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Letter to the Editor

High SARS-CoV-2 seroprevalence among health care workers in Bamako referral hospitals: a prospective multisite cross-sectional study (ANRS COV11)

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To the editor,

The coronavirus disease 2019 (COVID-19) outbreak has affected some parts of the globe more than others. Mali, like the majority of African countries, has reported much fewer deaths and cases related to COVID-19 compared with more affected states. As of December 2, 2021, there were 17 339 confirmed cases from a population of >20 million people. These figures may be underestimated due to the weak organization of the health care system and low screening capacity.

Serological rapid diagnostic tests could be used as tools to inform public health authorities on the development of herd immunity and spread within a population. Health care workers (HCWs) are a particularly affected population group, representing up to 14% of those infected with COVID-19. In Mali, there is currently no official data on the number of caregivers infected with COVID-19. Therefore, the aim of this study was to determine the seroprevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) among HCWs in Bamako hospitals and to determine predictive factors associated with positive serology.

We conducted a prospective study among HCWs age >18 years working at three referral hospitals with a centre for COVID-19 patient management in Bamako (Gabriel Toure University Hospital, Dermatology Hospital of Bamako, and Mali Hospital). Clinical and sociodemographic data were obtained from participants' records or collected after inclusion in the study. The Panbio IgG/IgM COVID-19 Rapid Test Device (Abbott Diagnostics, North Chicago, IL; specificities ≥94% for IgG and IgM [1]) was used per the manufacturer's instructions for qualitative detection of IgG and IgM directed against SARS-CoV-2 nucleocapsid. Wilcoxon and χ^2 statistics were used to assess statistical significance between groups for continuous and categorical variables, respectively. All variables with a p-value ≤0.1 in the univariate analysis were retained to build the final multivariate model.

From March 16, 2021 to July 15, 2021, 200 HCWs were consecutively included in our study. The enrollment period coincided with the second wave of the COVID-19 epidemic in Mali. The sociodemographic characteristics of the participants are presented in

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Table 1
Participant sociodemographic characteristics

	Overall $N = 200$	Positive serology $n = 101$	Negative serology $n = 94$	p-value (univariate analysis)
Age (y), median (IQR)	29.0 (25.0–35.0)	29.0 (25.0–35.0)	29.0 (25.0–35.0)	0.897
Male sex, *n*/*N* (%)	114/200 (57.0)	59/101 (58.4)	53/94 (56.4)	0.774
Marital status married, *n*/*N* (%)	110/200 (55.0)	57/101 (56.4)	51/94 (54.3)	0.568
People in household people (*n*), median (IQR)	7.0 (5.0–11.0)	8.5 (6.0–12.0)	6.0 (4.0–10.8)	**0.013**[a]
Public transport use (bus), *n*/*N* (%)	38/198 (19.2)	75/99 (75.8)	80/94 (85.1)	0.103
Commute time (min), median (IQR)	30.0 (15.0–45.0)	30.0 (15.0–45.0)	30.0 (15.0–36.3)	0.290
Urban residence, *n*/*N* (%)	123/198 (62.1)	61/101 (60.4)	59/92 (64.1)	0.593
Profession				
Medical staff, *n*/*N* (%)	74/200 (37.0)	33/101 (32.7)	36/94 (38.3)	0.754
Paramedical staff, *n*/*N* (%)	53/200 (26.5)	35/101 (34.7)	18/94 (19.1)	**0.021**[a]
Administrative and service staff, *n*/*N* (%)	73/200 (36.5)	33/101 (32.7)	40/94 (42.5)	0.154
Level of education				
Elementary, *n* (%)	41/200 (20.5)	19/101 (18.8)	22/94 (23.4)	0.432
Secondary, *n* (%)	33/200 (16.5)	22/101 (21.8)	11/94 (11.7)	0.113
University/doctorate, *n* (%)	118/200 (59.0)	55/101 (54.5)	58/94 (61.7)	0.971
Vaccinated participants, *n*/*N* (%)	52/178 (29.2)	27/91 (29.7)	24/83 (28.9)	0.834
COVID-19 confirmed case contact, *n*/*N* (%)	21/194 (10.5)	15/100 (15)	6/94 (6.4)	0.053

[a] Significant p-value (univariate analysis). COVID-19, coronavirus disease 2019; IQR, interquartile range (25th and 75th percentile).

Table 1. Only 1% of HCWs reported being a smoker. The median body mass index was 24.2 kg/m^2 (interquartile range, 21.1–27.3 kg/m^2) overall. Symptoms reported at the time of screening were rhinitis (3.5%), headache (3.0%), cough (2.5%), fever (1.5%), and thoracic pain (1.5%). Three percent of participants mentioned a medical history of sinusitis/rhinitis. None reported symptoms of severe COVID-19. Twenty-one HCWs reported having been in contact with a confirmed case of COVID-19 (10.5%). Finally, 29.2% of participants were vaccinated for COVID-19 with Vaxzevria (AstraZeneca, Cambridge, UK) by the time of screening.

After inclusion, five participants refused to provide a blood sample. Antinucleocapsid SARS-CoV-2 IgG was detected for 51.8% of HCWs (101 of 195). Only 2 of 195 samples were positive for IgM (1.0%; one IgG positive and one IgG negative with IgG remaining negative 1 month later). In univariate analysis, there were two predictive factors for positive serology: being paramedical staff ($n = 53$; 42 of 53 nurses; OR: 2.4; 95% CI, 1.1–4.9; $p = 0.020$) and having ≥8 individuals living in the household (OR: 2.4; 95% CI, 1.3–4.3; $p = 0.003$). When considering these two variables, only the number of people living in the household (≥8 vs. <8) was an independent predictive factor of positive serology.

In this study, we report a high seroprevalence of 51.8% among HCWs in Bamako referral hospitals. These results are notably higher than what has been observed among the general population in the Democratic Republic of Congo and Cameroon [2,3], but are in line with a recent study revealing a SARS-CoV-2 exposure rate of around 58% among three Malian communities after the first COVID-19 wave [4]. Antinucleocapsid antibodies allow for an estimation of viral spread by seroprevalence in the context of spike-based vaccination, but vanish within several months. Thus, our results could have been slightly underestimated, also because of the nondetection of very recent infections. Moreover, only 16.6% of the staff of the three hospitals were screened. In any case, this study suggests dramatic SARS-CoV-2 spread among HCWs in a West African country, supporting what has been shown in Nigeria [5]. Characteristics such as the median age of the population (29 years) could explain the majority of asymptomatic cases reported in this study. However, the spread of COVID-19 is an important concern because high viral circulation may lead to the selection of problematic SARS-CoV-2 variants.

Living in a household of >8 individuals was the only independent risk factor predictive of positive serology, reflecting that the concentration of people is a key factor in this outbreak. In Mali, vaccination was initiated at the peak of the second wave, concomitantly with this study, and only 29.2% of study participants were vaccinated. This possibly explains why seroprevalence did not differ according to vaccination status ($p = 0.834$).

In conclusion, our study showed a high seroprevalence among HCWs in Bamako and confirmed a large spread of SARS-CoV-2 infection in the region despite a previously underreported circulation in Africa. In this context, screening and molecular surveillance capacities should be enhanced. HCWs are on the frontline of the epidemic and should be considered for priority vaccination as much for their own protection as for the collective protection of public health.

Transparency declaration

The authors declare no conflicts of interest.

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Contribution

Conceptualization: AIM, ET; methodology: AIM, PH, ET; formal analysis: PH; investigation: MS, AK, AMT, GD, NOMET; project administration: AIM, KA, ET; supervision: AIM, OD, KA, DBF, AGM, ET; funding acquisition: AIM, ET; writing—original draft: AIM, AK, ET; writing—review and editing: all authors.

Research ethics statement

The study was approved by the ethics committee of the Faculty of Medicine, Dentistry and Pharmacy of Bamako (opinion number 2021/13/CE/USTTB) and the institutional review board CEEI Committee of INSERM (opinion number 20-743). The study was authorized by the Commission Nationale de l'Informatique et des Libertés (No. 921130), and registered in a public trial registry (ClinicalTrials.gov: NCT04710316). Written informed consent was obtained from the participants, and confidentiality of the data was ensured.

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