.

### 4.2 Implications for Silent Transmission and Public Health in Delta State

Given that our participants were asymptomatic and unvaccinated, the high seroprevalence indicates a substantial level of undetected and possibly silent transmission in Delta State. This has important public health implications. Because many infections may have gone unrecorded — especially in settings with limited testing capacity — relying on reported case numbers likely underestimates the true spread of the virus. In turn, serological surveys such as ours provide crucial complementary data that can guide interventions, including targeted vaccination campaigns and community-level surveillance.

Moreover, the relatively uniform seroprevalence across our three study sites — Warri, Ughelli, and Asaba — suggests that SARS-CoV-2 exposure is widespread across both urban and peri-urban/rural contexts within Delta State. This challenges assumptions that only densely populated urban centres bear substantial infection burden and supports the need for **s**tate-wide public health strategies.

### 4.3 Age and Gender Distribution: Interpretation and Relevance

Our analysis did not reveal a statistically significant association between seropositivity and age or gender, indicating that prior exposure to SARS-CoV-2 in this cohort was broadly distributed across demographic groups. This result is consistent with previous Nigerian data showing no significant gender difference in seroprevalence among unvaccinated populations.

However, the absence of significant association does not preclude the possibility of subtle differences in exposure risk or immune response; rather, it suggests that in this sample, exposure may have been widespread and relatively indiscriminate. Therefore, public health interventions should not be narrowly targeted at specific demographic groups but rather designed to cover the general population.

A strength of the current study is the balanced geographic sampling across three distinct locations in Delta State, which enhances representativeness and reduces location-based sampling bias. Also, focusing on asymptomatic, unvaccinated individuals helps to better estimate the hidden burden of natural SARS-CoV-2 infection.

## 5.0 Conclusion

The high seroprevalence of SARS-CoV-2 antibodies among asymptomatic, unvaccinated clinic attendees in Delta State underscores the substantial, largely undetected spread of the virus in this region. In line with broader national and continental trends, our findings highlight the gap between reported case numbers and actual exposure rates. Therefore, serological surveillance should be maintained as a key component of public health strategy, and vaccination efforts should continue to target the wider population regardless of presumed prior exposure.

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