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Short Communication

SARS-CoV-2 serosurvey among adults involved in healthcare and health research in Guinea-Bissau, West Africa

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Objectives: Many African countries have reported fewer COVID-19 cases than countries elsewhere. By the end of 2020, Guinea-Bissau, West Africa, had <2500 PCR-confirmed cases corresponding to 0.1% of the ~1.8 million national population. We assessed the prevalence of SARS-CoV-2 antibodies in urban Guinea-Bissau to help guide the pandemic response in Guinea-Bissau.

Study design: Cross-sectional assessment of SARS-CoV-2 antibody in a cohort of staff at the Bandim Health Project.

Methods: We measured IgG antibodies using point-of-care rapid tests among 140 staff and associates at a biometric research field station in Bissau, the capital of Guinea-Bissau, during November 2020.

Results: Of 140 participants, 25 (18%) were IgG-positive. Among IgG-positives, 12 (48%) reported an episode of illness since the onset of the pandemic. Twenty-five (18%) participants had been PCR-tested between May and September; 7 (28%) had been PCR-positive. Four of these seven tested IgG-negative in the present study. Five participants reported that somebody had died in their house, corresponding crudely to an annual death rate of 4.5/1000 people; no death was attributed to COVID-19. Outdoor workers had a lower prevalence of IgG-positivity.

Conclusions: In spite of the low official number of COVID-19 cases, our serosurvey found a high prevalence of IgG-positivity. Most IgG-positives had not been ill. The official number of PCR-confirmed COVID-19 cases has thus grossly underestimated the prevalence of COVID-19 during the pandemic. The observed overall mortality rate in households of Bandim Health Project employees was not higher than the official Guinean mortality rate of 9.6/1000 people. © 2021 The Author(s). Published by Elsevier Ltd on behalf of The Royal Society for Public Health. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Background

In Guinea-Bissau, a low-income country with a population of 1.9 million inhabitants, the first case of COVID-19 was registered on March 25, 2020, and quickly followed by a lockdown that lasted several months. Per December 20, of 35,644 people tested by PCR, 2447 (6.9%) tested positive for SARS-CoV-2 (0.1% of the national population) with 45 deaths (1.8% of positive cases) (Supplementary Fig. 1).

The Bandim Health Project (BHP, www.bandim.org) employs ~180 staff members in a Health and Demographic Surveillance System that covers the urban suburbs of Bandim, Belém, Mindarà and Cuntum in Guinea-Bissau’s capital, Bissau. Most staff and associates had been working throughout the epidemic, and we aimed to study the prevalence of SARS-CoV-2 antibodies by conducting a serosurvey among our local staff and associates.

Methods

We performed a serosurvey among field assistants who conducted house visits to collect demographic and health information, office staff members, and staff placed at three health centers in the study area and the nearby national hospital. From November 9 to

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November 24, 2020, after informed oral and written consent, we interviewed participants about background factors and about illness and mortality in their homes since March 25, 2020. For assessing SARS-CoV-2 antibody among participants, two drops of blood obtained by finger prick were applied to a point-of-care antibody test (OnSite COVID-19 IgG/IgM Rapid Test, CTK Biotech).

The study was approved by the Guinean National Ethics Committee (Ref 116/CNES/INASA/2020).

Results

A total of 146 staff and associates were present to be tested during the survey. Of these, 6 declined participation. Of 140 tested, 25 (18%) were IgG-positive. One participant who was IgM-positive and had a slight fever was referred for PCR testing, which was negative; all symptoms waned after a day.

The average age of IgG-positives tended to be higher than among IgG-negatives (mean 46 years (range 26–70) vs 41 years (range 19–63), \( P = 0.05 \)). There tended to be more infected females than males (24% vs 13%, \( P = 0.10 \)) (Table 1). The ethnicities that traditionally populated the study area had a higher risk of being IgG-positive than other ethnicities. All participants reported using masks.

The highest proportion of IgG-positives (42%) was found among laboratory staff, followed by frontline healthcare workers (HCWs) (doctors, nurses, or midwives) (24%) and office personnel (17%). In the combined group of frontline HCWs and laboratory technicians, 28% tested positive (\( P \) for the same risk as others = 0.01). The lowest proportions were among field assistants (8%) and other staff (mechanics, guards, cleaners) (9%).

The area of residence was associated with the risk of being IgG-positive, the proportion varying from 9% to 37% (\( P = 0.02 \) for the same risk across areas), the proportion being highest for those coming from outside the study area.

In a multivariable analysis retaining age and sex and the three variables (ethnicity, type of work, and area of residence) that were significant in univariate analysis, all three variables remained independently associated with the risk of being IgG-positive.

In urban Guinea-Bissau, most people live in multifamily houses. There was no association between being IgG-positive and the number of household inhabitants or the total number of people in the multifamily house (Table 1). Five people reported that somebody in their house had died during the past 8 months of the pandemic. With a mean of 12 people per house, this translates to a crude yearly mortality rate of 4.5/1000 people (5 deaths in 140 BHP staff houses * 12 persons/house * 8/12 years of observation). No death was attributed to COVID-19.

Table 1

| Characteristics of individuals testing IgG positive or IgG negative for SARS-CoV2 in Guinea-Bissau, Nov 2020. | IgG positive (% of group) N – 25 | IgG negative (%) of group N – 115 | Relative risk (95% CI) | P-value* | Multivariable modelc |
|---|---|---|---|---|---|
| Mean age in years (range) | 46 (26–70) | 41 (19–63) | 1.03 (1.00–1.07) | 0.05 | 1.02 (0.98–1.05) |
| Sex | Male | 10 (13%) | 67 | Ref | 0.10 | Ref |
| | Female | 15 (24%) | 48 | 1.83 (0.88–3.81) | 0.11 | 1.21 (0.57–2.60) |
| Ethnicitya | Pepel/Manjaco/Mancanha | 20 (27%) | 54 | 3.57 (1.41–9.00) | 0.003 | 3.19 (1.23–8.27) |
| | Other | 5 (8%) | 61 | Ref | | Ref |
| Type of work | Field assistants | 2 (8%) | 24 | Ref | 0.05 | Ref |
| | Office staff | 6 (17%) | 30 | 2.17 (0.47–9.95) | 0.38 | Ref |
| | Doctors/nurses/midwives | 10 (24%) | 31 | 3.17 (0.75–13.4) | 0.09 | Ref |
| | Lab technicians | 5 (42%) | 7 | 5.41 (1.21–24) | 0.04 | Ref |
| | Other staff | 2 (8%) | 23 | 1.04 (0.16–6.87) | 0.98 | Ref |
| Healthcare worker | Yes | 15 (28%) | 38 | 2.46 (1.19–5.09) | 0.02 | 2.22 (1.06–4.67) |
| | No | 10 (11%) | 11 | Ref | Ref | Ref |
| Area of residenceb | Bandim/Belem/Mindera/Cuntum | 5 (9%) | 50 | Ref | 0.02 | Ref |
| | Praça/Antula | 4 (15%) | 23 | 1.62 (0.47–5.61) | 0.83 | Ref |
| | Missira/Militar/Aeroporto | 5 (18%) | 23 | 1.96 (0.62–6.25) | 0.41 | Ref |
| | Bor/Quelé/Enterramento | 11 (37%) | 19 | 4.03 (1.54–10.6) | 0.001 | 3.17 (1.22–8.22) |
| Median number of people in household | 5 (1–9) | 5 (1–21) | | 0.77 | |
| Median number of people in house | 10 (3–26) | 12 (1–30) | | 0.43 | |
| Ill during the pandemic | Yes | 12 (21%) | 45 | 1.34 (0.66–2.74) | 0.42 | |
| | No | 13 (16%) | 70 | Ref | | |
| Among the ill | N – 12 | N – 45 | |
| Loss of taste/smell | Yes | 7 (28%) | 18 | 1.79 (0.64–5.02) | 0.27 | |
| | No | 5 (16%) | 27 | Ref | | |
| Fever | Yes | 8 (23%) | 27 | 1.26 (0.43–3.72) | 0.68 | |
| | No | 4 (18%) | 18 | Ref | | |
| Cough | Yes | 3 (16%) | 16 | 0.67 (0.20–2.20) | 0.61 | |
| | No | 9 (24%) | 29 | Ref | | |
| Runny nose | Yes | 8 (17%) | 40 | 0.38 (0.14–0.98) | 0.05 | |
| | No | 4 (44%) | 5 | Ref | | |
| Difficulties breathing | Yes | 2 (33%) | 4 | 1.70 (0.48–6.06) | 0.41 | |
| | No | 10 (20%) | 41 | Ref | | |
| Fatigue | Yes | 4 (29%) | 16 | 0.90 (0.31–2.65) | 0.85 | |
| | No | 8 (20%) | 29 | Ref | | |

*By rank-sum test (number of people in household/house) or Poisson test with robust variance estimation (rest).

a Grouped into traditional ethnicities in the study area, with related languages and social structures vs others.

b Grouped by geographical vicinity: the Bandim Health Project study area (Bandim/Belem/Cuntum); areas closer to city (Praça/Antula); areas further from the city on the northern side (Missira/Militar/Aeroporto); areas further out of the city on the southern side (Bor/Quelé/Enterramento).

c Retaining age, sex, and variables that were significant in univariate analysis.
The risk of being IgG-positive did not correlate with self-reported illness (Table 1). Among the IgG-positives, 12 (48%) reported having been ill since the onset of the pandemic, vs. 45 (40%) of IgG negative ($P = 0.41$). Of the 57 persons reporting being ill, 25 reported loss of smell or taste: 7 of these were IgG-positive (58% of IgG-positives), while 18 were IgG-negative (40% of IgG-negatives) ($P = 0.27$). One person was hospitalized during the pandemic; this person was not PCR-positive and tested IgG negative here.

Interestingly, 25 (18%) participants had been PCR-tested between March and September; 7 reported having been previously tested positive. Among these 7, 6 reported being ill during the pandemic, all reported lost of taste/smell and runny nose, approximately half reported fever and/or cough; only one reported difficulty breathing and one reported fatigue. Four of the 7 PCR-positives tested IgG-negative.

**Discussion**

COVID-19 infections appeared to have been widely transmitted in Bissau in November 2020, with the apparent decline of the first wave coinciding with the start of the rainy season in June 2020. In this serosurvey from November 2020, 18% (25/140) had IgG wave coinciding with the start of the rainy season in June 2020. In Bissau in November 2020, with the apparent decline of the pandemic, all reported loss of taste/smell and runny nose, approximately half reported fever and/or cough; only one reported difficulty breathing and one reported fatigue. Four of the 7 PCR-positives tested IgG-negative.

**What is already known on this subject**

- Many African countries have experienced far fewer COVID-19 cases than countries in Europe, Asia, or the Americas.
- By the end of 2020, Guinea-Bissau had <2500 PCR-confirmed cases corresponding to 0.1% of the national population.

**What this study adds**

- Among 140 field station staff members, the proportion being SARS-CoV-2 IgG-positive was 18%.
- Less than half of the IgG-positive individuals reported being ill during the pandemic.
- The official number of PCR-confirmed COVID-19 cases grossly underestimates the prevalence during the pandemic.

**Author statements**

**Ethical approval**

National Committee of Ethics in Health (CNES — Guinea-Bissau), approval number 116/CNES/INASA/2020.
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Competing interests

None declared.

Author contributions

All authors had had full access to all the data in the study. Benn takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Benn, Cabral, Martins, Schaltz-Buchholzer, Aaby.

Acquisition of data: Benn, Salinha, Fernandes.

Analysis or interpretation of data: All authors.

Drafting of the manuscript: Benn, Nielsen, Fisker, Schaltz-Buchholzer, Jørgensen, Aaby.

Critical revision of the manuscript for important intellectual content: All authors.

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Disclaimer

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhe.2021.11.013.

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