CENTER FOR GLOBAL HEALTH

Factors Associated with Long COVID-19 in Zambia, 2020 to 2022

Warren Malambo[1], Lily Besa[2], Duncan Chanda[2], Daniella Engamba[2], Linos Mwiinga[1], Mundia Mwitumwa[2], Jonas Z. Hines[1], Sombo Fwoloshi[2,3]

[1]U.S Centers for Disease Control and Prevention, Lusaka, Zambia, [2]Ministry of Health, Lusaka, Zambia, [3]University Teaching Hospitals, Adult and Emergency Hospital, Lusaka, Zambia

BACKGROUND

- Africa has cumulatively reported an estimated 7.2 million confirmed COVID-19 cases as of December 2022 [1].
- Following acute COVID-19, some (an estimated 10-20%) individuals continue to experience a variety of symptoms often referred to as long COVID-19 [2].
- The most common long COVID-19 symptoms are fatigue, shortness of breath, and cognitive dysfunction ('brain fog') [3].
- Evidence on long COVID-19 is, however, limited from countries in Africa. Disease severity (moderate illness) and admission to the intensive care unit during acute COVID-19 were, for example, found to be associated with long COVID-19 in Nigeria and South Africa [4,5].
- We sought to describe the clinical presentation of long COVID-19 in Zambia and determine the associated factors.

METHODS

- We conducted a cross-sectional analysis of routinely collected clinical information from 13 'post-acute COVID-19' (PAC-19) clinics established across Zambia (Figure 1) during 2020 to care for people following SARS-CoV-2 infection.
- Long COVID-19 was defined as experiencing persistent symptoms ≥4 weeks after initial symptom onset.
- We investigated factors (demographics, medical history, acute COVID-19 course, and vaccination status) associated with reporting long COVID-19 among patients who visited PAC-19 clinics
- Comorbidities detected at the time of SARS-CoV-2 infection were considered newly diagnosed medical condition.
- Severe illness was defined as acute COVID-19 that required supplemental oxygen therapy.
- We developed logistic regression models to assess factors associated with long COVID-19 at first visit to a PAC-19 clinic adjusting for sex, newly diagnosed medical condition, acute COVID-19 course, and vaccination status.

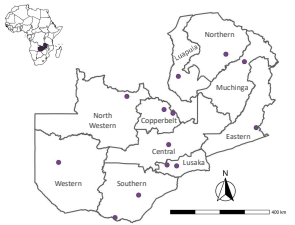

Figure 1: PAC-19 Clinics in Zambia

In Zambia, severe COVID-19 and hospitalization for acute COVID-19 with length of stay ≥15 days were associated with having long COVID-19

RESULTS

- In total, 1,238 (<1%) persons out of an estimated 319,500 confirmed cases in Zambia had ≥1 visit to a PAC-19 clinic from August 2020 to April 2022 (Figure 2).
- The median follow up time (from symptom onset to first PAC-19 clinic visit) was 4 weeks (interquartile range [IQR]: 2-6 weeks)
- Participants' median age was 53 years (IQR: 41-63 years) and 642 (52%) were female.
- Eight hundred twenty-three (66%) persons attending PAC-19 clinic had been hospitalized for acute COVID-19 and the median length of stay was 8 days (IQR: 4-16 days).
- Overall, 403 (33%) persons attending PAC-19 clinic had persistent symptoms lasting ≥4 weeks (i.e., long COVID-19)
- The median age in persons with long COVID-19 was 54 years (IQR: 44-63) compared to 50 years (IQR: 37-61) in those without long COVID-19 (p<0.001).
- Cough (22%), fatigue (21%), and shortness of breath (15%) were frequently reported symptoms among persons with long COVID-19, while 4% had forgetfulness.
- Overall, 226 (27%) persons had worse, or same (daily-life limitations) functional status since acute COVID-19. The functional status participants reported the plurality of difficulty undertaking was walking long distances greater than 1km (Figure 3).

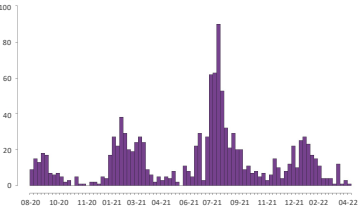

Figure 2: Histogram of First PAC-19 Clinical Visit, August 2020 – April 2022

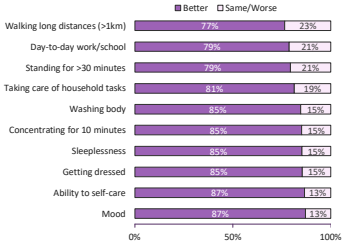

Figure 3: Participants' self-reported functional status over a 7 days period preceding visit to PAC-19 clinic. This was in comparison to the functional status since acute COVID-19 (n=830)

- One hundred seventy-two (76%) persons with worse or same functional status were referred for specialized assessments. The plurality (n=67, 39%) being referred to cardiology and/or physiotherapy
- Factors associated with long COVID-19 included having had severe disease with need for supplemental oxygen therapy (adjusted odds ratio [aOR] 2.8), and a prolonged hospitalization (i.e., length of stay ≥15 days) for acute COVID-19 (aOR 13) (Table 1).

DISCUSSION

- Long COVID-19 was common among people attending PAC-19 clinics in Zambia, yet few persons overall with COVID-19 had attended a PAC-19 clinic.
- Those with severe illness were more likely to experience long COVID-19, which is consistent with other studies of long COVID-19.
- Functional limitation in day-to-day activities were reported by some participants; a proportion of whom required assessment by specialized services.
- Given the burden of COVID-19 in Zambia, systems to care for patients with long COVID-19 might be needed in the future.

Table 1: Factors Associated with Long COVID-19 in Zambia, August 2020-April 2022

Variables	Long COVID-19, n (%)	Unadjusted ORs (CI†)	p-value	Adjusted ORs (CI†) *	p-value
Sex (n=731)	398 (54.4)		0.389		
Female		*Referent*		-	-
Male		1.2 (0.8, 1.6)		-	-
Age Group (n=738)	401 (54.3)		**<0.001**		
<29		*Referent*		*Referent*	-
30-39		3.0 (1.3, 7.0)		2.0 (0.7, 6.0)	0.216
40-49		4.9 (2.4, 10.7)		2.5 (0.9, 6.9)	0.070
50-59		3.6 (1.7, 7.8)		2.2 (0.9, 6.0)	0.108
60+		4.2 (2.1, 9.0)		1.8 (0.7, 4.6)	0.240
COVID-19 Wave (n=746)	403 (54.0)		**<0.001**		
1		*Referent*		*Referent*	-
2		0.7 (0.3, 1.7)		1.7 (0.1, 53)	0.737
3		2.1 (1.0, 4.6)		4.7 (0.3, 140)	0.305
4		0.7 (0.3, 1.5)		3.9 (0.2, 124)	0.365
Presence of any Comorbidities (n=746)	403 (54.0)		0.058		
No		*Referent*		-	-
Yes		1.4 (1.0, 1.9)		-	-
Newly Diagnosed Medical Condition‡	403 (54.0)		**0.008**		
No		*Referent*		*Referent*	-
Yes		1.9 (1.2, 3.1)		1.7 (0.9, 3.3)	0.084
Supplemental Oxygen Therapy (n=663)	375 (56.7)		**<0.001**		
No		*Referent*		*Referent*	-
Yes		5.6 (3.6, 8.9)		2.8 (1.6, 5.0)	**<0.001**
Intensive Care Unit Admission (n=648)	366 (56.5)		**0.039**		
No		*Referent*		*Referent*	-
Yes		2.0 (1.0, 4.1)		1.3 (0.6, 3.5)	0.531
Hospitalization Duration (days) (n=557)	336 (60.3)		**<0.001**		
0-3		*Referent*		*Referent*	-
4-7		3.2 (1.9, 5.6)		2.0 (1.1, 3.7)	**0.038**
8-14		5.1 (2.9, 9.2)		2.9 (1.5, 5.7)	**0.002**
15+		26.6 (13.5, 55.9)		13 (6.2, 31)	**<0.001**
Vaccination Status (n=746)	403 (54.0)		0.218		
Unvaccinated		*Referent*		-	-
Full		0.5 (0.2, 1.4)		-	-
Partial		1.5 (0.7, 3.4)		-	-
Indeterminate		0.8 (0.1, 6.3)		-	-
Unknown		1.9 (0.9, 4.4)		-	-

* Best fit model

† 95% confidence interval (CI)

‡ Diabetes mellitus, hypertension, deep vein thrombosis/pulmonary embolism, kidney injury/disease or any other

DISCUSSION - Continued

- Scaling up PAC-19 services and integrating into routine clinical care could improve access and further aid in understanding long COVID-19 in Zambia

REFERENCES

1. WHO. (2022). WHO Coronavirus (COVID-19) Dashboard. World Health Organization. Retrieved 10 February 2023 from https://covid19.who.int/
2. Soriano *et al.*, (2022). A clinical case definition of post-COVID-19 condition by a Delphi consensus. Lancet Infect Dis, 22(4).
3. Davis *et al.*, (2023). Long COVID: major findings, mechanisms and recommendations. Nature Reviews Microbiology.
4. Osikomaiya *et al.*, (2021). 'Long COVID': persistent COVID-19 symptoms in survivors managed in Lagos State, Nigeria. BMC Infect Dis, 21(1), 304.
5. Dryden *et al.*, (2022). Post-COVID-19 condition 3 months after hospitalization with SARS-CoV-2 in South Africa: a prospective cohort study. Lancet Glob Health, 10(9), e1247

CONTACT INFO
Warren Malambo | ykh1@cdc.gov

www.cdc.gov | Contact CDC at: 1-800-CDC-INFO or www.cdc.gov/info The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.