

## Retrospective overview of a COVID-19 outbreak in Mauritania

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### Abstract

A coronavirus disease 2019 (COVID-19) outbreak is currently ongoing in Mauritania. Until 1 July 2020, Mauritania health authorities reported 41 862 serologic and real-time reverse transcriptase PCR tests performed, of which 4472 (10.7%) were positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Male subjects were significantly more affected (57.1%) than female subjects (42.9%). Individuals of the age groups 15–34 years (35.8%) and 35–54 years (36.6%) were the most affected. There were 129 deaths (2.9%), 1677 recoveries (37.5%) and 2666 active cases (59.6%) of which 2261 (84.8%) were asymptomatic, 394 (14.7%) had mild symptoms and 11 (0.4%) had severe symptoms. A large proportion of fatalities (72%, 85/118) occurred among adults aged  $\geq 55$  years. Of 4472 positive cases, 4241 (94.8%) were infected through contact with a confirmed COVID-19 case, 133 (3.0%) had no contact with a confirmed COVID-19 case and 98 (2.2%) were imported. As a response to COVID-19, the Mauritanian authorities announced a set of preventive measures, including closure of land and air borders, night curfew, closure of markets, schools and universities and restriction of movement between cities. Control measures included the systematic testing of symptomatic patients, isolation and management of active cases, contact tracing and quarantine of people who have been in contact with a COVID-19-positive individual. We discuss the efforts of the Mauritanian government to combat this potentially life-threatening pneumonia.

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### Introduction

On 30 December 2019, an uncommon pneumonia outbreak of unknown aetiology was reported in Wuhan, Hubei province, China [1]. Virus isolation and molecular analysis indicated a novel coronavirus (family Coronaviridae) provisionally named 2019-nCov [2]. The International Committee on

Taxonomy of Viruses (2020) later designated the virus as 'severe acute respiratory syndrome coronavirus 2' (SARS-CoV-2) and the World Health Organization (WHO) officially named the associated disease coronavirus disease 2019 (COVID-19) [3,4].

As a result of its high infectiveness and person-to-person mode of transmission [5], SARS-CoV-2 rapidly spread across China to other countries worldwide. On 30 January 2020, the WHO emergency committee declared the coronavirus outbreak to be a global health emergency, and it was declared a pandemic on 11 March 2020 [4]. As of 9 October 2020, the number of globally confirmed cases and deaths reached 36 625 213 and 1 063 381 in 224 countries respectively [6]. Africa accounts for 3.3% and 2.3% of the global cases and deaths

respectively [7]. The COVID-19 pandemic is still spreading 9 months after the first Chinese reported cases.

In Mauritania, a West African country, the first case of COVID-19 was diagnosed on 13 March 2020 in a 40-year-old Australian expatriate traveling from abroad. A few days later, a second COVID-19 case was diagnosed in a 41-year-old foreign female domestic worker who returned from Senegal 10 days before she was diagnosed. A third positive case was reported on 26 March 2020 in a 74-year-old man who had returned from France 10 days earlier. The first death associated with COVID-19 occurred on 30 March 2020 in a 48-year-old French-Mauritanian woman who tested positive after death. The woman had been quarantined along with 16 other individuals who arrived in mid-March 2020 in one of the last flights from France before Mauritanian authorities banned international arrivals.

On 18 April 2020, Mauritania officially announced the country to be coronavirus free after the patient with the last active case recovered. However, after a 40-day COVID-19-free period, during which only two cases were registered, the disease resurged on 12 May 2020, and since that time, COVID-19 cases have been registered daily.

In the present study, we address the current situation of COVID-19 in Mauritania as of 1 July 2020 and discuss the efforts of Mauritanian authorities to combat this potentially life-threatening respiratory illness.

## Patients and methods

### Patient recruitment and data sources

There were three pathways through which the Mauritanian Ministry of Health recruited patients positive for COVID-19: mobile alert management teams; sentinel reception sites created in collaboration with the army; and patients with suspected COVID-19 signs and symptoms attending health facilities.

Regional hospitals throughout the country sent nasal swab and/or blood samples of symptomatic patients for real-time reverse transcriptase PCR (RT-PCR) and/or serologic tests to Institut National de Recherches en Santé Publique (INRSP) in Nouakchott, where diagnostic tests were centralized. During the period from 13 March to 1 July 2020, demographic, clinical, laboratory and raw outcome data of COVID-19-positive patients from all regions of Mauritania were obtained from the daily COVID-19 situation reports officially copublished by the Mauritanian Ministry of Health and the WHO country office in Nouakchott [8] and from data available online [9]. The daily press briefings held by the Ministry of Health were also available on the official website of the national television station.

### Case definitions of suspected cases

On the basis of the evolving situation of COVID-19, a scientific committee comprising 11 scientists and clinicians established national guidelines for COVID-19 clinical management, including case definition and treatment regimen. A COVID-19 suspected case was defined as clinical signs of acute respiratory infection, fever (suspected or measured) or symptoms associated with COVID-19 infection [10]. A probable case was defined as symptoms compatible with COVID-19 and close contact with a confirmed case of COVID-19 within the past 14 days. A confirmed case was defined as occurring in a symptomatic patient or asymptomatic carrier with laboratory confirmation of infection with SARS-CoV-2 using a PCR-based assay.

### Diagnostic methods

Implementation of the COVID-19 diagnostic testing started on 12 February 2020 using serologic and PCR-based approaches. Serology was performed by SARS-CoV-2 IgG/IgM rapid diagnostic test (Xiamen Biotime Biotechnology, Fujian, China). SARS-CoV-2 molecular diagnosis was performed using Daan real-time fluorescent-PCR kits for 2019 Novel Coronavirus RNA detection (DAAN Gene, Sun Yat-Sen University, Guangzhou, China). Both serologic tests and RT-PCR were performed at the virology laboratory, INRSP, Nouakchott.

### Treatment

The Mauritanian authorities adopted two experimental treatment regimens for the management of oxygen-dependent patients with symptomatic COVID-19 who do not require intensive care: chloroquine or hydroxychloroquine, with or without azithromycin or lopinavir/ritonavir combination.

### Statistical analysis

Proportions were compared by the Fisher exact test. The Pearson coefficient correlation was used to assess the relationship between the number of COVID-19 tests performed and the number of COVID-19-positive cases. A *p* value of <0.05 was considered statistically significant. Computations were performed by MedCalc 15.0 for Windows (MedCalc Software, Ostend, Belgium).

## Results

Overall, 41 862 tests for SARS-CoV-2 were performed by 1 July 2020 with a mean of 377 tests per day during the study period (*n* = 111 days) and an average of 798 tests per day for the last 48 days. Of 41 862 tested individuals, 4472 (10.7%), corresponding to an incidence rate of 1.1 per 1000 persons,

were positive for SARS-CoV-2, including 1377 confirmed by RT-PCR, 2561 by rapid diagnostic test and 534 by both methods of diagnosis. Male subjects were significantly more affected (57.1%, 2554/4472) than female subjects (42.9%, 1918/4472) ( $p < 0.0001$ ) (Table 1). Individuals of the age groups 15–34 years and 35–54 years were the most affected, with 1602 (35.8%) and 1635 (36.6%) positive cases respectively.

The disease resulted in 129 deaths (2.9%), corresponding to a mortality rate of three deaths per 100 000 persons, with 1677 recoveries (37.5%) and 2666 (59.6%) active cases. There were no data on the disease severity among 1677 recovered COVID-19 patients. Of 2666 active cases, 2261 (84.8%) were asymptomatic carriers, 394 (14.8%) were symptomatic patients with mild symptoms and 11 (0.4%) were severe cases. All patients who died ( $n = 129$ ) were symptomatic and had severe symptoms. Data from 118 (91.5%; 11 missing data) of 129 deceased patients indicated that COVID-19-associated mortality was significantly higher in men (61.0%, 72/118) than in women (39.0%, 46/118;  $p = 0.02$ ) and that 72.0% (85/118) of persons who died were adults aged  $\geq 55$  years (data not shown).

Of 4472 positive cases, 4241 (94.8%) were infected through close contact with a COVID-19 patient, 133 (3%) had apparently no contact with confirmed COVID-19 case (i.e. cases in which authorities were unable to trace the source of the infection) and 98 (2.2%) were imported. Of 2666 COVID-19 active cases, 2283 (85.6%) were from Nouakchott, the capital city. There were no clear indications as to whether 1667 recoveries from COVID-19 occurred after treatment with the recommended experimental regimens or by spontaneous recovery.

Fig. 1 illustrates the daily number of COVID-19 tests performed and the number of confirmed COVID-19 cases during the study period. COVID-19 peaked between 19 and 25 June, during which the maximum of COVID-19 tests were performed and 1315 (29.4%) of 4472 confirmed positive patients were recorded. A strong positive correlation was observed between the number of tested patients and the number of positive cases ( $r = 0.93$ ;  $n = 111$ ; 95% confidence interval, 0.91–0.95;  $p < 0.001$ ) (Fig. 2).

## Discussion

Using national case-based surveillance data, the present study describes the epidemiologic features of the COVID-19 outbreak in Mauritania. A low rate of mortality (2.9%) due to COVID-19 was observed during the period 13 March to 1 July 2020 in Mauritania. This result is within the range of 1.6% to 6.5% reported for the same period in some neighbouring countries of Mauritania, such as Senegal (1.6%), Morocco

(1.8%), Mali (5.3%) and Algeria (6.5%) [9]. Consistent with reports on morbidity and deaths in individuals with COVID-19, the majority of positive patients were men (56.6%), and most patients who died (72%) were aged  $\geq 55$  years [11,12].

Mauritania has a young population, with a majority of its inhabitants belonging to the age group 24–45 years [13], which corresponds to the most affected individuals during the current epidemic. However, young people have been reported to be less susceptible to COVID-19 infection than older people aged  $\geq 55$  years [14]. This is consistent with the high rate of asymptomatic individuals (84.6%) observed among young persons in this study and could be a favourable condition in limiting the mortality rate of the disease. This assumption is supported by a recent study showing that only a small proportion (within the range of 0–10%) of asymptomatic carriers eventually develop symptoms of COVID-19 [15].

Although the first case of COVID-19 was reported on 13 March 2020, the exponential growth in the number of positive cases was observed only from June. This could be because most initial COVID-19 cases were detected among foreigners who had little contact with Mauritians and the rapid response of the health authorities to trace the few positive individuals who were in contact with them. The opposite situation was observed after the 40-day COVID-19-free period, during which the deaths were announced of Mauritians with no apparent history of contact with a COVID-19-infected patient. Increasing growth in numbers of infected people observed during June could be due to the exponentially increasing number of persons tested for COVID-19 during contact tracing.

During the study period, a relatively low prevalence (10.7%) of COVID-19 was detected in Mauritania. Although the age distribution of infected patients was similar to that of the general population in Mauritania, the reported prevalence could be biased because the study population mostly consisted of individuals identified during contact tracing, which may not necessarily represent the general population. To overcome the possible weakness in the reported prevalence, population based-data on COVID-19 using immunodiagnostic tests that are rapid, less expensive and easier to use than PCR assay in the field are urgently needed. Moreover, because COVID-19-infected individuals can have mild illness or may be asymptomatic (and therefore might not be tested for diagnosis or receive medical care), COVID-19 seroprevalence surveys based on the detection of specific antibodies against SARS-CoV-2 could be more informative about the proportion of persons who have been infected with SARS-CoV-2. These surveys are also suitable and useful for disease surveillance [16].

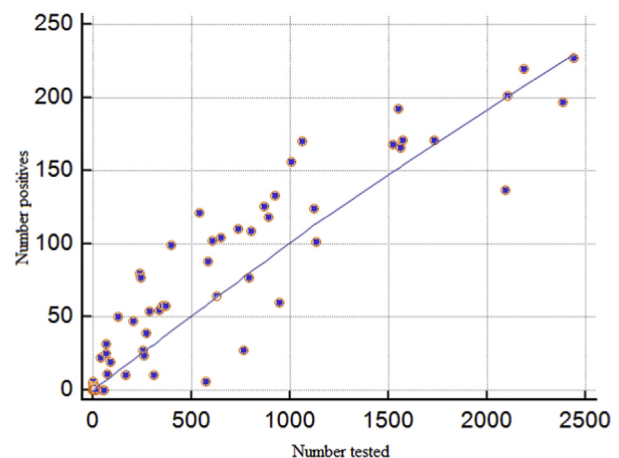
Preventive control measures were rapidly implemented in Mauritania to combat the COVID-19 epidemic. As a response

**TABLE 1.** Demographic and clinical characteristics of patients with coronavirus disease 2019 (COVID-19) in Mauritania between 13 March and 1 July 2020

Characteristic	N (%)
Gender, n = 4472	
Male	2554 (57.1)
Female	1918 (42.9)
Age groups, n = 4472	
0–14 years	275 (6.1)
15–34 years	1602 (35.8)
35–54 years	1635 (36.6)
≥55 years	960 (21.4)
Disease outcome, n = 4472	
Active cases	2666 (59.6)
Recovery	1677 (37.5)
Death	129 (2.9)
Disease severity among active cases, n = 2666	
Asymptomatic	2261 (84.8)
Mild symptoms	394 (14.8)
Severe symptoms	11 (0.4)
Source of infection, n = 4472	
Contact with confirmed case	4241 (94.8)
No contact with confirmed case	133 (3.0)
Imported case	98 (2.2)
Regional distribution of active cases, n = 2666	
Northern	79 (2.9)
Southern	262 (9.8)
South-eastern	42 (1.6)
Nouakchott	2283 (85.6)

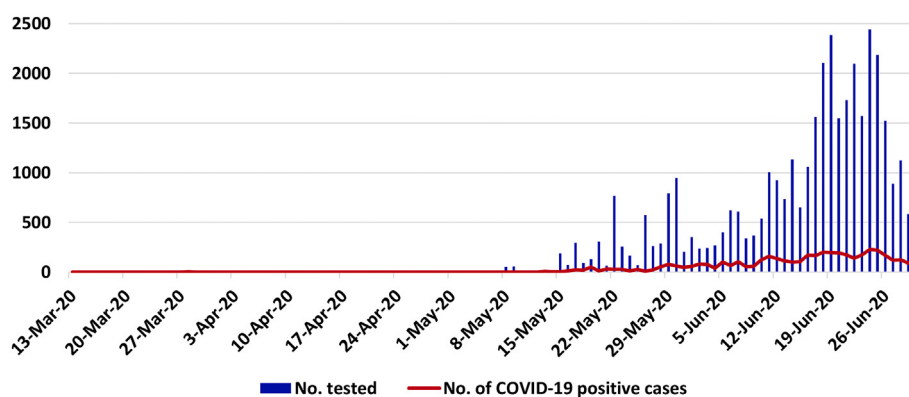
We were not able to obtain data on disease severity among patients who recovered.

to COVID-19, the Mauritanian authorities, via an interministerial committee, announced a set of preventive measures, including closure of land and air borders, night curfew, closure of markets, restaurants, cafeterias, schools and universities, prohibition of prayer in mosques and restriction of population movement between cities. Control measures included the systematic testing of symptomatic patients, isolation and management of active cases and contact tracing and quarantine of persons who had been in contact with a confirmed COVID-19 individual to prevent onward transmission. A call centre received and processed thousands of calls daily.

**FIG. 2.** Correlation between number of coronavirus disease 2019 (COVID-19) tests performed and number of COVID-19–positive cases in Mauritania between 13 March and 1 July 2020.

Also, despite the controversies surrounding them, chloroquine or hydroxychloroquine, with or without azithromycin, has been approved as a first-line treatment of confirmed COVID-19 cases in many African countries and was included in the regimen against COVID-19 in Mauritania [17–19].

However, as for most national health systems in developing countries, the Mauritanian national health system was not prepared to manage a public health crisis of such magnitude. For instance, very few beds in intensive care units existed in health facilities before the COVID-19 outbreak. According to the Ministry of Health's daily COVID-19 situation report, there are several areas where reinforcement is necessary to overcome COVID-19 outbreak, including testing facilities, qualified laboratory technicians, healthcare capacity and personal protective equipment.

**FIG. 1.** New daily confirmed cases of coronavirus disease 2019 (COVID-19) in Mauritania from 13 March to 1 July 2020.

## Conflict of interest

None declared.

## Acknowledgement

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