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PREVALENCE OF PERSISTING POST-COVID-19 SYMPTOMS AMONG ADULTS IN PRIMARY HEALTHCARE SETTINGS IN GABORONE, BOTSWANA

[1*]LUBINDA, Gaonyadiwe., [2]GABAITIRI Lesego, [3]UMOH, Chinememma. A. Deborah, [1]MENYATSO Lenah, [1]KGOSITAU Mabedi,

[1]University of Botswana, Faculty of Health Science, School of Nursing, Gaborone, Botswana; [2]Botswana International University of Science and Technology, Palapye, Botswana; [3]A.O Private Clinic, Gaborone Botswana

***Corresponding Author's E-mail**: sinombeg@ub.ac.bw

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Abstract

Background: Clients who have recovered from SARS-CoV-2 infection still experience lingering symptoms. However, data on the prevalence of persisting post-COVID-19 symptoms and their associations with post-COVID-19 complications among adults in primary healthcare settings in Gaborone, Botswana, are lacking.
This study was done to determine the prevalence of persisting post-COVID-19 symptoms among adults in the primary healthcare setting and their associations with post-COVID-19 complications.
Materials and Methods: A cross-sectional study involving 197 adults aged 18 and above was purposively selected from nine (9) clinics. Data were collected via a valid and reliable questionnaire from January to May 2024. Analysis was performed with STATA-SE version 16. Descriptive and inferential statistics were utilized to analyze the data; frequencies and percentages were computed for categorical variables.
Results: The prevalence of post-COVID-19 symptoms was 45.2% for respiratory symptoms and 41.1% for neuropsychiatric. Followed by 35% of general symptoms. Few respondents reported dermatologic (2.5%), gastrointestinal (5.1), and genitourinary (2.5%) symptoms. The prevalence of post-COVID-19 complications increased with age. The rates were 6.3% for those aged 18-30 years, 10.8% for those aged 31-45 years, and 25.9% for those aged 46 and above. There was no significant difference between male and female prevalence of post-COVID-19 symptoms and complications, p-value=0.352.
Conclusion: Adults in primary healthcare settings reported various persistent chronic symptoms post-COVID-19. Persisting post-COVID-19 symptoms are another significant health crisis originating from the COVID-19 pandemic that must be understood to inform healthcare professionals about developing standardized management protocols.

Keywords: post-COVID-19 conditions, long COVID-19, post-COVID-19 symptoms, chronic COVID-19 syndrome, primary healthcare setting, adults.

List of abbreviations: RAT: Rapid Antigen Test, **PCR**: Polymerase Chain Reactive, **COVID-19**: Coronavirus disease**, SARS-Cov-2**: Severe acute respiratory syndrome coronavirus 2

Introduction

SARS-CoV-2 infection was first identified in Wuhan, China, in 2019 (Wu and McGoogan, 2019). It spread rapidly to all parts of the world, including Botswana. The World Health Organization declared it a pandemic in 2020, and the world experienced lockdowns to control the spread of infection (WHO, 2025). Its long-term effects have become a public health issue tantamount to an epidemic (WHO, 2025).

The number of cases of SARS-CoV-2 has increased as of May 2025, although in the African region and Europe, as well as in some parts of America, low levels have been reported (WHO, 2025). Between December 9, 2024 and January 5, 2025, over 147,000 new cases were reported, and approximately 4,500 new deaths globally (WHO, 2025). The number of cases has increased by 4%; fatalities have decreased by 26% (WHO, 2024). As people are still

being infected with SARS-CoV-2, it is expected that the number of people who will experience long-term COVID-19 symptoms will increase worldwide (Fernández-de-las-Peñas, 2021).

The first case was identified in March 2020 in Botswana (Motlhatlhedi *et al.*, 2021). The number of infections increased in 2021. As of April 2024, 330,638 recorded cases of SARS-CoV-2 infections have been identified, and 2801 fatalities (Choga *et al.,* 2024).

The long-term effects of SARS-CoV-2 infection are not yet well understood (Iwu *et al.,* 2021). Many patients diagnosed with SARS-CoV-2 recover from the initial infection at different times. Some individuals continue to experience short- to long-term effects after contracting SARS-CoV-2 (International Diabetes Federation, 2021; WHO, 2023). Ideally, recovering from SARS-CoV-2 takes seven (7) days, but for some people, it may take months to heal (WHO 2023). People diagnosed with severe SARS-CoV-2 infections are likely to experience persistent chronic post-COVID-19 symptoms; however, even those who have experienced mild symptoms may do so (Cai *et al.*, 2024; WHO, 2024). The commonly reported symptoms are respiratory, neurological, dermatological, and general (Fernández-de-las-Peñas, 2021). There is a paucity of data on the prevalence of persistent post-COVID-19 symptoms in primary healthcare settings worldwide (WHO, 2024).

The response to SARS-CoV-2 infection has been successful (Fernández-de-las-Peñas, 2021). The effects of long-term SARS-CoV-2 infection on the health of a population and the burden it places on the healthcare system are unclear (Davis *et al.,* 2021; McCloskey and Heymann, 2021; WHO, 2023). These post-COVID-19 symptoms may impact all aspects of human activity and affect quality of life (Menges *et al*., 2021). In addition, to date, few studies have investigated persisting post-COVID-19 symptoms beyond one year or more, as these symptoms may fluctuate, come and go, or relapse over time (WHO, 2023).

There are many uncertainties regarding post-COVID-19 symptoms, including a definite time frame for diagnosis and no established diagnostic criteria (Iwu *et al.,* 2021). However, there is currently a reliance on symptoms to make a diagnosis. Inconsistencies in definitions have led to differences in estimates of the prevalence of post-COVID-19 symptoms (Menges *et al.*, 2021).

Most studies have been conducted in high-income countries. Still, few studies have been conducted in Africa, especially in low-income countries (Mendelsohn *et al.*, 2022; Pazukhina *et al.*, 2024). With this being identified, there is an urgent need to conduct further research to identify the prevalence of persisting post-COVID-19 symptoms. The purpose of this paper is to determine the prevalence of persisting post-COVID-19 symptoms among adults in the primary healthcare setting in Gaborone, Botswana. The primary healthcare setting serves as the first point of contact for many patients who present with persisting post-COVID-19 symptoms.

Materials and Methods

Study Design, Settings, Population, Sampling Method, and Size

This cross-sectional study was conducted in nine (9) randomly selected primary healthcare settings. These settings are part of the 22 clinics that provide primary healthcare services in Gaborone, Botswana. The Greater Gaborone setting was chosen because it was categorised as a red zone for COVID-19 infections due to many cases of COVID-19 infections (Siamisang *et al.,* 2021)

A purposive sampling method was used to select participants. The sample size was determined via an online smart survey sample size calculator. The confidence interval was 95%, with a 5% margin of error, and 197 eligible patients aged 18 and above participated in the study.

Inclusion and Exclusion Criteria

The inclusion criteria were adults aged 18 years and above who consented to participate in the study and had a diagnosis of COVID-19 from 2022-2023 according to Rapid Antigen Test (RAT) or Polymerase Chain Reactive (PCR) data recorded in outpatient cards and tested negative after seven (7) days to five (5) months, and were admitted to the hospital or isolation centers or were quarantined at home when they were sick and were vaccinated.

The exclusion criteria were individuals under 18 years of age, those not diagnosed with COVID-19 infection, and those who could not provide a record of a COVID-19 infection diagnosis and did not consent to participate in the study.

Data Collection Tools and Process

A validated and reliable questionnaire was used to inquire about the health status of patients and their persistent symptoms in the post-COVID-19 period (Kayaaslan *et al*., 2021). The questionnaire included demographic information, comorbid diseases, characteristics of acute COVID-19, history of hospitalization, duration since symptom onset, presence of persistent symptoms by system, and, for this study, any new diagnosis post-SARS-CoV-2 infection was added as an open-ended question. The World Health Organization guidelines on the severity of acute COVID-19 disease (mild, moderate, severe, and critical illness) were used to classify the illness (WHO, 2022). The questionnaire was pilot-tested, and modifications were made accordingly.

Participants were recruited physically in a face-to-face interview, from consulting rooms, by Family Nurse Practitioner students from January 22 to May 31, 2024. All patients who reported persisting post-COVID-19 symptoms were referred to the trained research assistants in a private room designated for the study. Further explanations, such as the purpose of the study, ethical considerations, use of the questionnaire, and duration, were provided. Participants were allowed time to ask questions and request clarification where necessary. Those who volunteered to participate were given informed consent forms to complete, and thereafter, they completed the questionnaires. The participants were remunerated with BWP 15 ($1) as an incentive. Anonymity was maintained, no direct identification information was collected from the participants, and only codes were used.

Primary Outcomes

The main outcomes were persisting post-COVID-19 symptoms (defined as symptoms beyond 12 weeks, without an alternate diagnosis, that fluctuate, come and go, or relapse over time), complications (new diagnosis) post-COVID-19 infection were hypertension, diabetes mellitus, and asthma.

Ethical Clearance

Ethical clearance (**Supplementary material 1**) was obtained from the Office of Research Development (ORD) (**UBR/RES/IRB/BIO/362)** at the University of Botswana and the Ministry of Health (**HPRD: 6/14/1**) and trained research assistants privately collected data from the consented participants. Data was stored in lockable cabinets, and only researchers were authorized to access it.

Data Management and Analysis

The data were entered into Excel (Microsoft) and analyzed via STATA-SE version 16 (**Supplementary material 2**). Nine (9) health facilities were selected within the Greater Gaborone area. An average of approximately twenty-two (22) respondents were from each. The number of participants ranged from 9 to 26 per health facility.

The analysis was performed for the greater Gaborone area, not by the health facility. Descriptive and inferential statistics were used to analyze the data, with frequencies and percentages computed for categorical variables.

Associations between variables were analyzed via the chi-square test. Fisher's exact test was employed when the expected cell frequencies were smaller than five. The frequencies and percentages of complications from COVID-19, including hypertension, diabetes, and respiratory disease, were computed, and their associations with post-COVID-19 symptoms were investigated through the chi-square test. Statistical significance was established if the p-value was less than 0.05 or if the 95% confidence interval did not contain one.

Results

The response rate was 100% (N= 197)

Table 1: Demographics of the respondents at the nine primary healthcare settings (N= 197)

Variable	Frequency	%
Age (Years)		
Mean age 36.55 (13.78) Median 33		
Range		
18-22	23	11.7
23-27	26	13.2
28-32	37	18.8
33-37	30	15.2
38-42	22	11.2
43-47	18	9.1
48-52	8	4.1
53-57	17	8.6
58-62	3	1.5
63-67	6	3.0
68-72	3	1.5
73-76	4	2.0
Gender		
Female	134	68.0

Variable	Frequency	%
Male	63	32.0
Education		
Informal	1	0.5
None	5	2.5
Primary	16	8.1
Secondary	95	48.2
Tertiary	80	40.6
Marital Status		
Married	39	19.8
Single	156	79.2
Widow	2	1.0

There were 134 (68%) females and 63 (32%) males aged between 18 to 76 years. The mean age was 36.55 (SD 13.78), with a median of 33. Most respondents were single and had attained secondary education, as depicted in Table 1.

Table 2: Respondents Diagnosed with hypertension, diabetes mellitus, or asthma post-COVID-19 infection

Variable		**No (n=171)**	**Yes (n=26)**	**p-value**
Socio-demographic		n (%)	n (%)	
Age Group (Years)				0.002^
	18–30	75 (93.8)	5 (6.3)	
	31–45	66 (89.2)	8 (10.8)	
	46–60	20 (74.1)	7 (25.9)	
	>60	10 (62.5)	6 (37.5)	
Gender				0.352
	Female	115 (85.8)	19 (14.2)	
	Male	56 (88.9)	7 (11.1)	
Educational Background				0.073^
	None	3 (50.0)	3 (50.0)	
	Primary	14 (87.5)	2 (12.5)	
	Secondary	80 (89.9)	9 (14.0)	
	Tertiary	74 (86.8)	12 (13.2)	
Marital Status				0.811
	Single	138 (87.9)	19 (12.1)	

Table 2: The study included 197 participants, out of whom 26 were diagnosed with hypertension, diabetes mellitus, or asthma post-COVID-19 infection. The prevalence of post-COVID-19 complications increased with age. The rates were 6.3% for those aged 18-30 years, 10.8% for those aged 31-45 years, and 25.9% for those aged 46 and above. There was no significant difference between male and female prevalence of post-COVID-19 symptoms and complications, p-value=0.352. The prevalence for males was 11.1%, while for females, it was slightly higher but not significant.

Table 3: Prevalence of persistent symptoms reported by respondents by the system (N=197)

Variable	**No**	**Yes**
Presence of Persistent Symptoms by Systems	n (%)	n (%)
General (Fatigue, malaise, fever, body weakness, dizziness)	128 (64.9)	69 (35)
Respiratory system (cough, chest pains, shortness of breath, running nose, nasal congestion)	108 (54.8)	89 (45.2)

Variable	No	Yes
Cardiovascular system (palpitations)	172 (87.3)	25 (12.7)
Neuropsychiatric (Headache, forgetfulness, loss of smell and taste)	116 (58.9)	81 (41.1)
Dermatologic (Rash, Skin discoloration)	192 (97.5)	5 (2.5)
Gastrointestinal (Bloated, constipation, diarrhea)	187 (94.9)	10 (5.1)
Genitourinary systems (Loss of libido, burning urine)	192 (97.5)	5 (2.5)

The prevalence of post-COVID-19 symptoms and complications was 13.2% (95% confidence interval: 9.1%, 18.7%).
Table 3: The prevalence of post-COVID-19 symptoms was 45.2% for respiratory symptoms and 41.1% for neuropsychiatric. Followed by 35% of general symptoms. Very few respondents reported dermatologic (2.5%), gastrointestinal (5.1), and genitourinary (2.5%) symptoms.

Table 4: History of hospitalization and its associations with complications post-COVID-19 infection (n=197)
Diagnosis of hypertension, diabetes mellitus, or other conditions post-COVID-19

Variable		**No (n=171)**	**Yes (n=26)**	**p-value**
History of Hospitalization		n (%)	n (%)	
Disease Severity				0.372
	Mild	110 (89.4)	13 (10.6)	
	Moderate	47 (82.5)	10 (17.5)	
	Severe	14 (82.3)	3 (17.7)	
Characteristics of Acute COVID-19				
	Asymptomatic	16 (88.9)	2 (11.1)	0.784
	At Least One Symptom	155 (86.8)	24 (13.4)	

Fisher's exact p-value, in addition to the presented p-value, is based on the chi-square statistics.

Table 4: The majority of respondents (89.4%) were diagnosed with mild disease. The characteristics of acute COVID-19 were not associated with post-COVID-19 symptoms or complications, with *p-values* of 0.784. The prevalence of post-COVID-19 symptoms and complications was slightly higher among those with at least one acute COVID-19 symptom (13.4%) compared to those who were asymptomatic (11.1%), but the difference was not statistically significant.

Discussion

Persistent post-COVID-19 symptoms are a new pandemic (Fernández-de-las-Peñas, 2021). Since 2020, even as people have recovered from the acute phase of the illness, some continue to experience symptoms similar to those they had during their infection, aligning with our results. With approximately 1 in 100 people developing long-term

conditions, and new infections still occurring, the risk of developing these persistent symptoms remains high (WHO, 2025).

There are over 200 known persistent symptoms that vary from person to person (WHO, 2024). While the exact cause of these symptoms remains unknown, potential contributing factors include viral persistence, immune dysfunction, and chronic inflammation. During the initial infection, the SARS-CoV-2 virus can cause severe damage to the respiratory, cardiovascular, and coagulation systems, which may contribute to long-term multi-organ damage (Sree Sudha *et al.*, 2022; Mahmoud *et al.,* 2023; WHO, 2024). Notably, many of the symptoms found in the Botswana study were similar to those reported internationally, highlighting the global nature of this condition.

Our study, the first of its kind in a primary healthcare setting in Botswana, found a lower prevalence of persistent post-COVID-19 symptoms as compared to some other African countries. For example, a scoping review reported a prevalence of 31% to 40% in Africa, with a global pooled prevalence of 45% (Ansah *et al*., 2023). Despite the lower figures, our findings are crucial and timely for Botswana, a country already struggling with a high prevalence of non-communicable diseases (NCDs). The age-standardized mortality rate for NCDs was 934 per 100,000 for males and 713 for females in 2021, and NCDs were responsible for 46% of deaths in 2019 (WHO, 2023). The added burden of persistent post-COVID-19 symptoms could overstretch the healthcare system, which is already understaffed.

Our study identified respiratory, neuropsychiatric, and general symptoms as the most common, which aligns with a scoping review on post-COVID-19 conditions in Africa (Ansah *et al.*, 2023). That review found fatigue, dyspnoea, brain fog, insomnia, anosmia, arthralgia, and headache to be the most reported symptoms, with neuropsychiatric issues being the second most common. Since 2020, it is evident that patients report post-COVID-19 symptoms even after two (2) years post-infection (Bowe *et al.*, 2023), similar to our findings. This implies that the ongoing threat of persistent post-COVID-19 symptoms requires targeted public health strategies. The WHO is currently developing clinical guidelines for managing these symptoms (WHO, 2025). In the meantime, since most patients in Botswana seek care at primary healthcare facilities, healthcare providers can create individualized care plans based on existing knowledge to provide symptom relief. Health education is also vital, as it can empower patients with self-management skills to identify symptom triggers and prevent relapses (WHO, 2025).

Furthermore, patients should be encouraged to continue practicing preventive measures, such as wearing masks, hand washing, and ensuring proper ventilation, to avoid repeated infections that can increase the risk of post-COVID-19 symptoms (WHO, 2025). Vaccination is another critical tool, as it has been shown to reduce the risk of developing symptoms (Byambasuren *et al*., 2023; Rick *et al.,* 2023). Healthcare workers should encourage patients to receive their full two-dose vaccination to reduce the likelihood of experiencing these persistent symptoms.

Association between characteristics of acute COVID-19 Symptoms, Disease Severity, and Complications

Our study found no significant association between COVID-19 infection and the new onset of hypertension, diabetes, and asthma, even though some patients reported these new diagnoses. However, global trends suggest a link between COVID-19 and these long-term complications, particularly in patients who had severe infections (Bellia *et al.*, 2023; Boparai *et al.,* 2025). More local studies are needed to determine the true magnitude of this issue and its impact on the country's healthcare system.

Globally, there's growing evidence of a link between COVID-19 infection and the new onset of NCDs. This is especially noted in patients who were hospitalized in intensive care units (ICU) (Bellia *et al*, 2023). While the exact mechanism isn't fully understood, the virus is known to cause severe multi-organ damage, which can lead to long-term adverse outcomes and new health complications (WHO, 2022). The incidence of cardiovascular, pulmonary, and diabetes mellitus issues after COVID-19 has been well-documented in the scientific literature (WHO, 2022).

The potential for COVID-19 to cause new cases of hypertension, diabetes, and pulmonary conditions poses a significant threat to Botswana's healthcare system. The pandemic disrupted the management, monitoring, and follow-up of existing non-communicable diseases (NCDs), potentially leading to increased disabilities and premature deaths (WHO, 2022). Health facilities were understaffed and overwhelmed with patients, which impacted the quality of care. Botswana, like many countries, was already burdened with a high number of NCD patients who were particularly vulnerable to severe illness from the COVID-19 virus. The new onset of these conditions further strains the system, which is struggling to cope.

Although our study didn't establish a significant association, the presence of these new diagnoses warrants further investigation. The global evidence suggests that these complications are a real concern (WHO, 2025). This information is crucial for developing targeted public health strategies and allocating resources to manage this emerging public health challenge.

The Study Limitation

Respondents reported their persisting symptoms a year to two years post-COVID-19 infection, which may pose a potential recall bias. The researchers had limited access to the Ministry of Health's electronic database, and only data from the clinic records were used. Data from the catchment areas for the selected clinics could not be accessed.

Conclusion

This study offers valuable insight into the prevalence of persistent post-COVID-19 symptoms in Botswana's primary healthcare settings. The findings underscore that these symptoms are not just physical, but also mental, and highlight a significant association with age. The study emphasizes the critical need for research, especially in the African context, to better understand this new pandemic.

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Conflict of Interest Declaration

The authors declare that there is no conflict of interest associated with this study.

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