Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Chapter 15

Coronavirus disease 2019 in Africa: why the recent spike in cases?

Olutosin Ademola Otekunrin[1], Alloysius Chibuike Ogodo[2], Folorunso Oludayo Fasina[3,4], Muhammad Akram[5], Oluwaseun Aramide Otekunrin[6] and Chukwuebuka Egbuna[7,8]

[1]*Department of Agricultural Economics and Farm Management, Federal University of Agriculture, Abeokuta (FUNAAB), Abeokuta, Ogun State, Nigeria;* [2]*Department of Microbiology, Faculty of Pure and Applied Sciences, Federal University Wukari, Wukari, Taraba State, Nigeria;* [3]*Emergency Centre for Transboundary Animal Diseases, Food and Agriculture Organization of the United Nations (FAO-ECTAD), Dar es Salaam, Tanzania;* [4]*Department of Veterinary Tropical Diseases, University of Pretoria, Pretoria, Gauteng, South Africa;* [5]*Department of Eastern Medicine, Government College University Faisalabad, Faisalabad, Punjab, Pakistan;* [6]*Department of Statistics, University of Ibadan, Ibadan Oyo State, Nigeria;* [7]*Department of Biochemistry, Faculty of Natural Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State, Nigeria;* [8]*Nutritional Biochemistry and Toxicology Unit, World Bank Africa Centre of Excellence, Centre for Public Health and Toxicological Research (ACE-PUTOR), University of Port-Harcourt, Port Harcourt, Rivers State, Nigeria*

Chapter outline

Coronavirus Drug Discovery. https://doi.org/10.1016/B978-0-323-85156-5.00047-X

15.1 Introduction

The global emergence of novel coronavirus disease (COVID-19) in December 2019 became a major turning point in global health. The disease was first reported from the city of Wuhan, Hubei Province, China. The Chinese government officially reported the first confirmed and diagnosed case to the World Health Organization (WHO) on December 8, 2019 [1]. On March 11, 2020, WHO declared COVID-19 a global pandemic [2,3]. As of July 21, 2020, 14,562,550 confirmed cases and 607,781 deaths have been reported globally [4]. Table 15.1 shows the current situation report per region across the world, and to date, the Americas have the highest number of cases and fatalities (7,702,075; 311,569) while the Western Pacific region remains the continent with the lowest confirmed cases (266,190) and deaths (8077) based on reported and confirmed cases [4].

While the number of cases, management, and control protocols were similar globally, the application thereof differed significantly across countries and regions. For instance, for over 3 months, one-third of countries globally was under COVID-19 lockdown. During such lockdowns, staying at home was enforced with permission to go out only for extremely important reasons (food, medical items, and other essential commodities). It is expected that COVID-19 resulted in a drop in household consumption, purchasing power, and a shift in lifestyle and spending habits [5,6].

As of May 4, 2020, South Africa, Egypt, and Nigeria had 6783, 6465, and 2558 confirmed cases, respectively [7]. Surprisingly, South Africa is now grappling with 373,628 cases and 5173 deaths, Egypt with 88,402 cases and 4352 deaths, while Nigeria has 37,225 cases with 801 deaths [8]. Many

TABLE 15.1 Situation report in numbers (WHO region) as of July 21, 2020.

Region	Cases (n)	Deaths (n)
Globally	14,562,550	607,781
Africa	611,185	9,898
Americas	7,702,075	311,569
Eastern Mediterranean	1,400,544	35,145
Europe	3,103,674	207,958
South-East Asia	1,478,141	35,121
Western Pacific	266,190	8,077

Based on WHO. WHO coronavirus disease (COVID-19) situation reports 183. Retrieved from: https://www.who.int/docs/default-source/wha-70-and-phe/20200721-covid-19-sitrep-183.pdf?sfvrsn=b3869b3_2. [Accessed 23 July 2020].

African countries that were not having any reported cases of COVID-19 before now have confirmed cases while some are experiencing a huge rise in the number of confirmed cases due to severe acute respiratory syndrome coronavirus (SARS-CoV-2). To date (as of July 21, 2020), according to the current situation report, African COVID-19 cases and deaths stand at 736,288 and 15,418, respectively [8]. The top five countries in terms of number of confirmed cases are South Africa, Egypt, Nigeria, Ghana, and Algeria.

Most African countries are inadequately prepared to combat this virus. Poor health infrastructures lead to poor disease surveillance and response systems, and the health facilities are often ill-equipped for efficient management of cases [9–11]. Hence, the inability to carry out rapid tests on probable and suspected COVID-19 infected persons leads to low number of cases reported from Africa in the early weeks of the spread of the virus on the continent in comparison to details from other parts of the world. In recent times, most African countries have shored-up capacity for testing and management of cases in view of enormous internal and externally generated relief funds from relevant stakeholders, international, nongovernmental, and corporate organizations; hence, recent epidemiological events have shown significant increase in numbers of COVID-19 cases originating from Africa (Table 15.2).

15.2 COVID-19 in Southern African region

The first COVID-19 confirmed case in South Africa was reported on March 5, 2020 in a male returnee from Italy, while the first record of death was on

TABLE 15.2 African regions with reported laboratory-confirmed COVID-19 cases, recoveries, and deaths. Data as of 9 a.m. EAT, July 21, 2020.

African region	Number of cases	Number of recoveries	Number of deaths
Central Africa	43,466	26,579	3,859
Eastern Africa	57,031	30,814	1,403
Northern Africa	138,332	65,279	5,960
Southern Africa	388,019	199,872	5,465
Western Africa	109,440	69,354	1,731
Total	**736,288**	**391,898**	**15,418**

Based on Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic; 2020. CDC. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].

March 27, 2020 [12]. Ten days after the reported case, the number of confirmed COVID-19 cases rose to 61, and by March 23, South Africa alone had about 402 confirmed cases [12]. The Southern African regions have continued to experience hike in the number of confirmed cases, and currently as of July 21, 2020, the total number of confirmed cases in the region has risen to 388,019 with 5465 deaths and 199,872 recoveries (Table 15.3). South Africa remained the country with the highest number of confirmed cases both in the continent and in the Southern African countries with 373,628 cases, 5173 deaths, and 194,865 recoveries [8].

15.3 COVID-19 in Central African region

The current statistics show that central African region had recorded a total of 43,466 confirmed cases of COVID-19 with 3859 deaths which are still envisaged for more increase. This region has been reported to have the least number of COVID-19 confirmed cases in the continent with Burundi as the least affected country with 328 confirmed cases, 237 recoveries, and 1 death (Table 15.4). However, cases in Cameroon have continued to increase with more than 16000 cases followed by DR Congo (8443) and Gabon (6433) [8].

TABLE 15.3 Reported confirmed cases of COVID-19 in Southern Africa Region as of July 21, 2020.

S/N	Country	Number of confirmed cases	Number of recoveries	Number of deaths
1.	Angola	749	29	221
2.	Botswana	522	48	01
3.	Eswatini/ Swaziland	1,826	850	23
4.	Lesotho	359	69	6
5.	Malawi	3,045	1,180	64
6.	Mozambique	1,507	505	11
7.	Namibia	1,344	42	4
8.	South Africa	373,628	194,865	5,173
9.	Zambia	3,326	1,620	128
10.	Zimbabwe	1,713	472	26
	Total	**388,019**	**199,872**	**5,465**

Based on Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic; 2020. CDC. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].

TABLE 15.4 Reported confirmed cases of COVID-19 in Central Africa Region as of July 12, 2020.

S/N	Country	Number of confirmed cases	Number of recoveries	Number of deaths
1.	Burundi	328	237	1
2.	Cameroon	16,157	13,728	373
3.	Central African Republic	4,548	1,400	55
4.	Chad	889	801	75
5.	Congo	2,851	666	50
6.	DR Congo	8,443	4,335	194
7.	Equatorial Guinea	3,071	842	51
8.	Gabon	6,433	4,034	46
9.	Sao Tome and Principe	746	536	14
	Total	**43,466**	**26,579**	**3,859**

Based on Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic; 2020. CDC. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].

15.4 COVID-19 in Eastern Africa region

The East African region has remained the second region in the continent with the less number of confirmed cases and least number of deaths (1403) compared to other regions. There were no records of deaths due to COVID-19 in countries like Uganda, Seychelles, and Eritrea. However, countries like Ethiopia, Kenya, and Madagascar have reported high number of confirmed cases in the region (Table 15.5).

15.5 COVID-19 in Northern Africa region

The North African region of the continent is not an exception in the reported increasing trends in the COVID-19 infection in Africa. According to Africa CDC [8], a total of 138,332 cases have been confirmed in North African countries as of July 21, 2020. Egypt is on the lead in this region with 88,402 confirmed cases followed by Morocco (17,562) and Algeria (23,084) (Table 15.6).

TABLE 15.5 Reported confirmed cases of COVID-19 in Eastern Africa Region as of July 21, 2020.

S/N	Country	Number of confirmed cases	Number of recoveries	Number of deaths
1.	Comoros	334	313	7
2.	Djibouti	5,020	4,868	56
3.	Eritrea	251	155	0
4.	Ethiopia	10,511	5,290	173
5.	Kenya	13,771	5,616	238
6.	Madagascar	7,153	3,788	62
7.	Mauritius	343	332	10
8.	Rwanda	1,629	838	5
9.	Seychelles	108	11	0
10.	Somalia	3,130	1,462	93
11.	South Sudan	2,211	1,185	45
12.	Sudan	10,992	5,707	693
13.	Tanzania	509	178	21
14.	Uganda	1,069	1,071	0
	Total	**57,031**	**30,814**	**1,403**

Based on Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic; 2020. CDC. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].

15.6 COVID-19 in Western Africa region

In the West African region, the spread of COVID-19 was rapid after the confirmation in countries like Nigeria, Senegal, and Burkina Faso. Moreover, Senegal confirmed her first three cases of community transmission on March 12, 2020 [13,14]. Currently, a total of 109,440 cases were based on Africa CDC [8] update at July 21, 2020 with a total of 69,354 recoveries and 1731 deaths (Table 15.7). From the report, Nigeria (37,225) had the highest number of confirmed cases in West African region followed by Ghana (28,430) and Côte d'Ivoire (14,312) while Gambia (112) had the least confirmed cases of COVID-19.

TABLE 15.6 Reported confirmed cases of COVID-19 in Northern Africa Region as of July 12, 2020.

S/N	Country	Number of confirmed cases	Number of recoveries	Number of deaths
1.	Algeria	23,084	16,051	1,078
2.	Egypt	88,402	28,924	4,352
3.	Libya	1,980	441	49
4.	Mauritania	5,923	3,632	155
5.	Morocco	17,562	15,132	276
6.	Tunisia	1,381	1,099	50
	Total	**138,332**	**65,279**	**5,960**

Based on Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic; 2020. CDC. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].

15.7 Country-specific example: COVID-19 pandemic in Nigeria

In Nigeria, COVID-19 was first reported on February 27, 2020 in a 44-year old Italian diagnosed of the virus in Lagos State. As of this day (February 27, 2020), a total of 85,403 confirmed cases was reported in 49 countries globally (95.5% of the cases in China) with 2924 deaths while only three African countries (Egypt, Algeria, and Nigeria) have been affected [15]. According to the Nigeria Center for Disease Control (NCDC), the number of confirmed cases of COVID-19 rose gradually and consistently to 37,801 with 805 fatalities and 15,677 recoveries by July 21, 2020 (Fig. 15.1). Table 15.8 shows the number of cases, recoveries, fatalities, and total number of active cases in the country for May 15 and July 21, 2020, respectively. Lagos State remained the epicenter of this disease in Nigeria with the highest number of cases, recoveries, deaths, and total active cases [16,17].

Fig. 15.1 reveals the unprecedented rise in the number of COVID-19 cases in each state in Nigeria. Lagos State recorded 2278 cases on May 15, 2020 but had 13,626 as of July 21, 2020 [16,17]. However, in all the 36 states and the Federal Capital Territory (FCT), Sokoto and Kogi states were the only states with zero active case as of July 21, 2020 [16]. The number of cases rose, nationally from 5445 to 37,801 cases within 10 weeks. The number of deaths has also increased from 171 to 805 while the number of those that recovered

TABLE 15.7 Reported confirmed cases of COVID-19 in Western Africa Region as of July 21, 2020.

S/N	Country	Number of confirmed cases	Number of recoveries	Number of deaths
1.	Benin	1,602	782	31
2.	Burkina Faso	1,065	913	53
3.	Cape Verde	2,071	1,063	21
4.	Côte d'Ivoire	14,312	8,659	92
5.	Gambia	112	57	4
6.	Ghana	28,430	24,901	153
7.	Guinea	6,544	5,511	39
8.	Guinea-Bissau	1,950	906	26
9.	Mali	2,475	1,851	121
10.	Niger	1,105	1,014	69
11.	Nigeria	37,225	15,333	801
12.	Senegal	8,948	6,002	170
13.	Sierra Leone	1,711	1,261	66
14.	Togo	783	554	15
	Total	**109,440**	**69,354**	**1,731**

Based on Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic; 2020. CDC. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].

increased from 1320 to 15,677 within the same period [16,17]. It should be understood that the epidemiology of COVID-19 remains dynamic in Nigeria, hence there is a need for regular updates as events unfold.

With consideration to sex distribution, the total number of cases in Nigeria from April 20 to July 21, 2020 is displayed in Fig. 15.2. Specifically, as of April 20, 2020, 463 (70%) males and 202 (30%) females were infected, while as of July 21, 2020, a significant increase in total cumulative cases had occurred totaling 24,379 (64%) for males and 13,422 (36%) for females (Figs. 15.1 and 15.2). The COVID-19 fatality rate in Nigeria was 3% as of April 20, but has dropped to 2.1% on July 21, 2020 [16,17].

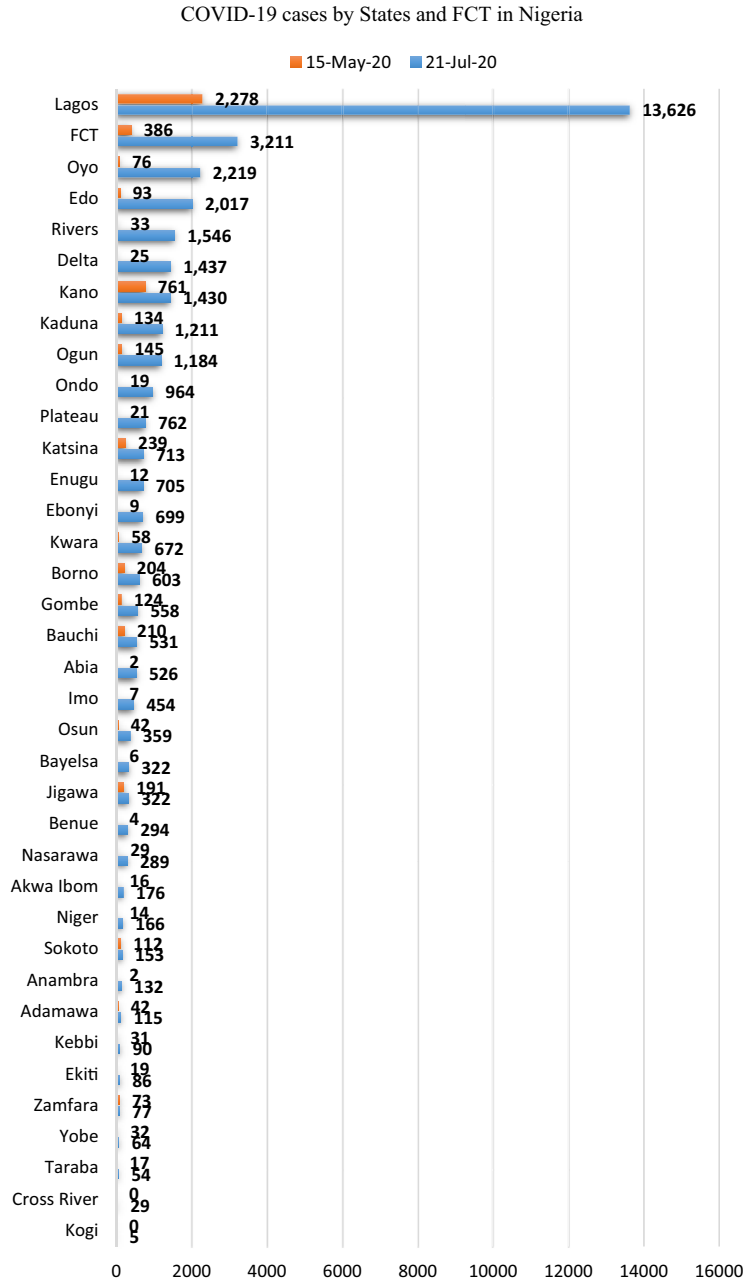

FIGURE 15.1 Number of cases of COVID-19 in 36 states and Federal Capital Territory (FCT) in Nigeria. *Based on Nigeria Centre for Disease Control (NCDC). COVID-19 situation report; February 29, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 15 June 2020]; NCDC. COVID-19 situation report; July 21, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 23 July 2020]; Nigeria Centre for Disease Control (NCDC). COVID-19 situation report; May 15, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 17 June 2020].*

TABLE 15.8 Nigeria COVID-19 Situation report of States with reported laboratory-confirmed COVID-19 cases, recoveries, deaths, and active cases from May 15 to July 21, 2020.

	Confirmed cases		Recoveries		Deaths		Total active cases	
State	15 May	21 July	15 May	21 July	15 May	21 July	15 May	21 July
Lagos	2,278	13,626	541	1,993	36	177	1,701	11,456
FCT	386	3,211	88	943	7	39	291	2,229
Oyo	76	2,219	28	1,120	2	20	46	1,079
Edo	93	2,017	27	1300	5	68	61	649
Rivers	33	1,546	10	1,039	3	49	20	458
Delta	25	1,437	9	634	4	39	12	764
Kano	761	1,430	90	1,125	33	53	638	252
Kaduna	134	1,211	53	931	3	12	78	268
Ogun	145	1,184	59	900	5	23	81	261
Ondo	19	964	11	143	1	22	7	799
Plateau	21	762	4	349	0	18	17	395
Katsina	239	713	29	441	12	23	198	249
Enugu	12	705	2	371	0	17	10	317
Ebonyi	9	699	1	572	0	18	8	109

Kwara	58	672	12	188	1	14	45	470
Borno	204	603	44	521	20	35	140	47
Gombe	124	558	90	510	2	23	32	25
Bauchi	210	531	41	506	3	13	166	12
Abia	2	526	1	391	0	3	1	132
Imo	7	454	2	87	0	9	5	358
Osun	42	359	30	155	4	10	8	194
Bayelsa	6	322	3	200	0	21	3	101
Jigawa	191	322	4	308	3	11	184	3
Benue	4	294	0	53	0	6	4	235
Nasarawa	29	289	5	113	1	8	23	168
Akwa Ibom	16	176	12	121	2	3	2	53
Niger	14	166	2	112	0	9	12	45
Sokoto	112	153	53	112	13	16	46	0
Anambra	2	132	1	67	0	12	1	53
Adamawa	42	115	11	85	0	9	10	21
Kebbi	31	90	11	74	4	7	16	9
Ekiti	19	86	13	47	1	2	5	37
Zamfara	73	77	29	71	5	5	39	1

Continued

TABLE 15.8 Nigeria COVID-19 Situation report of States with reported laboratory-confirmed COVID-19 cases, recoveries, deaths, and active cases from May 15 to July 21, 2020.—cont'd

	Confirmed cases		Recoveries		Deaths		Total active cases	
State	15 May	21 July	15 May	21 July	15 May	21 July	15 May	21 July
Yobe	32	64	3	53	1	8	28	3
Taraba	17	54	1	11	0	0	16	43
Cross River	0	29	0	3	0	1	0	25
Kogi	0	5	0	3	0	2	0	0
Total	**5,445**	**37,801**	**1,320**	**15,677**	171	805	**3,954**	**21,319**

Note: States including FCT are arranged in descending order by the number of total confirmed cases.
Based on NCDC. COVID-19 situation report; July 21, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 23 July 2020].

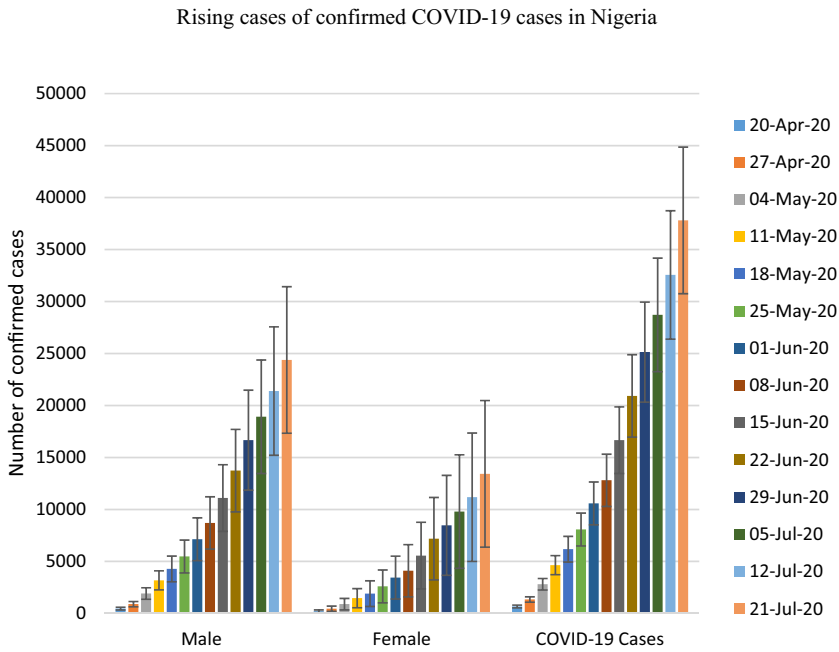

FIGURE 15.2 Sex distribution of COVID-19 cases in Nigeria (April 20–July 21, 2020). *Authors' graph using data from Nigeria Centre for Disease Control (NCDC). COVID-19 situation report; February 29, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 15 June 2020]; NCDC. COVID-19 situation report; July 21, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 23 July 2020]; Nigeria Centre for Disease Control (NCDC). COVID-19 situation report; May 15, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 17 June 2020].*

15.8 Why is Nigeria and other African countries experiencing continuous spike in COVID-19 cases?

Nigeria is the most populous country in Africa with approximately 200 million people, but over 95 million people live in extreme poverty as of April 14, 2020 [18]. The current spike in cases of COVID-19 in Nigeria comes with a different "outlook." It is a situation of "a crisis within a crisis" because Nigeria currently battles with the challenges of highest population of poor people in the world, poor infrastructure, poor service delivery in terms of health and nutrition, and a host of other challenges [18–23]. The majority of people in Nigeria live on daily income with meager or no savings. The pandemic and the attendant lockdown measures in the states of the federation have disrupted the livelihoods of most citizens, and although no specific empirical data exist yet, anecdotal evidence suggests an increase in the number of poor and hungry

people in the country [23]. In this situation, breadwinners in the family and heads of households are under intense pressure to break the lockdown rule and go out to look for means of livelihoods. This situation intensifies COVID-19 transmission dynamics with implications on the increased number of cases.

To date, a significant percentage of Nigerian population and Africans too has not believed that COVID-19 exists because they are yet to see infected and hospitalized persons. The erroneous campaign that people may drop dead in the streets has also not happened and further emboldened doubters on the nonexistence of the virus and fueled theory that it was just a political gimmick. The situation of perceived increased extreme hunger and abject poverty mentioned above made many Nigerians to avoid compliance with the WHO and NCDC guidelines [19–21]. These guidelines have previously given prescriptions on the observation of personal and respiratory hygiene including but not limited to social (physical) distance, regular washing of hands with running water, or using alcohol-based (over 65% alcohol) hand sanitizer, avoiding crowded spaces and the use of face masks.

Realistically, and using the scale of livelihoods versus public health, while people still believe in health and personal safety, many Nigerians perceived hunger as a much dire issue that needs immediate attention in comparison with the COVID-19 pandemic [23]. Hence, we have observed the loss of personal sense of responsibility with regards to taking cognizance of the health guidelines. In addition, the enforcement of the guidelines by law enforcement agents has largely been ineffective including the ban on interstate movements. Unscrupulous persons have been alleged to bribe the officers to conduct unpermitted interstate travels with implications on community spread of the virus in the country. Furthermore, we believed that the increase in testing capacity must have contributed to the observed spike in cases of COVID-19 tests in the country (Fig. 15.3). The cumulative number of samples tested has increased from 8587 on May 15, 2020 to 134,257 on June 29, 2020, in just a space of 44 days. Similar trend has been observed for the various regions in Africa (Fig. 15.4).

Similarly, based on WHO observatory health data, most countries in West Africa and other regions of the continent are characterized with less than five hospital beds per 10,000 of the population and less than two medical doctors per 10,000 of the population with majority of the countries having less than $50 per capita expenditure on health [24]. These factors may have contributed to the spike in the confirmed cases of COVID-19 in Africa. More so, risk factors such as hypertension and other disease conditions including malaria and human immunodeficiency virus (HIV) infections may be contributing factors [25]. The continent's inadequate health facilities, prevalence of malnutrition, malaria, tuberculosis, poor economy, and large number of immunocompromised individuals could contribute to challenges in controlling the spread of COVID-19 in Africa [26].

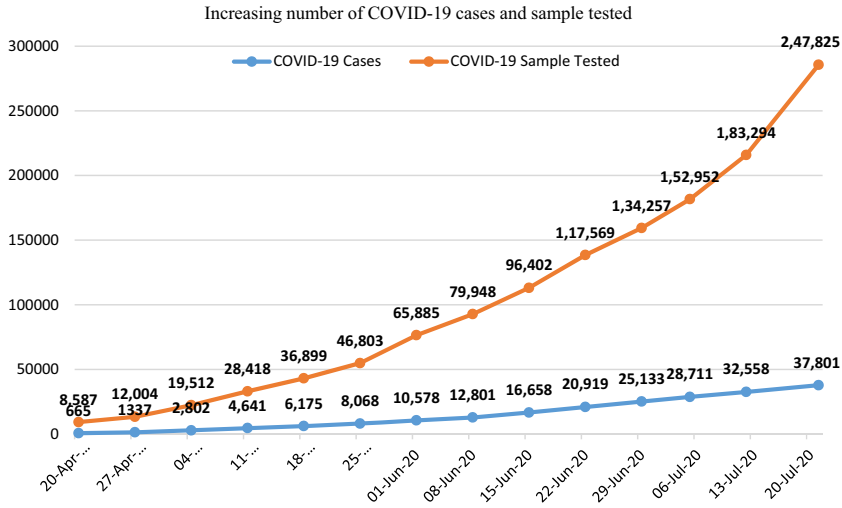

FIGURE 15.3 Increasing number of COVID-19 cases and sample tested in Nigeria (April 20–July 21, 2020). *Authors' graph using data from Nigeria Centre for Disease Control (NCDC). COVID-19 situation report; February 29, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 15 June 2020]; NCDC. COVID-19 situation report; July 21, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 23 July 2020]; Nigeria Centre for Disease Control (NCDC). COVID-19 situation report; May 15, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 17 June 2020].*

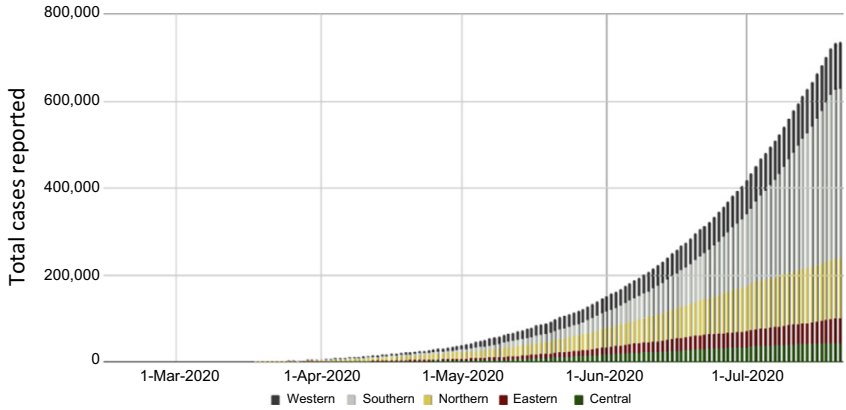

FIGURE 15.4 Regional spike in COVID-19 in Africa [8].

15.9 Future perspectives

The proper control of COVID-19 in Africa lies in effective early identification with swift contact tracing and physical isolation, health system measures, and community engagement [14]. There should be efforts to limit morbidity and death from COVID-19 by ensuring that access to healthcare equipment and supplies are sustained in health facilities. There should be adequate ventilators, oxygen, intensive care units, and medications as well as emergency units and employment of health personnels. Sustaining the economy through social welfare/investment schemes and poverty eradication programs as well as widespread and systematic surveillance, diagnosis, and testing could contribute to the control of widespread COVID-19 pandemic in the continent.

15.10 Conclusion

The rising number of confirmed cases in Africa is a source of worry to the public health authorities because the continent's situation of the virus outbreak is that of "concatenated crisis" due to crisis of hunger, poor medical facilities, lack of test kits, challenging governance, and reduced revenues amidst COVID-19 pandemic. With the continued effort of the health sector in curtailing the virus spread and the political will of the African government in providing succor to the citizens in this critical period of the pandemic, it is hoped that the disease will be eradicated and controlled. We recommend continued adherence to personal and respiratory hygiene protocols based on the WHO guidelines to keep safe in this COVID-19 pandemic period in the continent.

List of abbreviations

COVID-19 Coronavirus disease 2019
HIV Human immunodeficiency virus
NCDC Nigeria Center for Disease Control
SARS-CoV-2 Severe acute respiratory syndrome coronavirus 2
WHO World Health Organization

References

[1] Verity R, Okell LC, Dorigatti L, Winskill P, Whittaker C, Imai N, Cuomo-Dannemburg G, Thompson H, Walker PGT, Fu H, Dighe A, Griffin JT, Baguelin M, Bhatia S, et al. Estimates of the severity of coronavirus disease 2019: a model-based analysis. Lancet Infect Dis 2020;20:669–77. https://doi.org/10.1016/S14733099(20)30243-7.

[2] World Health Organization (WHO). WHO director-general's opening remarks at the media briefing on COVID-19. Geneva, Switzerland: World Health Organization; March 11, 2020.

[3] Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Biomed 2020;91(1):157–60. https://doi.org/10.23750/abm.v91i1.9397.

[4] WHO coronavirus disease (COVID-19) situation reports 183. Retrieved from: https://www.who.int/docs/default-source/wha-70-and-phe/20200721-covid-19-sitrep-183.pdf?sfvrsn=b3869b3_2. [Accessed 23 July 2020].
[5] Criteo Coronavirus Survey. Coronavirus consumer trends: consumer electronics, pet supplies, and more. 2020. Resource document, www.criteo.com/insights/coronavirus-consumer-trends/. [Accessed 26 May 2020].
[6] Jribi S, Ismail HB, Doggui D, Debbabi H. COVID-19 virus outbreak lockdown: what impacts on household food wastage? Environ Dev Sustain 2020;22:3939–55. https://doi.org/10.1007/s10668-020-00740-y.
[7] Africa Centre for Disease Control. Africa CDC COVID-19 dashboard. 2020. Retrieved from: https://africacdc.org/covid-19/. [Accessed 5 May 2020].
[8] Africa Centres for Disease Control and Prevention. Outbreak brief #27: coronavirus disease 2019 (COVID-19) pandemic. CDC; 2020. https://africacdc.org/download/outbreak-brief-27-covid-19-pandemic-21-july-2020/. [Accessed 21 July 2020].
[9] Adegboye OA, Adekunle AI, Gayawan E. Early transmission dynamics of novel coronavirus (COVID-19) in Nigeria. Int J Environ Res Publ Health 2020;17(3054):1–10. https://doi.org/10.3390/ijerph17093054.
[10] Gilbert M, Pullano G, Pinotti F, Valdano E, Poletto C, Boelle PY, D'Ortenzio E, Yazdanpanah Y, Eholie SP, Altmann M, Gutierrez B, Kraemer MUG, Colizza V. Preparedness and vulnerability of African countries against importations of COVID-19: a modelling study. Lancet 2020;395(10227):871–7. https://doi.org/10.1016/S0140-6736(20)30411-6.
[11] Otekunrin OA, Otekunrin OA, Fasina FO, Omotayo AO, Akram M. Assessing the zero hunger target readiness in Africa in the face of COVID-19 pandemic. Caraka Tani J Sustain Agric 2020;35(2):213–27. https://doi.org/10.20961/carakatani.v35i2.41503.
[12] Ebrahim A. COVID-19 and socioeconomic aspect in Africa. 2020. https://doi.org/10.35188/UNU-WIDER/WBN/2020-2. Wider background note. [Accessed 15 June 2020].
[13] Kock RA, Karesh WB, Veas F. 2019-nCoV in context: lessons learned? Lancet Planet Health 2020;20(234):2354–9.
[14] Tunde AA. COVID-19 pandemic in West Africa-review. Int J Zool Appl Biosci 2020;5(3):149–50.
[15] Nigeria Centre for Disease Control (NCDC). COVID-19 situation report. February 29, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 15 June 2020].
[16] NCDC. COVID-19 situation report. July 21, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 23 July 2020].
[17] Nigeria Centre for Disease Control (NCDC). COVID-19 situation report. May 15, 2020. Retrieved from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria. [Accessed 17 June 2020].
[18] World data lab. 2018. https://worldpoverty.io/index.html. [Accessed 19 May 2018].
[19] Otekunrin OA, Otekunrin OA, Momoh S, Ayinde IA. How far has Africa gone in achieving the zero hunger target? Evidence from Nigeria. Global Food Secur 2019;22:1–12. https://doi.org/10.1016/j.gfs.2019.08.001.
[20] Otekunrin OA, Otekunrin OA, Momoh S, Ayinde IA. Assessing the zero hunger target readiness in Africa: global hunger index (GHI) patterns and indicators. In: Proceedings of the 33rd annual national conference of the farm management association of Nigeria (FAMAN), 7th–10th October, 2019; 2019. p. 456–64.

[21] Otekunrin OA, Momoh S, Ayinde IA, Otekunrin OA. How far has Africa gone in achieving the sustainable development goals? Exploring the African dataset. Data Brief 2019;27(104647):1−7. https://doi.org/10.1016/j.dib.2019.104647.
[22] World data lab. 2020. https://worldpoverty.io/index.html. [Accessed 14 April 2020].
[23] Kalu B. COVID-19 in Nigeria: a disease of hunger. Lancet Respir Med 2020;8(6):556−7. https://doi.org/10.1016/S22132600(20)30220-4.
[24] Haider N, Yavlinsky A, Simons D, Osman AY, Ntoumi F, Zumla A, Kock R. Passengers' destinations from China: low risk of novel coronavirus (2019-nCoV) transmission into Africa and South America. Epidemiol Infect 2020:148.
[25] Cham B, Scholes S, Ng Fat L, Badjie O, Mindell JS. Burden of hypertension in the Gambia: evidence from a national World Health Organization (WHO) STEP survey. Int J Epidemiol 2018;47(3):860−71.
[26] Lone SA, Ahmad A. COVID-19 pandemic − an African perspective. Emerg Microb Infect 2020;9. https://doi.org/10.1080/22221751.2020.1775132.