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Trends in Testing and Positivity in Banadir, Somalia During the First Seventeen Months of the Covid-19 Pandemic, 2020

Sulaiman Bangura
Department of Public Health, Texila American University, Sierra Leone

Abstract

Coronavirus Disease (Covid-19) is an infectious respiratory disease caused by a new strain of CoronaVirus. Many countries, including Somalia, have experienced two or more waves of the disease. The spread of Covid-19 in Banadir was a sporadic event distributed in many locations. The study aims to assess the time trends of Covid 19 testing positivity rate in the Banadir region of Somalia during the first seventeen months of the Covid-19 pandemic. A cross-sectional analytical study involving the review, analysis, and interpretation of existing dataset collected in the course of Covid-19 response between March 2020 and August 2021 to characterize the time trends of Covid 19 testing, compare the testing rates, attack rate, and positivity rates, and determine factors associated with positive Covid-19 tests in Banadir region. The categorical data were compared using a chi-square test. A total of 164 836 entries were analysed in this study. The majority (67.9%) of the participants were male, while close to a third (29.7%) were aged between 25-35 years, and 27.1% were aged 36-50 years. A total of 6,404(3.9%) participants tested positive for the Covid 19 virus. The chi-square test revealed bivariate association of age (P<0.001) and gender (P<0.001) were significantly associated with positive test results. Females and persons above 70 years had higher positivity of 4.4% and 13.7 %, respectively, compared to males and younger age groups. Banadir has recorded three waves of Covid 19 transmission from March 2020 to September 2021. Covid-19 vaccination uptake is needed to minimize spread.

Keywords*: Attack-rate, Covid-19, Positivity, Somali, Trends, Waves.*

Introduction

This first identified cases of respiratory illness were reported in Wuhan City, Hubei Province of China, and notified to the World Health Organization (WHO) in December 2019. On 30th January 2020, the WHO designated Covid-19 as a public health emergency of international concern and declared it a pandemic on 11th March 2020. By the fourth week of November 2021, over 261 million cases had been reported globally, with about 5.2 million associated deaths globally [1]. The majority of the people affected by the Covid-19 disease had experienced respiratory diseases with similar signs and symptoms and recovered with or without specific treatments [2]. Elderly people with underlying medical problems such as obesity, diabetes, cardiovascular disorders, chronic respiratory diseases, and cancer are more likely to develop severe illnesses [2,3].

From the onset of the pandemic, the Centers for disease control and prevention (CDC) anticipated that Africa would be the most devastated continent on the basis of poor healthcare infrastructure, weak health systems across individual countries, the poor state of preparedness, and widespread poverty. However, by the fourth week of November 2021, the continent had reported about 8.6 million cases, which was only 3.3% of the

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Corresponding Author: bangurasulaiman722@gmail.com

globally reported cases, with about 222,000 attributable deaths [4].

Somalia is a country that has been at war since 1991 and, for more than two decades, did not have a functioning government but rather was governed by warlords who controlled large swathes of Somalia's territory. The three decades of war have brought the governance systems and public sector services to near collapse.

At the time the first case was confirmed, the country did not have a laboratory with the capacity to test Covid-19 samples using the real-time Polymerase Chain Reaction (RT-PCR) technique. The first suspected case (of a student returning from China) involved the collection of specimens and transportation to a neighboring country (Kenya) for testing. Kenya was also under pressure to develop its own testing capacity, and although RT-PCR capacity existed, it had been developed over time for HIV/AIDS and the polio eradication programmes, among others [5, 6].

Besides the lack of testing capacity, Somalia also lacked specialized isolation facilities with life support equipment and had no pre-positioned personal protective equipment (PPE). With global supply chain gliding to a halt due to grounding of international flights, a ban on export for life-saving commodities and PPE by countries where manufacturing is done, coupled with increased demand by countries around the world and humanitarian donors rolling back humanitarian aid to address domestic crises, Somalia was at odds with projections. The country also has a sizeable human resource for health, characterized by unregulated training, weak standards (of training) enforcement, high turnover due to insecurity, and erratic funding (as over 60% of health care facilities are run by humanitarian actors), which is dependent on donor funding and priorities of those donors.

Somalia faced an uphill task to wean itself off its reliance on Kenya for testing, which was clearly unsustainable. Somalia needed to develop internal capacities in the middle of a pandemic and amid global supply glitches [7, 8]. It was, therefore a unique experience given the fragility and combination of external factors that makes Somalia an important country for this study. The analysis will identify missed opportunities in the past to shape future responses. The purpose of this study, therefore, is to explore the trends in testing Covid 19 in the Banadir region.

This study primarily analyzed data from a line list that contained both Somali residents as well as travelers who were not residing in Banadir. While travelers' data included people from Banadir, it is impossible to exclude such travelers from the rest of Somalia, who opted to be tested in Banadir, as testing capacity was first being conducted in the city. Banadir region is the capital city and, therefore better-testing infrastructure. As such, the findings of this study may not be generalizable to the rest of the country. However, the findings provide knowledge on the impact of the investment on the testing strategies in response to the Covid 19 pandemic in Somalia.

Thus, the study is to assess the time trends of Covid 19 testing positivity rate in the Banadir region of Somalia during the first seventeen months of the Covid-19 pandemic. Specific objectives were to characterize the time trends of Covid 19 testing; to compare the testing rates, attack rate, and positivity rates of Covid 19 infections; and to determine factors associated with positive Covid-19 tests in the Banadir region. This is the first study to document the testing trends and positivity rates in Somalia. The findings of this study will add to the body of knowledge on Covid testing as a response strategy in the control of the pandemic in resource-constrained settings. The study findings will inform policymakers and funders on the impact of testing infrastructure in place and indicate areas of improvement in response to infectious diseases pandemics such as the Covid 19 pandemic.

Materials and Methods

Study Design

This is a cross-sectional analytical study involving review, analysis, and interpretation of existing dataset collected in the course of Covid-19 response in the Banadir region of Somalia. The analysis looks at time trends in testing, positivity rate, and factors associated with positive results between 16th March 2020 (date of the index case in Somalia) and the end August 2021. The data was obtained from Banadir's line list of suspected Covid-19 cases and data from residents and travelers (domestic and international) who took the test as part of the mandatory travel requirement.

Study Site/study Area or Setting

Banadir region is one of the 18 administrative regions of Somalia, equivalent to a province. The region covers the city of Mogadishu, which serves as the capital. It is bordered to the northwest by the Shabelle River and to the southeast by the Indian Ocean. Banadir region is administered by a Regional Administration and is divided into 17 districts. Banadir region has a population of 3 million people projected from the population estimation survey of Somalia 2014.

Study population

The study analyzed an existing dataset that was extracted from Banadir line lists. The line lists comprise all suspected cases from the Banadir region together with travelers data, who required Covid-19 test results prior to international travel (Figure 1).

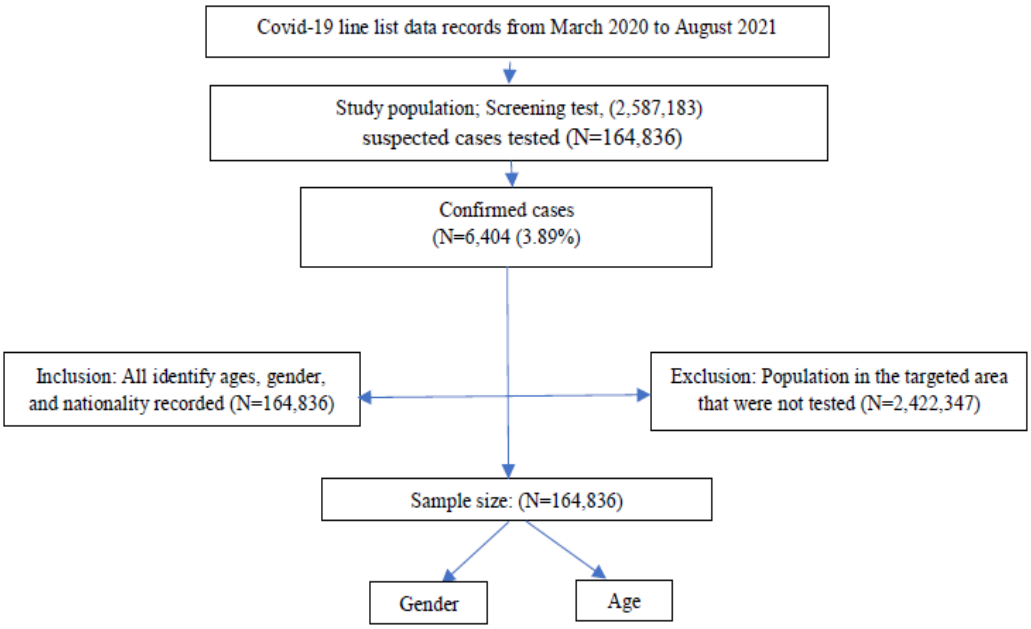

Figure 1. Study Population Derivation

Data Collection

The data set had been collected during routine testing for SARS CoV 2 in the Banadir region. The study involved a desk review of this dataset covering the period between March 2020 to August 2021.

Study Instruments

Covid-19 testing line lists, review of results for Genome Sequencing for Somalia, for triangulation of results of the analysis.

Data Analysis

The completed items of the Covid-19-line list and other relevant information was collected, collated, cleaned, and analyzed using descriptive statistics, and the result was presented in table and charts using basic excel. Additionally, Chi-square test was used to test the association between socio-demographic data and positive test results.

Ethical Considerations

Ethical approval was not required since the whole study was based on reviewing secondary aggregated data. Before data was obtained from a source, permission was obtained for the use of data from the National Institute of Health (NIH) in the Ministries of Health and partners of health that support surveillance systems and immunization in the country.

Results

Socio-demographic Characteristics and Test Results of the Participants

A total of 164,836 entries were analyzed in this study. A majority (67.9%) of the participants were male, while close to a third (29.7%) were aged between 25-35 years, and 27.1% were aged 36-50 years. A total of 6,404(3.9%) tested positive for the Covid 19 virus. The distribution is as shown in Table 1.

Table 1. Distribution of Persons tested by Age, sex, and laboratory results in Banadir

Variable	**N**	**N = 164,836[1]**	
Gender	164,836		
Female		52,971	32.1%
Male		111,865	67.9%
Age group	164,831		
18-24 years		24,840	15.1%
25-35 years		48,877	29.7%
36-50 years		44,697	27.1%
51-70 years		26,696	16.2%
Above 70 years		3,769	2.3%
Below 18 years		15,952	9.7%
Laboratory Results	164,836		
Negative		158,432	96.11%
Positive		6,404	3.89%

Time Trends of Covid 19 Testing in Banadir Region between March 2020 and August 2021

Banadir state has recorded three waves from March 2020 to September 2021, as shown in figure 1. The first wave was reported between April 2020 to July 2020, with the highest cases reported at 90 cases, while the second wave, which occurred between February 2021 and April 2021, reported the highest caseload of 220. The third wave started towards the end of July 2021 to September 2021, with the highest caseload of 70 cases. In between the waves, Banadir had a negligible number of Covid-19 cases (See Figure 2).

Testing Rates, Attack Rate, and Positivity Rates of Covid 19 Infections in Banadir Region

Testing increased gradually over time, peaking at epidemiological week 12 and week 33 of 2021 at 200 and 300 tests per 100,000 populations, as shown in Figure 3.

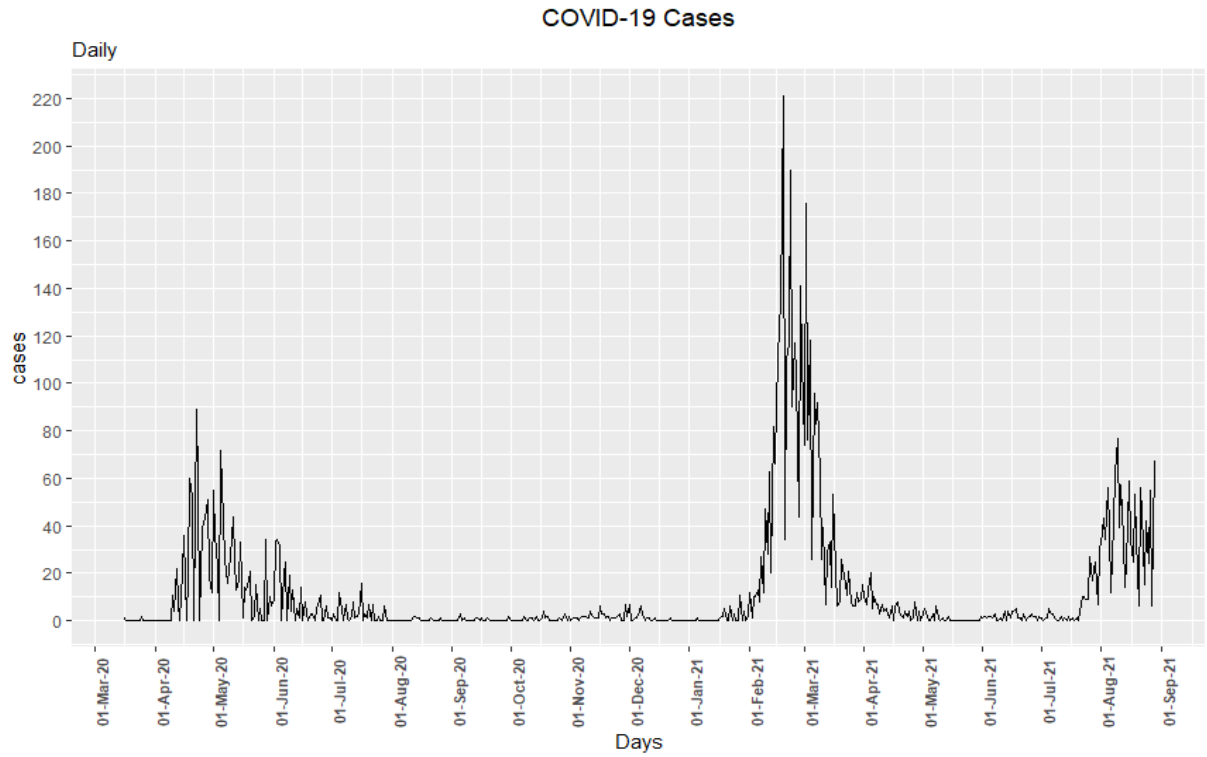

Figure 2. Distribution of Covid-19 Cases by Epidemiologic Week, Banadir Region

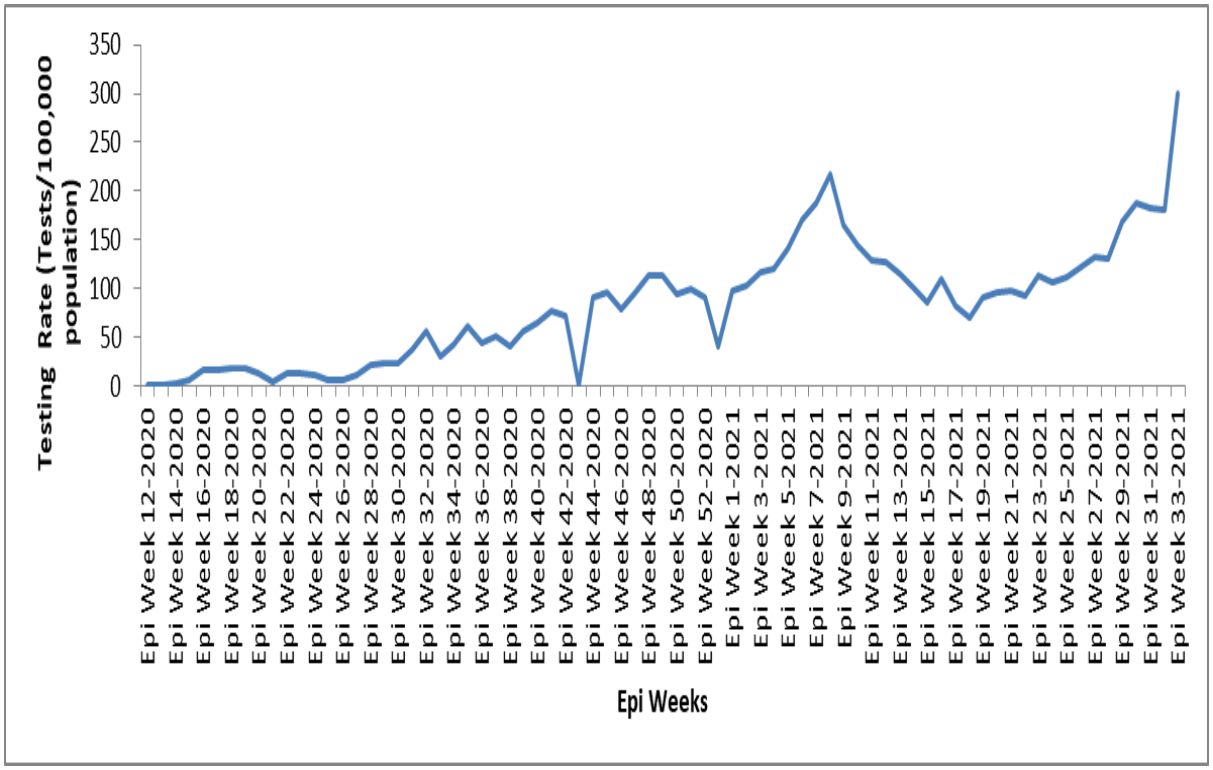

Figure 3. Trends in testing rates in Banadir Region per 100,000 population

The graph above shows the trends in the number of tests conducted per 100,000 populations, a measure that allows for comparison in testing between populations.

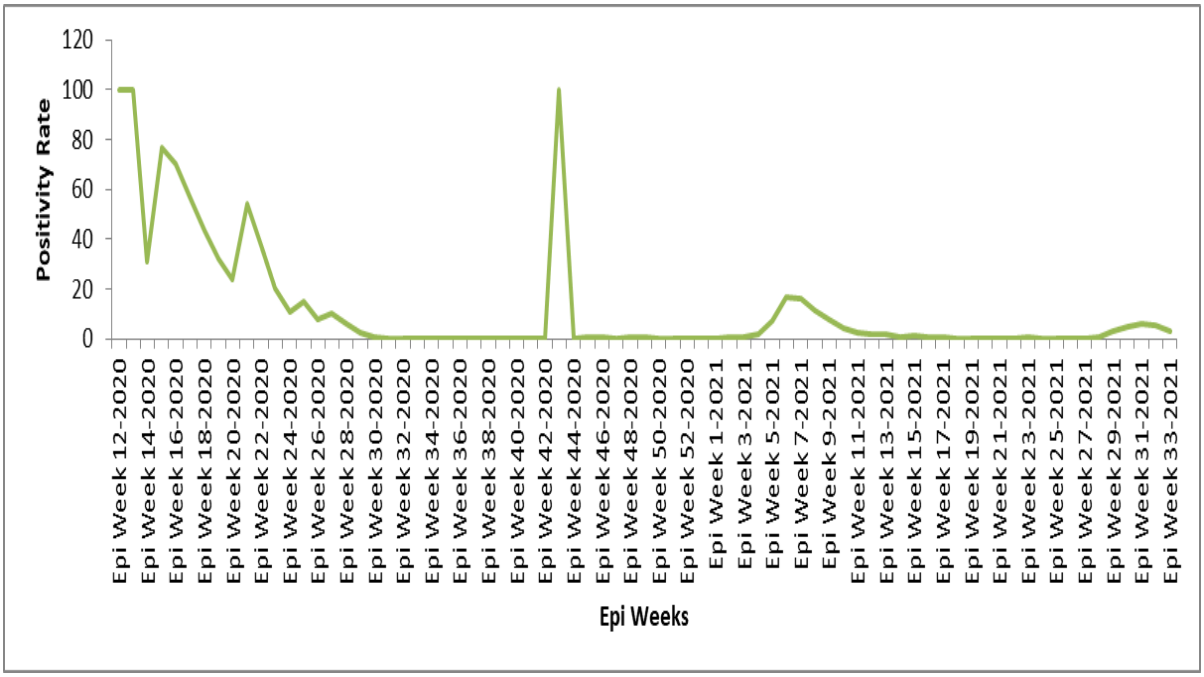

Figure 4. Trends in positivity rates, Banadir region

The average positivity rate was 3.9%. Initially, testing involved only a few symptomatic cases and therefore at the start of the pandemic, the positivity rate in the Banadir region was reported at almost 100%. However, the rate gradually declined over time as testing was widened and included asymptomatic cases and screening of travelers. A sharp increase in positivity rate was observed between epi week 42 and 44 of 2020 and epi week 3 and week 10 of 2021 (See Figure 4).

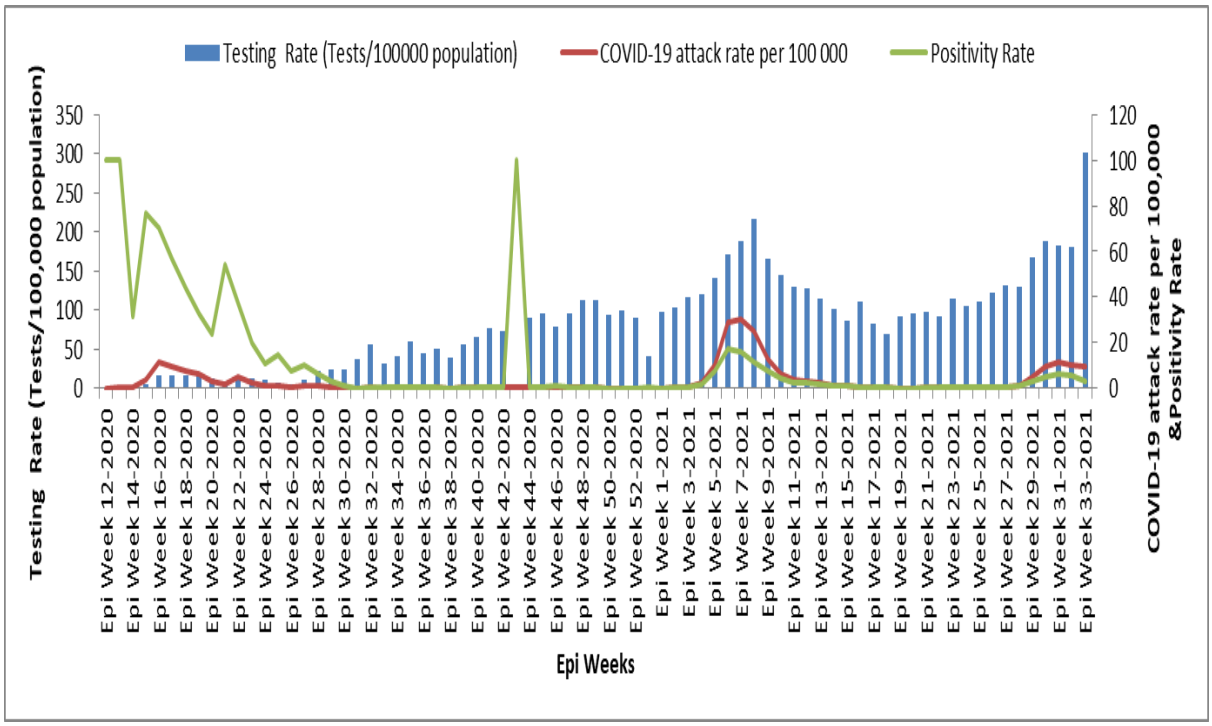

Figure 5. Comparison of Testing rate, Attack rate and Positivity

As shown in Figure 5, the positivity rate decreased with an increase in testing rates. Similarly, the attack rate increased gradually early in the pandemic in the Banadir region, with the highest rates occurring between epi week 3 and 13 of 2021 with 30 cases per 100000 populations. The attack rate remained below 5 per 100000 between epi week 24 of 2020 to epi week 3 of 2021, as shown in figure 5.

Factors Associated with Positive Covid-19 Tests in Banadir Region

Overall positivity was reported at 3.9%. The majority of cases were between the age of 25 to 50year old at 56%. Table 2 shows the cross-tabulation of Covid-19 positive cases by gender and age.

Table 1. Relationship between Gender and Age with Laboratory Outcomes, Banadir

Characteristic	Negative		Positive		Total	P-Value
Gender	**n**	**%**	**n**	**%**		
Female	50,623	95.6	2,348	4.4	52,971	<0.001
Male	107,809	96.4	4,056	3.6	111,865	
Age group(years)						
Below 18	15,824	99.2	128	0.8	15,952	<0.001
18-24	24,114	97.1	726	2.9	24,840	
25-35	46,883	95.9	1,994	4.1	48,877	
36-50	43,186	96.6	1,511	3.4	44,697	
51-70	25,169	94.3	1,527	5.7	26,696	
Above 70	3,251	86.3	518	13.7	3,769	

Bivariate association of age, gender, and the laboratory test outcome showed that age (P<0.001) and gender (P<0.001) were significantly associated with positive test results. Females and persons above 70 years reported a higher positivity rate of 4.4% and 13.7 %, respectively as shown in table 2.

Discussion

Time Trends of Covid 19 Testing and Distribution of Covid 19 Cases

The study revealed that Somalia had three waves of Covid- 19 in the last seventeen-month of the pandemic. Evidence shows that Covid 19 waves are driven by many factors, which include the effectiveness of vaccines over time, human behaviour, infection prevention policy, mutations of the coronavirus, the number of the susceptible in the society, and cold weather [9, 10]. The first wave occurred between April and June 2020. This wave could have been driven by the global trend in transmission as the virus was introduced in Somali, and the community had no prior exposure to the virus. The wave also coincided with the rainy season, which is a relatively cold season in Banadir.

The second wave, which occurred in February 2021 to June 2021, had the highest caseload of 220 and corresponded with the rainy season in Banadir. The wave could also be attributed to the occurrence of new Covid-19 variants. Data from unpublished genome sequencing from samples tested during this wave showed the dominant variant in circulation was beta (B.1) South African variant. Similarly, the third wave, which occurred in July to September 2021, may have been driven by mutant variants, mainly the delta variant (unpublished genome sequencing data). Although the Covid 19 vaccines had been introduced by April 2021 through the Covax facility, the uptake was low as vaccines targeted high-risk population subgroups which included people with co-morbidity, health workers,

teachers, police and armed forces, and the elderly.

Testing Rates, Attack Rate, and Positivity Rates of Covid 19 Infections in Banadir Region

Testing rates increased over time; however it remained below 300 tests /100,000 populations while the attack rate remained below 5 per 100,000 populations. The average positivity rate in the Banadir region was 3.9. During the study period, the positivity rate has been on a decline with the exception of periods when the state was experiencing a wave. This has also been shown in global studies related to attack rate and risk factors of Covid 19 [11, 12].

We observe that access to Covid-19 testing in Banadir was suboptimal. Similar patterns have been observed especially in Sub-Saharan Africa, where constraints to access to HIV testing were described [13, 14]. Access to testing in Somali like any other country, is still suboptimal, and this is evidence by the low testing rate and attack rate.

Factors Associated with Positive Covid-19 Tests in Banadir Region

In the current study the males tested were twice as many as females and this was also observed among the Covid-19 positive cases. The finding is similar to what has been described globally. Evidence has shown exposure to Covid 19 is associated with behaviors, occupations, and societal and cultural norms among the different gender that also impact on the probability of access to testing and healthcare [15, 16, 17]. Males were more likely to travel and access testing compared to female in a country like Somali where social norms define women as homemakers. In Somali culture, males are the heads of households and are the breadwinners while females are expected to play the role of housewives, bringing up children. Majority of males are traders, and they were bound to interact and mingle more with other traders and customers, increasing their risk of exposure.

Although the positivity rate was higher in females at 4.4% compared to that of males at 3.6%, the number of positive males (4,056) were twice those of females (2,348). The data is not conclusive whether the prevalence of Covid-19 was higher in either sex or the observed low positivity rate among men was due to an increased rate of testing. Evidence from other studies show that the number of Covid-19 cases are comparable between men and women; however, the severity of disease and death is two times greater for men than for women [16, 17, 18, 19].

Similarly, Covid-19 positivity increased with age, with the highest positivity being recorded among those older than 70 years. This could be attributed to a more severe presentation of older patients due to the possible presence of comorbidities, unlike the younger population. This is in agreement with other studies that show Covid-19 is more prevalent among persons aged above 50 years [17, 22, 23] In terms of age, Somalia has a youthful population, and it is estimated that 75% of the population is aged below the age of 30 years (Population Estimation Survey UNFPA 2014) which could be attributed to the generally low positivity rate.

Similarly, resistance to adhere to movement restriction at the peak of the first and second waves could have contributed to the increasing positivity rate. For instance, mosques remained open for the better part of the period of lockdown, and the government did not have sufficient capacity to enforce the lockdown due to the nature of the security environment in the country. There was also reported and observed resistance to the use of recommended preventive measures in the study area, which could have contributed to increasing positive cases. This included hesitance to the use of face masks, keeping physical distancing and regular handwashing, or using alcohol-based hand sanitizers.

The availability of vaccines and subsequent acceptance/hesitance presented obstacles to limiting population transmission. The first batch

of vaccines became available in March 2021 through the COVAX facility. The poor health infrastructure, limited refrigeration capacity (no capacity existed to support the roll out of Pfizer BioNTech and Moderna vaccines), and the misinformation campaigns about safety and efficacy of vaccines circulated in social media in the period corresponding to the time of rollout. Perceptions regarding Covid-19 vaccine efficacy, acceptability, hesitancy, and decision making to take vaccine among general adult populations is highlighted in other studies [24, 25].

Conclusions and Recommendations

From March 2020 to September 2021, three waves of Covid 19 transmission were observed in Banadir state.

Despite the fact that testing increased over time, the Covid 19 testing rate remained substandard at 300 tests per 100,000 people.

The average level of positivity was 3.9 %. Females had a higher positivity rate (4.4%) than males (3.6%), but there were twice as many males tested as females, and the number of male positive cases was twice as high as the number of female positive cases.

Participant age ($P<0.001$) and sex ($P<0.001$) were significantly associated with positive Covid 19 results.

While the focus is shifting towards vaccination, access to Covid-19 testing should be prioritized to enhance early diagnosis and hence timely response.

While we did not gather data on why fewer women were tested, more research on women's access to testing and factors related to suboptimal testing is needed to guide testing implementation and, by proxy, potentially provide information on Covid-19 vaccination access.

Geographic variation in testing still exists, but this can be addressed by expanding universal testing availability.

Conflict of Interest

The author declare that he has no conflicts of interest regarding the publication of this paper.

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