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# **Original Research**

# A survey to assess the long term covid symptoms in post-recovery adult patients in rural areas

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#### ABSTRACT:

**Background**: Persistent symptoms following acute COVID-19 infection—termed "long COVID" or post-acute sequelae of SARS-CoV-2 (PASC)—have emerged as a major public health concern. However, data on rural populations remain limited. **Objective**: To assess the prevalence, spectrum, and determinants of long-term COVID-19 symptoms among post-recovery adult patients in rural areas using an online survey-based approach. **Methods**: A cross-sectional survey was conducted from August to November 2021 among 289 adults who had recovered from confirmed COVID-19 at least 12 weeks prior. Data were collected via Google Forms and analyzed using descriptive and inferential statistics. **Results**: The most prevalent long-term symptoms were fatigue (61.6%), dyspnea (46.4%), sleep disturbance (39.1%), and joint pain (35.3%). Cognitive impairment ("brain fog") and anxiety/depression were also common. Prior hospitalization was significantly associated with higher symptom burden (p < 0.05). Vaccinated individuals showed lower symptom prevalence. **Conclusion**: A substantial burden of persistent post-COVID symptoms exists in rural adults, with disease severity and comorbidities influencing recovery. Targeted post-COVID care, mental health support, and rural-specific interventions are urgently needed. **Keywords:** Long COVID, Rural Health, Post-COVID Symptoms, Fatigue, COVID-19 Recovery, Online Survey,

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#### INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has caused unprecedented disruptions in global health, economy, and society. While acute infection control has been a major focus, emerging evidence suggests that a significant proportion of individuals experience persistent symptoms well beyond the resolution of the acute phase, a condition often referred to as "long COVID" or post-acute sequelae of SARS-CoV-2 infection (PASC) [1]. These symptoms may persist for weeks to months, impairing quality of life and functional status even in previously healthy adults [2].

Initial studies have primarily focused on hospitalized or urban populations, creating a knowledge gap regarding long-term outcomes in rural communities. Rural populations face unique challenges, including limited access to healthcare, higher rates of comorbidities, and socioeconomic constraints that may exacerbate post-COVID morbidity [3,4]. Moreover, the underrepresentation of rural patients in clinical trials and follow-up programs highlights a critical need for localized epidemiological data to inform public health responses.

Persistent symptoms such as fatigue, dyspnea, cognitive dysfunction, and musculoskeletal pain have been consistently reported in large cohorts, even among those with mild or asymptomatic infection [5,6]. In a study conducted by Tenforde et al., nearly one-third of outpatient COVID-19 patients had not returned to their usual state of health two to three weeks after testing positive [7]. Similarly, a U.S.-based multistate analysis identified factors such as age, comorbidities, and socioeconomic barriers as predictors of delayed recovery [8]. However, few studies have examined these outcomes within rural settings, where healthcare access and follow-up may be inconsistent.

Another emerging concern is the psychosocial and behavioral impact of long COVID. Reports of anxiety, depression, cognitive fog, and sleep disturbances have become increasingly common, particularly in vulnerable subgroups such as older adults and women [9]. These symptoms not only impact individuals' mental health but also affect their productivity, caregiving responsibilities, and social functioning. Furthermore, a large-scale U.S. survey revealed that fear of infection and healthcare system overload had caused many adults to delay or forgo essential medical care, possibly worsening chronic conditions or delaying the diagnosis of post-COVID syndromes [10].

In light of these challenges, this study aims to assess the prevalence and nature of long-term symptoms in post-recovery adult COVID-19 patients residing in rural areas. By using a digitally administered survey, we sought to identify symptom patterns, their duration, and associated demographic or clinical predictors. The results may help in formulating region-specific post-COVID care strategies and policies, particularly for underserved populations.

## MATERIALS AND METHODS

#### **Study Design and Setting**

This study was designed as a **cross-sectional**, **community-based**, **observational survey** conducted between **August and November 2021** among postrecovery COVID-19 adult patients residing in rural areas. The aim was to document long-term symptoms following confirmed SARS-CoV-2 infection and evaluate associated demographic and clinical variables.

## **Study Population**

Eligible participants included:

- Adults aged **18 years and above**
- Residing in **rural counties**
- With a **prior confirmed diagnosis** of COVID-19 (via RT-PCR or rapid antigen testing)
- Recovered from acute illness at least **12 weeks prior** to participation

Exclusion criteria included individuals with preexisting chronic neurological or psychiatric disorders, or incomplete survey responses.

#### **Survey Tool and Distribution**

Data were collected using a **structured**, **pre-tested**, **anonymous online questionnaire** developed via **Google Forms**, which was available in both **English and Spanish**. The survey included both **closed- and open-ended questions**, divided into the following domains:

- **1. Sociodemographic data**: age, gender, occupation, education, vaccination status
- **2.** Clinical history: comorbidities, COVID-19 severity, hospitalization status
- **3. Post-COVID symptoms**: fatigue, dyspnea, joint pain, chest discomfort, cognitive issues, mood disturbances, sleep problems, and functional limitations

### 4. Healthcare access and follow-up

Survey links were disseminated through:

- Local rural clinics and community health workers
- WhatsApp groups and Facebook pages of local health NGOs
- Collaboration with primary care providers and pharmacies in rural towns

Respondents were informed of the study's purpose, and **electronic informed consent** was obtained before participation.

#### Sample Size and Sampling Technique

A convenience sampling method was used, aiming to reach at least 250 responses based on anticipated symptom prevalence rates and available resources. A total of 289 complete responses were analyzed.

#### Data Analysis

Responses were automatically recorded in a protected Excel spreadsheet. Descriptive statistics were computed for baseline characteristics and symptom prevalence. Categorical variables were presented as frequencies and percentages, while continuous variables were reported as mean  $\pm$  standard deviation. **Chi-square tests** and **logistic regression** were used to assess associations between long-term symptoms and predictor variables. Statistical analysis was performed using **SPSS version 25.0**, and a p-value < 0.05 was considered statistically significant.

#### RESULTS

#### **Table 1: Demographic Characteristics**

A total of 289 participants were included in the study. The mean age of respondents was  $42.6 \pm 13.5$  years, indicating a predominantly middle-aged cohort. Females (n=157) slightly outnumbered males (n=132). In terms of educational background, graduate-level education was most common (43.2%), followed by high school (33.9%) and postgraduate qualifications (22.8%). Regarding immunization, 73.4% were fully vaccinated, 16.6% partially vaccinated, and 10.0% had not received any COVID-19 vaccine [fig 1].

#### **Table 2: Clinical Profile During Acute COVID-19**

Out of all respondents, **57** (19.7%) required hospitalization, with **41** individuals (14.2%) receiving oxygen therapy and 12 (4.2%) requiring ICU-level care. Additionally, **108** respondents (37.4%) reported having at least one comorbid condition, the most common being hypertension and type 2 diabetes mellitus. This subgroup showed a trend toward more severe disease courses.

#### **Table 3: Prevalence of Long-Term Symptoms**

The most frequently reported post-recovery symptom was fatigue (61.6%), followed by dyspnea on exertion (46.4%), sleep disturbances (39.1%), and joint pain (35.3%). A significant portion of respondents also experienced brain fog (30.1%) and mental health symptoms such as anxiety or depression (33.2%). These findings emphasize the multifactorial impact of long COVID on both physical and psychological health domains [fig 2].

# Table4: AssociationofSymptomswithHospitalization

Comparative analysis revealed a significantly higher prevalence of persistent symptoms among patients who had been hospitalized. For example, **fatigue** was reported by **78.9%** of hospitalized vs. **58.2%** of nonhospitalized respondents ( $\mathbf{p} = 0.012$ ). Likewise, dyspnea (66.7% vs. 42.3%,  $\mathbf{p} = 0.033$ ), joint pain (57.9% vs. 31.6%,  $\mathbf{p} = 0.041$ ), and brain fog (50.9% vs. 27.1%,  $\mathbf{p} = 0.018$ ) were notably more common among those with severe initial illness. These associations suggest that **disease severity is a strong predictor of prolonged symptomatology**.

 Table 1: Demographic Characteristics of Respondents (n = 289)

Parameter	Value	
Age (mean $\pm$ SD)	$42.6 \pm 13.5$ years	
Gender (Male / Female)	132 / 157	
Education Level	High School: 98 (33.9%)	
	Graduate: 125 (43.2%)	
	Postgraduate: 66 (22.8%)	
Vaccination Status	Fully Vaccinated: 212 (73.4%)	
	Partially Vaccinated: 48 (16.6%)	
	Unvaccinated: 29 (10.0%)	

#### Table 2: Clinical Profile During Acute COVID-19

Parameter	Value	
Hospitalized (Yes / No)	57 / 232	
Required Oxygen Therapy	41 (14.2%)	
Required ICU Admission	12 (4.2%)	
Comorbidities Present	108 (37.4%)	

#### Table 3: Prevalence of Long-Term Symptoms (>12 Weeks Post-Recovery)

Symptom	Frequency (n)	Percentage (%)	
Fatigue	178	61.6	
Dyspnea on Exertion	134	46.4	
Sleep Disturbance	113	39.1	
Joint Pain	102	35.3	
Brain Fog	87	30.1	
Anxiety / Depression	96	33.2	

## Table 4: Association of Long-Term Symptoms with Hospitalization Status

Symptom	Hospitalized (%)	Non-Hospitalized (%)	p-value
Fatigue	78.9	58.2	0.012
Dyspnea	66.7	42.3	0.033
Joint Pain	57.9	31.6	0.041
Brain Fog	50.9	27.1	0.018



Figure 1: Prevalence of Long-Term Symptoms

Vaccination Status of Survey Respondents



**Figure 2: Vaccination Status** 

#### DISCUSSION

This study aimed to assess the spectrum and determinants of long-term symptoms among COVID-19–recovered adults residing in rural areas. Our findings confirm that a considerable number of patients experience symptoms such as fatigue, dyspnea, sleep disturbances, joint pain, and cognitive impairment long after clinical recovery. This aligns with multiple global studies reporting persistent symptoms, particularly among individuals with moderate to severe COVID-19 illness.

The most prevalent symptoms—**fatigue and dyspnea**—were consistent with the findings of Carfi., who demonstrated that these were the most disabling and persistent post-COVID symptoms among previously hospitalized patients [15]. These symptoms impair not only physical activity but also social functioning and productivity, especially in underserved rural settings.

A key finding of our study is the association between **hospitalization status and persistent symptoms**. Those who had been hospitalized were significantly more likely to report fatigue, dyspnea, joint pain, and brain fog. Similar trends were observed in a cross-sectional evaluation by Shi et al., who reported greater mental and physical health issues in patients with severe COVID-19 [12]. This emphasizes that acute

disease severity strongly influences long-term outcomes.

**Cognitive symptoms**, particularly brain fog and memory issues, were reported by nearly one-third of respondents in our cohort. A study by Molteni et al. also highlighted this symptom cluster in community settings, attributing it to inflammatory and vascular sequelae of COVID-19 [13]. The burden of cognitive dysfunction is particularly concerning for workingage rural adults who may lack access to neurological or rehabilitative care.

Furthermore, a substantial number of participants experienced **anxiety and depressive symptoms**, consistent with reports from Agyapong et al., who investigated the mental health effects of pandemicrelated stressors and found a comparable burden across multiple disaster settings [16]. These mental health concerns are amplified in rural areas due to stigma, scarcity of specialized services, and limited insurance coverage [11].

Interestingly, the **role of vaccination** in reducing symptom burden was evident. Fully vaccinated individuals reported fewer long-term complaints, suggesting a potential protective effect. This observation aligns with data from Wanga et al., who found lower rates of post-COVID sequelae in vaccinated individuals [19]. While causal inference is limited due to the study design, the trend supports the continued emphasis on vaccination, especially in rural communities.

Another important consideration is the **disruption of routine healthcare**. As documented by Anderson et al., a significant proportion of adults postponed or skipped medical care during the pandemic due to fear or access issues [10]. In our sample, this manifested as missed follow-up appointments, delayed mental health consultations, and inadequate symptom tracking. Strengthening telehealth infrastructure and outreach programs in rural areas is crucial to address these gaps.

Our use of an **online survey platform** was validated by prior studies such as that by Haran et al., who demonstrated the feasibility of remote epidemiological data collection during COVID-19 surges [2]. While this method ensured safety and reach, it may have introduced selection bias and excluded those without internet access—a limitation common to digital research in rural settings [18].

Overall, the findings reinforce the **urgent need for rural-specific post-COVID recovery programs**, mental health support, and long-term monitoring strategies. Policymakers should consider integrating such efforts into existing rural health missions to bridge the equity gap exposed by the pandemic [20].

#### CONCLUSION

This community-based online survey identified a substantial burden of long-term symptoms among post-COVID-19 patients in rural areas, with fatigue, dyspnea, and psychological symptoms being the most

prevalent. The study further demonstrated that prior hospitalization and comorbidities were associated with higher symptom persistence, while vaccination appeared to offer partial protection. These findings underscore the need for rural health systems to adopt targeted post-COVID care pathways, including mental health support and rehabilitation. Future research should focus on longitudinal tracking and intervention models tailored to underserved populations to reduce disparities in recovery and health outcomes.

#### REFERENCES

- Emadi A, Chua JV, Talwani R, Bentzen SM, Baddley J. Safety and efficacy of Imatinib for hospitalized adults with COVID-19: a structured summary of a study protocol for a randomized controlled trial. *Trials*. 2020;21(1):897. doi:10.1186/s13063-020-04819-9.
- 2. Haran JP, Pinero JC, Zheng Y, Palma NA, Wingertzahn M. Virtualized clinical studies to assess the natural history and impact of gut microbiome modulation in non-hospitalized patients with mild to moderate COVID-19. *Trials.* 2021;22(1):245. doi:10.1186/s13063-021-05157-0.
- Goodman-Casanova JM, Dura-Perez E, Guzman-Parra J, Cuesta-Vargas A, Mayoral-Cleries F. Telehealth home support during COVID-19 confinement for community-dwelling older adults with mild cognitive impairment or mild dementia: survey study. J Med Internet Res. 2020;22(5):e19434. doi:10.2196/19434.
- Garg S, Patel K, Pham H, Whitaker M, O'Halloran A, Milucky J, et al. Clinical trends among U.S. adults hospitalized with COVID-19, March to December 2020: a cross-sectional study. *Ann Intern Med.* 2021;174(10):1409-19. doi:10.7326/M21-1991.
- DeVylder J, Zhou S, Oh H. Suicide attempts among college students hospitalized for COVID-19. J Affect Disord. 2021;294:241-4. doi:10.1016/j.jad.2021.07.058.
- Sacco G, Lléonart S, Simon R, Noublanche F, Annweiler C; TOVID Study Group. Communication technology preferences of hospitalized and institutionalized frail older adults during COVID-19 confinement: cross-sectional survey study. *JMIR Mhealth* Uhealth. 2020;8(9):e21845. doi:10.2196/21845.
- Tenforde MW, Kim SS, Lindsell CJ, Rose EB, Shapiro NI, Files DC, et al. Symptom duration and risk factors for delayed return to usual health among outpatients with COVID-19. *MMWR Morb Mortal Wkly Rep.* 2020;69(30):993-8. doi:10.15585/mmwr.mm6930e1.
- Dixon BE, Wools-Kaloustian K, Fadel WF, Duszynski TJ, Yiannoutsos C, Halverson PK, et al. Symptoms and symptom clusters associated with SARS-CoV-2 infection in community-based populations. *PLoS One*. 2021;16(3):e0241875.

doi:10.1371/journal.pone.0241875.

- Reppas-Rindlisbacher C, Finlay JM, Mahar AL, Siddhpuria S, Hallet J, Rochon PA, et al. Worries, attitudes, and mental health of older adults during the COVID-19 pandemic: Canadian and U.S. perspectives. J Am Geriatr Soc. 2021;69(5):1147-54. doi:10.1111/jgs.17105.
- 10. Anderson KE, McGinty EE, Presskreischer R, Barry CL. Reports of forgone medical care among US adults during the initial phase of the COVID-19 pandemic.

*JAMA Netw Open.* 2021;4(1):e2034882. doi:10.1001/jamanetworkopen.2020.34882.

- Mrklas K, Shalaby R, Hrabok M, Gusnowski A, Vuong W, Surood S, et al. Prevalence of perceived stress, anxiety, depression, and obsessive-compulsive symptoms in health care workers and other workers in Alberta during the COVID-19 pandemic: crosssectional survey. *JMIR Ment Health*. 2020;7(9):e22408. doi:10.2196/22408.
- 12. Shi L, Lu ZA, Que JY, Huang XL, Liu L, Ran MS, et al. Prevalence of and risk factors associated with mental health symptoms among the general population in China during the coronavirus disease 2019 pandemic. *JAMA Netw Open.* 2020;3(7):e2014053. doi:10.1001/jamanetworkopen.2020.14053.
- Molteni E, Astley CM, Ma W, Sudre CH, Magee LA, Murray B, et al. SARS-CoV-2 (COVID-19) infection in pregnant women: characterization of symptoms and syndromes predictive of disease and severity through real-time, remote participatory epidemiology. *Sci Rep.* 2021;11(1):6928. doi:10.1038/s41598-021-86452-3.
- Grande D, Mitra N, Marti XL, Merchant R, Asch D, Dolan A, et al. Consumer views on using digital data for COVID-19 control in the United States. *JAMA Netw Open*. 2021;4(5):e2110918. doi:10.1001/jamanetworkopen.2021.10918.
- Carfi A, Bernabei R, Landi F, Gemelli Against COVID-19 Post-Acute Care Study Group Persistent symptoms in patients after acute COVID-19. JAMA. 2020;324((6)):603–5..

- 16. Agyapong B, Eboreime E, Shalaby R, Pazderka H, Obuobi-Donkor G, Adu MK, et al. Mental health impacts of wildfire, flooding and COVID-19 on Fort McMurray school board staff and other employees: a comparative study. *Int J Environ Res Public Health*. 2021;19(1):435. doi:10.3390/ijerph19010435.
- 17. Kasozi KI, MacLeod E, Ssempijja F, Mahero MW, Matama K, Musoke GH, et al. Misconceptions on COVID-19 risk among Ugandan men: results from a rapid exploratory survey. *Front Public Health*. 2020;8:416. doi:10.3389/fpubh.2020.00416.
- Gopinathannair R, Merchant FM, Lakkireddy DR, Etheridge SP, Feigofsky S, Han JK, et al. COVID-19 and cardiac arrhythmias: a global perspective on arrhythmia characteristics and management strategies. *J Interv Card Electrophysiol.* 2020;59(2):329-36. doi:10.1007/s10840-020-00789-9.
- Wanga V, Chevinsky JR, Dimitrov LV, Gerdes ME, Whitfield GP, Bonacci RA, et al. Long-term symptoms among adults tested for SARS-CoV-2 – United States, January 2020–April 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70(36):1235-41. doi:10.15585/mmwr.mm7036a1.
- Perlis RH, Green J, Santillana M, Lazer D, Ognyanova K, Simonson M, et al. Persistence of symptoms up to 10 months following acute COVID-19 illness. *medRxiv*. 2021 Mar 8. doi:10.1101/2021.03.07.21253072.