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Abstract

A COVID-19 outbreak is currently ongoing in Mauritania. Until July 1, 2020, Mauritania health authorities reported 41,862 serological and RT-qPCR tests performed, of which 4,472 (10.7%) were positive for SARS-Cov-2. Males were significantly more affected (57.1%) than females (42.9%). Individuals of the age groups 15–34 (35.8%) and 35–54 (36.6%) years were the most affected. There were 129 (2.9%) deaths, 1,677 (37.5%) recoveries and 2,666 (59.6%) active cases of whom 2,261 (84.8%) were asymptomatic, 394 (14.7%) with mild symptoms and 11 (0.4%) severe cases. A large proportion of fatalities (72%; 85/118) occurred among adults aged ≥ 55 years. Of 4,472 positive cases, 4,241 (94.8%) were infected through contact with a confirmed COVID-19 case, 133 (3.0%) had no contact with confirmed COVID-19 case, and 98 (2.2%) were imported. As a riposte against COVID-19, the Mauritanian authorities announced a set of preventive measures, including closure of land and air borders, nocturne curfew, closure of markets, schools, and universities, and restriction of movement between cities. Control measures include 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.

Keywords: Severe acute respiratory syndrome coronavirus 2, COVID-19, Mauritania, epidemiology, West Africa, preventive measures

Introduction

In December 30, 2019, an uncommon pneumonia outbreak of unknown etiology was reported in Wuhan (province of Hubei), China [1]. Viral isolation and molecular analyses indicated a novel coronavirus (family *Coronaviridae*) provisionally named 2019-nCov [2]. The International Committee on Taxonomy of Viruses (2020) later designated the virus 'Severe Acute Respiratory Syndrome Coronavirus 2' (SARS-CoV-2), and the World Health Organization (WHO) officially named the associated disease '2019-Coronavirus Disease' (COVID-19) [3,4].

Due to its high infectiveness and person-to-person mode of transmission [5], the SARS-CoV-2 rapidly spread across China to other countries worldwide, and the WHO emergency committee declared on January 30, 2020, the coronavirus outbreak a global health emergency and a pandemic on March 11, 2020 [4]. As of October 09, 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]. COVID-19 pandemic is still spreading nine months after the first Chinese reported cases.

In Mauritania, a West African country, the first case of COVID-19 was diagnosed on March 13, 2020, in a 40-year-old Australian expatriate traveling from abroad. 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 March 26, 2020, in a 74-year-old man who had returned from France 10 days earlier. The first death associated with COVID-19 occurred on March 30, 2020, in a 48-year-old French-Mauritanian woman who tested positive post-mortem. The woman had been quarantined alongside 16 other individuals who arrived in mid-March 2020 in one of the last flights from France before Mauritanian authorities banned international arrivals.

On April 18, 2020, Mauritania officially announced that the country is coronavirus-free, after the last active case had recovered. However, following a 40-day 'COVID-19-free' period, during which only two cases were registered, the disease resurged on May 12, 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 July 1, 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 Covid-19-positive cases: (i) the mobile alert management teams (ii) sentinel reception sites created n collaboration with the army, and (iii) patients attending health facilities with suspected COVID-19 signs and symptoms.

Regional hospitals throughout the country sent nasal swab samples/blood samples of symptomatic patients for RT-PCR/serological tests to Institut National de Recherches en Santé Publique (INRSP) in Nouakchott where diagnostic tests were centralized. During the period from March 13 to July 1, 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 co-published by the Mauritanian Ministry of Health and the WHO country Office in Nouakchott [8] and data available online [9]. The daily press briefings of the Ministry of Health were also available on the official site of the national television.

Case definitions of suspected cases

Based on the evolving situation of COVID-19, the scientific committee comprising 11 scientists and clinicians established a national guideline for COVID-19 clinical management, including case definition and treatment regimen. A COVID-19 'suspected case' was defined as any individual with clinical signs of acute respiratory infection, fever (suspected or measured), or symptoms associated with COVID-19 infection [10]. 'Probable case' was defined as any individual with symptoms compatible with COVID-19 and had close contact with a confirmed case of COVID-19 within the past 14 days. 'Confirmed case' was defined as 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 from February 12, 2020 using serological and PCR-based approaches. Serology was performed by SARS-CoV 2 IgG/IgM rapid diagnostic test (RDT; 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 Co. Ltd., Sun Yat-Sen University, Guangzhou, China) Both serological tests and RT-PCR were performed at the "Laboratoire de Virologie", INRSP, Nouakchott.

Treatment

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

Statistical analysis

Proportions were compared using Fisher exact test. 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 <0.05 was considered statistically significant. Computations were performed using MedCalc software for Windows, version 15.0 (MedCalc Software, Ostend, Belgium).

Results

Overall, 41,862 tests for Sars-Cov-2 were performed by July 1, 2020, with a mean of 377 tests per day during the study period (n = 111 days), and an average of 798 tests/day for the last 48 days. Of 41,862 tested individuals, 4,472 (10.7%), corresponding to an incidence rate of 1.1/1,000 persons, were positive for SARS-Cov-2, including 1,377 confirmed by RT-PCR, 2,561 by RDT, and 534 by both methods of diagnosis. Males were significantly more affected (57.1%; 2,554/4,472) than females (42.9%; 1,918/4,472) (*P < 0.0001*) (Table 1). Individuals of the age groups 15–34 and 35–54 years were the most affected with 1,602 (35.8%) and 1,635 (36.6%) positive cases, respectively.

The disease resulted in 129 (2.9%) deaths, corresponding to a mortality rate of 3 deaths/100,000 persons, 1,677 (37.5%) recoveries, and 2,666 (59.6%) active cases. There were no data on the disease severity among 1,677 recovered COVID-19 patients. Of 2,666 active cases, 2,261 (84.8%) were asymptomatic carriers, 394 (14.8%) symptomatic patients with mild symptoms, and 11 (0.4%) 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 ≥ 55 years (data not shown).

Of 4,472 positive cases, 4,241 (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 2,666 COVID-19 active cases, 2,283 (85.6%) were from Nouakchott, the capital city. There were no clear indications as to whether 1,667 recoveries from COVID-19 occurred after treatment with the recommended 'experimental' regimens or by spontaneous recovery.

Figure 2 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 June 19 and June 25, during which the maximum of COVID-19 tests were performed and 1,315/4,472 (29.4%) 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; $P < 0.001$) (Figure 3).

Discussion

Using the national case-based surveillance, the present study describes the epidemiological feature of COVID-19 outbreak in Mauritania. A low rate of mortality (2.9%) due to COVID-19 was observed during the period between March 13 and July 1, 2020 in Mauritania. This result is within the range of 1.6–6.5% reported for the same period in some neighboring 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 males (56.6%) and most deceased patients (72%) were aged ≥ 55 years [11, 12].

Mauritania has a young population with a majority of its inhabitants belonging to the age group between 24 and 45 years old [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 ≥ 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 favorable 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 March 13, 2020, the exponential growth phase in the number of positive cases was observed only from June. This could be due to the fact that the majority of initial cases of COVID-19 were detected among foreigners who had little contact with Mauritanians and the rapid riposte of the health authorities to trace few positive individuals who were in contact with them. The opposite situation was observed after the 40-day 'COVID-19-free' period, during which death of Mauritanians, who apparently had no history of contact with a COVID-19-infected patient, was announced. Increasing growth observed during June could be due to the exponential number of persons tested for COVID-19 during contact tracing.

During the study period, a relatively low prevalence (10.8%) 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, a 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 sero-prevalence 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].

To combat COVID-19 epidemic, preventive control measures were rapidly implemented in Mauritania. As a riposte against COVID-19, the Mauritanian authorities through an inter-ministerial 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 center received and processed thousands of calls daily.

Also, despite a mediatic controversies, 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, 18].

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

Ethics approval and consent to participate

Not Applicable.

Consent for publication

Not Applicable.

Availability of data

Data sharing not applicable to this article as no datasets were generated during the current study.

Declaration of competing interest

The authors declare no conflicts of interest.

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Author contributions

AV, MAB, AB, SML, JD, MSOAS, and MO collected data from the different sources. AOMSB, LB, and PP analyzed data, wrote the manuscript and approved the final draft. All authors read and approved the final manuscript.

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Figure 1. New daily confirmed cases of COVID-19 in Mauritania from March 13 to July 1, 2020

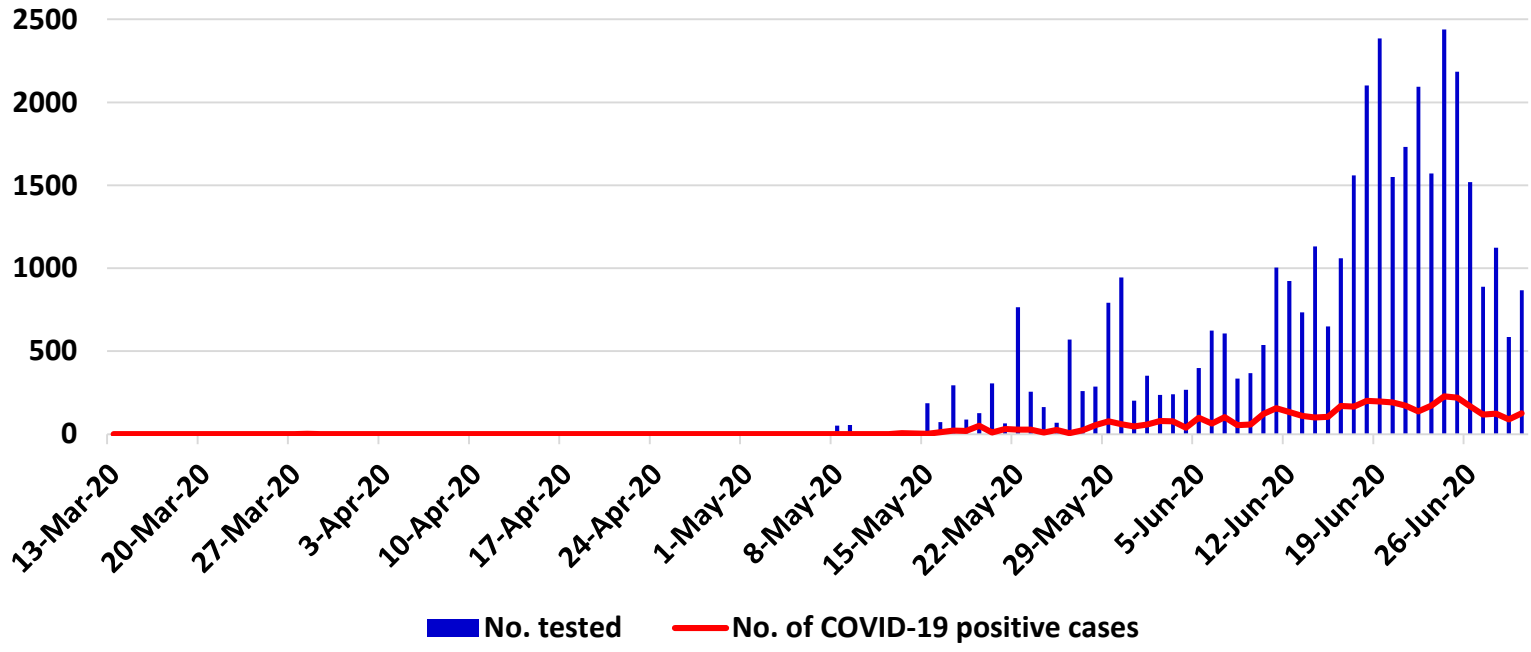
Figure 2. Correlation between the number of COVID-19 tests performed and the number of COVID-19 positive cases in Mauritania between March 13 and July 1, 2020.

Table 1. Demographic and clinical characteristics of patients with COVID-19 in Mauritania between March 13 and July 1, 2020

Characteristics	*n* (%)
Gender	
Male	2,554 (57.1)
Female	1,918 (42.9)
Age groups (year)	
0 – 14	275 (6.1)
15 – 34	1,602 (35.8)
35 – 54	1,635 (36.6)
≥ 55	960 (21.4)
Disease outcome	
Active cases	2,666 (59.6)
Recovery	1,677 (37.5)
Death	129 (2.9)
Disease severity among active cases*	
Asymptomatic	2,261 (84.8)
Mild symptoms	394 (14.8)
Severe symptoms	11 (0.4)
Source of infection	
Contact with confirmed case	4,241 (94.8)

No contact with confirmed COVID-19 case	133 (3.0)
Imported cases	98 (2.2)
Regional distribution of active cases	
Northern region	79 (2.9)
Southern region	262 (9.8)
Southeastern region	42 (1.6)
Nouakchott	2,283 (85.6)

n, number of cases; There were a total of 4,472 COVID-19-positive patients, as of July 1, 2020. We were not able to obtain data on disease severity among patients who recovered.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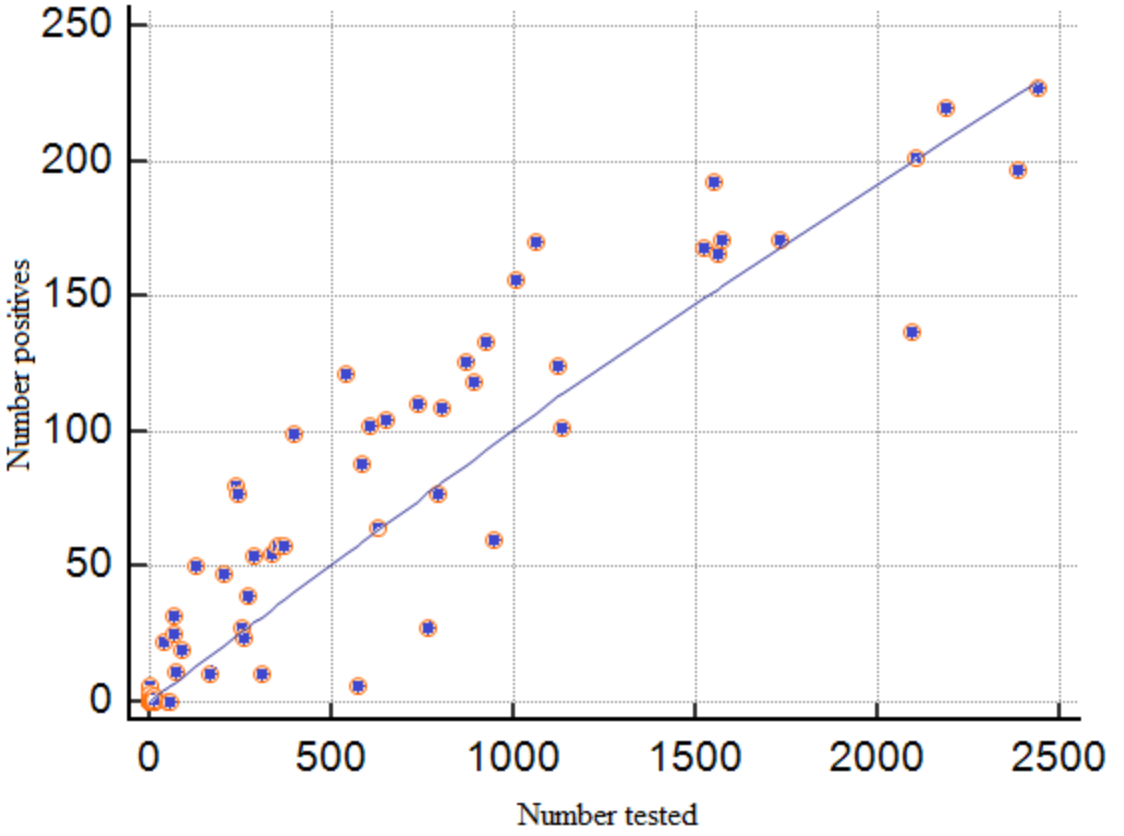
No. tested
No. of COVID-19 positive cases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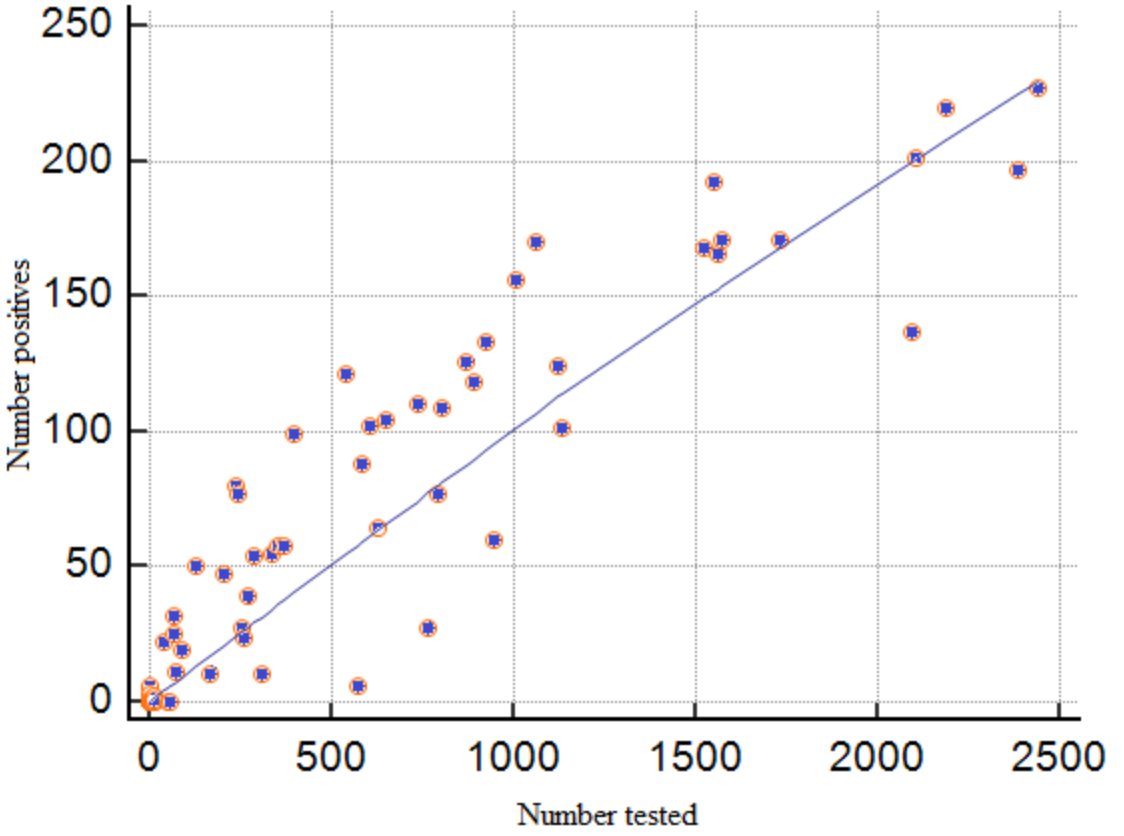
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