

Two years of Cameroon's resilient response to the COVID-19 pandemic

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Abstract

In the last two years, Cameroon has faced five waves of COVID-19, with its fourth wave of the B.1.1.529 Omicron variant in December 2021 and subsequently hosted the African Cup of Nations of Football Men's competition that gathered thousands of people from across the world in January 2022 with no increase in the number of cases/deaths. A fifth wave of BA.4, and BA.5 Omicron variants was seen in August 2022. The country has claimed 123 785 cases, 121 633 recovered and 1960 deaths by 30th September 2022. Despite a low vaccination coverage of 8.7% the country has seen a limited impact of COVID-19 as compared to the international prediction. The response of Cameroon focused in limiting the spread of the SARS-CoV-2 in the population, reducing the morbidity and mortality due to COVID-19 and limiting the socio economic impact of the COVID-19 in Cameroon. The contextualized Cameroonian response was based on an important epidemiologic surveillance relying on mass testing strategy and adaptive measures that ensure the continuity of the of planned mass gathering activities including hosting the African Cup of Nations of Football in the COVID-19 context and the continuity of education. While the COVID-19 has shown some weakness in the health system it has been an opportunity to show its resilience and the opportunity for strengthening the health system including the implementation of a genomic surveillance platform. The lessons learnt from COVID-19 including the importance of coordination through the Public Health Emergency Operating Centre will help the country to address the future public health emergencies and move toward cholera elimination by 2030.

Key words : COVID-19 ; epidemic ; Cameroon ; emergency control measures ; public health

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Résumé

Au cours des deux dernières années, le Cameroun a fait face à cinq vagues de COVID-19, avec une quatrième vague marquée par le variant B.1.1.529 Omicron en décembre 2021. Parmi les événements susceptibles d'influencer la courbe épidémiologique, le Cameroun a accueilli la Coupe d'Afrique des Nations de Football qui a rassemblé des milliers de personnes venant de par le monde en janvier 2022. Toutefois cet événement d'afflux massif n'a pas induit une augmentation du nombre de cas/décès. Néanmoins une cinquième vague de BA.4 et BA.5 Omicron a été observée en août 2022. Le pays a déclaré 123 785 cas, 121 633 guéris et 1960 décès au 30 septembre 2022. Malgré une faible couverture vaccinale de 8,7 %, le pays a connu un impact limité du COVID-19 par rapport aux prévisions internationales. La réponse du Cameroun s'est concentrée sur la limitation de la propagation du SRAS-CoV-2 dans la population, la réduction de la morbidité et de la mortalité dues au COVID-19 la décentralisation déconcentration et la limitation de l'impact socio-économique du COVID-19 au Cameroun. La réponse camerounaise contextualisée s'appuie sur une importante surveillance épidémiologique avec une stratégie de dépistage de masse et des mesures qui assurent la continuité des activités, y compris l'accueil de la Coupe d'Afrique des Nations de Football dans le contexte du COVID-19 et la continuité de l'éducation. Alors que le COVID-19 a montré certaines faiblesses dans le système de santé il a été l'occasion de mettre en avant sa résilience et l'opportunité de le renforcer le système de santé notamment par la mise en place d'une plateforme de surveillance génomique. Les enseignements tirés du COVID-19 dont l'importance de la coordination à travers les Centre Opérationnel d'Urgence de Santé Publique aideront le pays à faire face aux urgences de santé publique à venir et à progresser vers l'élimination du choléra d'ici 2030.

Introduction

In the early phase of the COVID-19 pandemic, Cameroon was among the top 5 countries in sub-Saharan Africa and the first in Central Africa in the number of confirmed cases (<https://www.ccousp.cm>). From the beginning, Cameroon faced the pandemic with the objectives of reducing viral transmission in the community, limiting deaths, and lessening the socio-economic impact of COVID-19. The Cameroon Government made calculated decisions including contextualized mitigation measures, a bold testing strategy incorporating rapid diagnostic tests, decentralizing the treatment of COVID-19 patients, re-opening schools during the peak of the pandemic, integrating mental health care into the national response (Mviena et al., 2020), implementing a genomic surveillance platform that rely in an impressive laboratory network and organizing mass gathering event including the African Cup of Nations of Football Men’s competition (AFCON) Total Energies in January-February 2022. It was critical for Cameroon to use operational research to find home-grown and innovative solutions that are adapted to the local situation while responding to the global pandemic (Boum, Bebell, et al., 2021).

Methodology of the Response to COVID-19 pandemic in Cameroon

The first two COVID-19 cases were confirmed in Cameroon on March 5, 2020, including an imported case from France and one of his close contacts in Cameroon. The number of cases increased rapidly, first imported from Western

Europe mostly before community transmission of the disease was confirmed in late April 2020 (CCOUSP, 2021d). In December 2019, the Ministry of Public Health created a preparedness and response plan for COVID-19 to quickly detect possible imported cases of COVID-19 and limit its spread in Cameroon. The COVID-19 incident management system (IMS) was activated at the Public Health Emergencies Operations Coordination Center (PHEOCC) on March 6, 2020, the day after the first cases were confirmed in Yaoundé (CCOUSP, 2021d). Based on confirmed case counts and Polymerase Chain Reaction (PCR) positivity rates, Cameroon experienced a first COVID-19 peak at the end of June 2020 (26 March 2020 – 29 July 2020). A second peak was recorded in April 2021 (19 April 2021 – 29 June 2021), a third peak in October 2021 (27 September 2021 – 15 November 2021) and the fourth peak in January 2021 (22 November 2021 – 31 January 2022) (Figure 1). The COVID-19 IMS organised the response through a number of guidelines and strategies (CCOUSP, 2020a, 2021c, 2021a, 2021e, 2021b, 2022a).

Results and Discussion

In Cameroon, the average age of people with COVID-19 is 38 years and 53.1% are men (Fouda Mbarga et al., 2021). The average age of fatal cases is 58 and nearly 20% have comorbidities (Table 1). In a study performed in Djoungolo Hospital in Yaoundé during the first wave, most cases (85.3%; n = 221) of the disease were mild and had a low fatality (Table 1).

Table 1: Multivariable analysis of symptoms associated with COVID-19 severity.

	OR	Std error	t value	P- value	95% Confidence interval	
Male gender	2.75	0.47	2.12	0.008*	1.12	7.4
Age group 40 to 49	4.79	0.60	2.58	0.009**	1.49	16.63
Age group 50 to 59	3.19	0.59	1.95	0.05	1.01	10.7
Age group 60 to 69	6.65	0.59	3.13	0.001**	2.07	22.3
Fatigue	3.35	0.52	2.31	0.02*	1.26	10.1
Dyspnoea	3.70	0.49	2.64	0.008**	1.46	10.45
Abdominal pains	0.31	0.8	61.42	0.15	0.04	1.27
Muscle pains	2.25	0.59	1.93	0.05	1.00	5.23

*Level of statistical significance.

It also identified comorbidities associated with severe disease (Table 2), namely hypertension (18.9%; n = 49), other cardiovascular diseases (8.1%; n = 21), diabetes (5.8%: n = 15), and HIV infection (2.7%; n = 7).

4 were 43 and 48 years. In terms of severity of patients admitted in hospital, the highest proportion of patients deceased was in the third wave (15.0%), followed by the first (2.7%), second (2.0%), and fourth (1.1%)

Table 2: Multivariable analysis of comorbidities associated with COVID-19 severity.

	OR	Std Error	t Value	P value	95% Confidence Interval	
Male gender	2.53	0.04	1.98	0.04*	1.06	6.76
Age group 40 to 49	4.54	0.05	2.37	0.01*	1.52	14.63
Age group 50 to 59	4.09	0.05	2.16	0.03*	1.36	13.18
Age group 60 to 69	7.41	0.06	3.56	0.0001***	2.52	23.85
HIV infection	5.57	0.13	0.13	0.03*	0.92	31.76
Diabetes	4.05	0.09	2.53	0.01*	1.12	14.15
Lung disease	6.29	0.13	0.14	0.02*	0.91	44.93

*Level of statistical significance.

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Aside from comorbidities other factors associated with severe disease included increasing age groups i.e., 40-49, 50-59, and 60-69, as well as the male gender (Mbarga et al., 2021). However, the profile of patients admitted to hospital has varied across the respective waves (Figure 1). The overall mean age was 50.1 years with a standard deviation of 18.3 years. The median total age was 50 years, with the ages ranging between 3 to 95 years. Waves 2 and 3 had higher mean ages, 54.7 and 58.9 years respectively, compared to waves 1 and 4 which were 45.2 and 48.9 years respectively. Waves 2 and 3 also had higher median ages at 57.5 and 62, while waves 1 and

waves. As of 29th June 2022, Cameroon has reported 120 154 confirmed cases, 1 931 deaths (Case fatality rate 1.6%), 118 178 recoveries (recovery rate: 98.4%), 1 182 378 people received at least one dose of vaccine (11.1% of the target population). Among these case were 4 473 infected health care workers infected with 61 deaths and 785 infected pregnant women infected with 7 deaths (CCOUSP, 2022b).

One clear objective of the response was to detect as many cases as possible given the limited testing resources. Despite fifteen PCR-capable diagnostic laboratories implemented in 9 of 10 Cameroonian geographic regions by

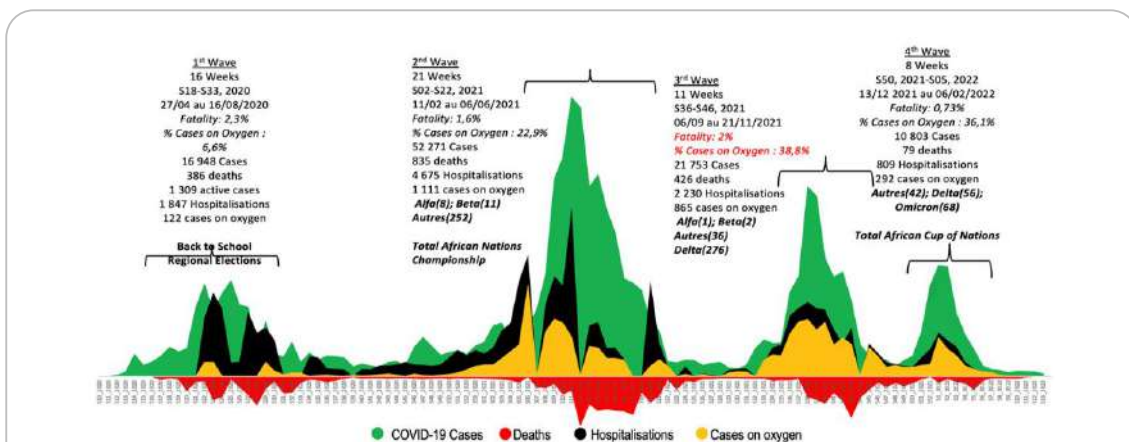


Figure 1: A descriptive graph of the four COVID-19 pandemic waves in Cameroon including the total cases, deaths, hospitalisations, and cases on oxygen. The time periods, fatality rates, significant events, and circulating variants are also outlined

April 2020, it was clear many cases were being missed (CCOUSP, 2020b). Therefore, the Cameroon Ministry of Health made a bold decision to incorporate and evaluate rapid diagnostic tests for SARS-CoV-2 antigen and serology (Boum, Fai, et al., 2021). The national algorithm was validated by the Scientific Council of Public Health Emergencies in June 2020. In total, 2 101 296 samples were analysed by rapid diagnostic test (RDT) bringing the diagnostic rate by RDT alone to 75.6 per 1,000 inhabitants between June 6th and June 22nd 2022 in selected testing sites located in markets, schools, universities, administrative offices and businesses. Within the same period, 670 406 samples have been analysed by PCR bringing the PCR diagnostic rate to 24.1 per 1,000 inhabitants. This was possible thanks to the important laboratory network that include 45 molecular laboratories and 4 public laboratories (National Public Health Laboratory (NPHL), Centre Pasteur du Cameroun (CPC), Centre International de Recherche Chantal Biya (CIRCB), Centre de Recherche sur les Maladies Emergentes et Re-emergentes (CREMER) able to perform complete genome sequencing. To date 1000 samples have been sequenced locally and 168 sequences have been generated by the NPHL.

In addition, the Government established specialized COVID-19 care centers in the regions with community transmission, relieving congestion in public health facilities and reducing the stigma associated with hospitals treating COVID-19 patients. This was followed by an important capacity building in terms of human and material resource that increased COVID-19 treatment capacity in all hospitals including in rural settings to ensure no patient is left behind.

To limit further transmission of SARS CoV-2 in the community, on March 18th 2020 the Government implemented 19 public health and social-distancing measures (PHSM) including closing all borders, closing bars and restaurants after 6p.m., limiting public transport occupancy, closing of schools and universities, and mandating mask-wearing in public places. However, recognizing the potential negative socio-economic impact of COVID-19, the Government alleviated some

of these PHSM over time, altering its pandemic response to address new challenges. For example, Cameroon partially resumed in-person classes on June 1st 2020 and partially opened borders whilst maintaining mask-wearing and physical distancing measures.

Despite the second and third, more detrimental, wave of COVID-19 in Africa, the expected death toll in Africa and Cameroon did not occur. In part, this is because Cameroon mobilized significant resources to manage the COVID-19 health crisis (Mbopi-Keou et al., 2020). The initial strict government measures were eased rapidly, to relieve the burden on the country's economy. The decentralization of response interventions, integration of operational research, provision of rapid diagnostic tests that are resulting in improved testing capacities, homecare services, and implementing a national genomic surveillance platform to follow circulating SARS-CoV-2 variants have made it possible to limit disease transmission even while hosting the Football African Cup of Nation (AfCON) TotalEnergies 2021 in January and February 2022, an event that hosted thousands of supporters from across Africa despite the reluctance of the international community to support Cameroon's hosting rights. This event occurred during the fourth wave caused by the Omicron variant. Despite the known high transmission of this variant the country has observed a considerable low number of cases and fatality although the AFCON was a mass gathering event across five of its ten densely populated regions.

However, the implementation of COVID-19 adult vaccination programme against COVID-19 since April 2021 was faced by an important level vaccine hesitancy among the targeted population, and this may somehow jeopardize the expected effects of the vaccines in limiting severe forms of the disease. Nonetheless, the seroprevalence surveys that took place in Cameroon have shown that the country has significantly been exposed to the COVID-19 despite the low number of reported cases and deaths (Nwosu et al., 2021). In August 2021 a national seroprevalence survey was implemented in the 10 regional capital in Cameroon. Overall, 758/5739 participants

tested positive by RDT resulting in a weighted SARS-CoV-2 seroprevalence of 11.3% (95%CI, 10.0-12.5). Among participants that tested positive, the majority 351/758 (46.3%) tested IgG and IgM positive, 347/758 were only IgG positive (45.8%), and 60/758 (7.9%) tested only IgM positive. Seroprevalence among non-vaccinated was significantly higher among the 50+ year-olds with 13.5% (95%CI 10.9-16.3%) compared to the other age-groups with 7.9% - 11.1%. Seroprevalence was comparable between the male (9.6%; 95%CI 8.1-11.3%) and female participants (9.4%; 95%CI 8.0-11.0%) (Table 3).

Seroprevalence was highest in Central, South-West, West and South regions (Table 4, Figure 2).

One of the key success of the Cameroonian response to COVID-19 was the integration of mental health at all levels of the response. At the early phase of the pandemic, mental health personnel were placed at Yaoundé Nsimalen and Douala international airports to manage travellers who were to be quarantined for 14 days upon arrival, hostels where these travellers were hosted, and isolation sites where positives cases with mild COVID-19 were admitted. Moreover, a team of psychologists from the Public Health Operation Centre (PHEOC) was involved at all levels, including delivery of COVID-19 laboratory results and contact tracing in the community. They were

under the coordination of a psychological care sub-unit within the Incident Management System that was created in April, 2020, first at the central level in Yaoundé, the capital city, and then in the ten regions of the country. The COVID-19 pandemic was a great opportunity for key stakeholders to understand the importance of addressing mental health problems (Mviena et al., 2020).

Last but not the least, the Cameroon response to COVID-19 has relied on an important coordination through an involvement at the highest level of the authorities in the COVID-19 response in Cameroon. There was and still is a strong leadership and expertise going beyond borders. The national response in Cameroon was put in place using the incident management system (IMS) structure, which came into place after the Ebola epidemic in West Africa (Olu et al., 2016). The IMS was implemented at national, regional and local levels through (Esso et al., 2021) and is in charge of coordinating all interventions of the response, including surveillance and case investigations, case management, infection and prevention control, risk communication, community engagement, vaccination, and interventions at points of entry. Furthermore, the coordination relied on a set of strategies and policies including the development of a national COVID-19 pandemic resurgence plan to guide all actors involved in the response.

Table 3. Summary of seroprevalence among non-vaccinated individuals according to RDT results in August 2021

Characteristics		Seroprevalence	Weighted seroprevalence % (95%CI)	OR (95%CI)
Sex	Male	256/2318	9.6 (8.1-11.3)	Ref.
	Female	337/2975	9.4 (8.0-11.0)	1.0 (0.8-1.3)
Age group (years)	0 – 19	86/1041	7.9 (5.8-10.4)	Ref.
	20 – 34	230/2246	8.7 (7.4-10.2)	1.1 (0.8-1.6)
	35 – 49	142/1099	11.1 (9.0-13.6)	1.5 (1.0-2.1)
	≥50	135/907	13.5 (10.9-16.3)	1.8 (1.3-2.6)*
Stratum	High transmission	452/3733	11.1 (9.9-12.4)	Ref.
	Low transmission	140/1572	7.7 (5.8-9.9)	0.7 (0.5-0.9)*

* p-value <0.05

Those strategies relied on scientific evidences gathered by Cameroonian and international scientists coordinated by the Division of Operational Research (DROS) of the Ministry of Health and Operational Research Office of the National PHEOC. The Scientific Council of Public Health Emergency (CSUSP) and the National Immunization Technical Advisory Groups (NITAGs) have also provided scientific recommendations to the Ministry of Public Health to adjust strategies to respond to the pandemic.

Table 4. Seroprevalence by region based on RDT.

Region	Seroprevalence	Weighted seroprevalence % (95%CI)
Adamawa	16/340	3.9 (1.5-7.8)
Central	236/1529	14.8 (12.7-17)
East	11/197	4.6 (1.8-9.1)
Far North	28/571	5.8 (2.8-10.3)
Littoral	108/1255	8.0 (6.3-10)
North	70/483	11.4 (7.7-16)
North-West	34/325	9.6 (6.2-13.9)
West	38/272	13.3 (9.2-18.3)
South	25/142	13.3 (8.2-19.9)
South-West	26/170	14.0 (6.7-24.5)

Conclusion

Cameroon has provided a bold response to COVID-19 which allowed the country to limit the transmission of SARS-CoV-2 in the country by using a mass testing strategy relying on the use of RDTs, to reduce the morbidity and mortality of COVID-19 by investing in adequate treatment strategies including an emphasis in mental health, and to limit the socio (economic impact of the COVID-19 pandemic by adapting the PHSM to the Cameroonian context. It has been an opportunity to strengthened the epidemiological surveillance including the genomic surveillance capacity, to test the resilience of the health system and the Cameroonian population but also to appreciate

the rooms for improvement to preparedness for future pandemics. The main challenge Cameroon faces now is to strengthen the health system for the next pandemic with greater investment in medical regulation, traditional medicine (Boum, Kwedi-Nolna, et al., 2021), tele-health (Boum, 2021; Portnoy et al., 2020), homecare and primary care services that contributed to better management of COVID-19 patients but will also be critically important in future management of acute and chronic diseases. Through the implementation of pragmatic and resilient strategies, Cameroon is learning from the COVID-19 pandemic to provide better care for its communities and adequately prepare for future global health threats including the road toward cholera elimination by 2030.

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