

# A Community-Based Study on the Knowledge and Practices towards COVID-19 Prevention in Binunga Village of Rwanda

Bushaija Emmy<sup>1</sup>, Wabwire Paul Francis<sup>1</sup>, Okesina Akeem Ayodeji<sup>1\*</sup>, Habyarimana Innocent<sup>1</sup>

<sup>1</sup>College of Medicine and Health Sciences, University of Rwanda.

## ABSTRACT

**Introduction:** Background: COVID-19 has become the fifth documented pandemic since 1918, threatening to widen inequalities globally. Binunga village recorded an increase in COVID-19 cases, which was attributed to the limited community knowledge and practices of COVID-19. Therefore, the need to ascertain knowledge and practices in Binunga village on COVID-19 preventive measures during the pandemic.

**Methods:** A descriptive cross-sectional study was utilized. Simple random sampling was used to select 198 respondents for data collection using face-to-face interviews.

**Results:** In this study, all 198 respondents (100%) demonstrated awareness of COVID-19. A significant proportion of respondents, 90.4%, 95.5%, and 99%, respectively, possessed knowledge of the causes, associated risk factors, and the potential for COVID-19 to be cured. Moreover, 80.3% and 68.7% of the respondents were aware of the main modes of transmission and recognized the symptoms of COVID-19. Interestingly, a majority of respondents (64%) were unaware of self-isolation measures, while 21% demonstrated awareness, and 15% correctly stated a duration of 14 days for isolation accompanied by symptom monitoring. In terms of preventive measures, all respondents (100%) reported wearing face masks, 98% engaged in hand washing, 46.5% practiced social distancing, and 6.6% made necessary movements. Additionally, 95.5% of respondents reported being vaccinated, while 27.8% observed self-isolation in the presence of COVID-19 symptoms, and 72.2% sought treatment.

**Conclusion:** The residents of Binunga exhibited commendable knowledge of COVID-19 and preventive measures, emphasizing effective public health communication and the need for targeted interventions to address remaining knowledge gaps.

\*Corresponding author:  
Dr Okesina Akeem Ayodeji  
College of Medicine and Health  
Sciences, University of  
Rwanda.  
E-mail: akeemokesina@gmail.  
com

Received: April 2, 2022  
Accepted: June 6, 2023  
Published: June 30, 2023

Cite this article as: Ayodeji et al. A Community-Based Study on the Knowledge and Practices towards COVID-19 Prevention in Binunga Village of Rwanda *Rw. Public Health Bul.* 2023. 4 (2): 39-47. <https://dx.doi.org/10.4314/rphb.v4i2.4>

## INTRODUCTION

Since the emergence of the Coronavirus disease (COVID-19) outbreak in Wuhan, Hubei, China, in November 2019, there have been substantial global implications for public health [1]. In response, efforts have been directed towards

raising awareness and implementing health communication strategies to promote knowledge of COVID-19 prevention [2]–[4], and to raise community knowledge of healthy practices against COVID-19 prevention [5]. It is well recognized that individuals' practices are often influenced by their level of knowledge [6]. The COVID-19

**Potential Conflicts of Interest:** No potential conflicts of interest disclosed by all authors. **Academic Integrity:** All authors confirm their substantial academic contributions to development of this manuscript as defined by the International Committee of Medical Journal Editors. **Originality:** All authors confirm this manuscript as an original piece of work, and confirm that has not been published elsewhere. **Review:** All authors allow this manuscript to be peer-reviewed by independent reviewers in a double-blind review process. © **Copyright:** The Author(s). This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY-NC-ND), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. **Publisher:** Rwanda Health Communication Centre, K.G 302st., Kigali-Rwanda. Print ISSN: 2663 - 4651; Online ISSN: 2663 - 4653. **Website:** <https://rbc.gov.rw/publichealthbulletin/>

pandemic, caused by the SARV-CoV-2 virus, originated in Wuhan City, China, in late December 2019 and rapidly spread worldwide [7]. As of June 2022, there were over 533 million confirmed cases and approximately 6.3 million deaths globally [8]. Notably, the United States of America (USA) reported the highest number of confirmed cases (around 85 million) and over 1 million deaths. In Africa, South Africa had the highest number of cases (over 3.97 million) and 102,873 deaths, while Kenya recorded the highest number of cases (328,977) and 5,651 deaths in the East African region [8]. Ten months after its initial case, Rwanda reported 10,316 cases and 133 COVID-19-related deaths, resulting in a case fatality rate (CFR) of 1.3%. This relatively low CFR in Rwanda raised questions regarding the factors contributing to its success in managing the pandemic [9]. However, by June 2021, the number of confirmed cases in Rwanda had risen to 30,813, with 382 deaths. Within a month, in July 2021, an additional 18,203 cases and 200 deaths were reported [10].

COVID-19 symptoms include fever, difficulty in breathing, tiredness, muscle aches and pain, and dry cough [11]. All people are at risk of infection but the most vulnerable people include those with comorbidities such as diabetes, HIV/AIDS, and hypertension; and either the advanced age (above 65 years) or the young below 5 years old. There is no curative treatment but supportive treatment, and the use of vaccines is now available [11]. According to current evidence, COVID-19 is transmitted between people through respiratory droplets, fomites, and direct contact routes [12]. The World Health Organization (WHO) has proven preventive measures to deal with the pandemic, including but not limited to regular handwashing using soap and clean water or the use of sanitizers to avoid contamination, avoidance of touching eyes, mouth, nose, and handshakes, to cover the mouth and nose by wearing a facial mask, avoidance of unnecessary movement and social distancing [11].

Rwandan Government inaugurated a joint task force headed by the prime minister, which organized a weekly public awareness on preparedness and response plan for the pandemic. This was done at the peak of the pandemic by mid-July 2020 to create awareness among the population and to reduce the spread of COVID-19 [2]. There were also different means of community sensitization and measures taken in the form of air

travel bans, closure of all borders, suspension of public transportation, limitations of unnecessary movements, the closing of public spaces such as schools and churches, isolation, and care for COVID-19 infected patients and/ or suspected cases [7]. Initially, a national lockdown, self-quarantine campaign was launched and led by Rwanda National Police- requiring people to stay and work from home from March 20, 2020.

Subsequently, Rapid Response Teams (RRTs) were activated at central and district levels to respond to the pandemic in collaboration with local leaders and government organs focused on the prevention of the spread of COVID-19 [7], [13]. Despite the efforts in place, daily data from Rwandan Biomedical Center (RBC) showed that the pandemic was spreading in all districts of Rwanda, and the number of positive cases was rising [7].

The Village of Binunga, Murama cell in Kinyinya sector-Gasabo district, Kigali, Rwanda, had a large number of positive cases of COVID-19 where new cases increased from around 30 to 60 confirmed cases within a period of 14 days (late June and early July 2021), compared to the number of cases in the month of May [7]. The high number of positive COVID-19 cases in Binunga village indicates a significant lack of community knowledge and poor practices regarding disease prevention. Insufficient awareness about COVID-19 and inadequate adherence to preventive measures such as handwashing and wearing face masks contribute to the spread of the virus. It is crucial to promote and prioritize good health knowledge, positive attitudes, and appropriate practices in disease prevention to effectively control and mitigate the impact of pandemic diseases [7]. A recent study in Rwanda among health workers in April 2020 found that all (100%) understood COVID-19 transmission and prevention as well as the necessity for self-isolation and quarantine as control measures. Subsequently, 95% of the population of Rwanda, was reported to be mainly engaged in hand washing; social distancing; limiting unnecessary travel and crowds as well as using facial masks and gloves [7].

This study aims to investigate the knowledge and practices of the semi-urban community in Binunga village, Kinyinya sector, Kigali City, regarding COVID-19 prevention. The findings of this study are expected to provide valuable insights to healthcare providers, local leaders,

and other stakeholders regarding the community's understanding and behavior toward COVID-19 prevention measures. By conducting this community-based study, researchers and public health professionals will be able to gather important information that can guide efforts in promoting accurate knowledge, addressing misconceptions, and enhancing preventive practices specifically within the Binunga Village community in Rwanda.

## METHODS

### Study Design and Sample Technique

The study was a cross-sectional study, and quantitative data were collected from household members that were aged over 18 years. The sample size (n) was determined using Taro Yamane's method [14], and out of 392 households, gave 198 respondents.

$n = N/[1+N(e^2)]$ ; where: n is the sample size; N is the total study population and e is the margin error. Since Binunga village is composed of 392 resident households (Data from the Head of Binunga village, 2021),  $N=392$  and  $e=0.05$

Then,  $n = 392/[1+392(0.05^2)] = 198$  respondents.

Simple random sampling was used for data collection, where households with adult members were picked randomly using the lottery method without replacement until the desired number of respondents was obtained.

### Study Tool

For data collection, a structured questionnaire was developed as the study tool, and face-to-face interviews were conducted. The questionnaire consisted of three sections. Section A included seven questions to gather information on the participants' socio-demographic characteristics. Section B comprised ten questions to assess participants' knowledge of COVID-19 prevention, while section C comprised six questions about their practices in preventing COVID-19. To ensure quality control, expert opinions from researchers and statisticians were sought to validate the content and design of the research tool. The questionnaire underwent a pre-testing phase in a non-study area, and feedback was incorporated into the final version, which was produced in the Kinyarwanda language. The use of neutral language and open-ended questions helped minimize bias in the questionnaire. The pre-coded data was checked and entered in SPSS version 21. The accuracy

of the data entered was further checked and cleaned through trial runs; i.e., the data were doubled checked by the research assistants. Data analysis was done where knowledge and practices were determined by the number of scores of the questions that were obtained. Then, knowledge variables were dichotomized into right or wrong responses, and the right answer was assigned one mark. The sum of marks of every respondent was scored out of 10, then total marks were classified into low (0-3), average (4-6), and high (7-10). Likewise, the score for practice was categorized as poor (0-2), fair (3-4), and good (5-6) as the total questions for practice are 6 [15].

### Ethical Considerations

Upon the approval of the research proposal by the College of Medicine and Health Sciences (CMHS)-School of Health Sciences, the Institutional Review Board (IRB) of the College of Medicine and Health Sciences at the University of Rwanda granted ethical clearance (CMHS/IRB/235/2022). Subsequently, permission for data collection was obtained from the relevant authority in Kinyinya Sector. Prior to the commencement of data collection, the study participants received comprehensive orientation and were fully informed about the study's objectives and procedures. They were given the autonomy to choose whether to participate or withdraw from the study, and confidentiality was ensured by not collecting any personal identifying information. The participants were informed that the study was solely for educational purposes, which encouraged their participation.

## RESULTS

### The Socio-Demographic Characteristics of Respondents

The youngest respondent was 19 years old, and the oldest was 67 years. The majority of respondents (59.1%) were in the 18-29 years age group. Approximately 65.2% of the respondents were females while 34.8% were males. Though most of the participants were married 51% and single 31.3%, some were divorced, separated, or widowed. Educational level varied where the respondents attained secondary schools and primary schools were equal (48.5% each) while 0.5% attended university schools and 2% had no formal education.

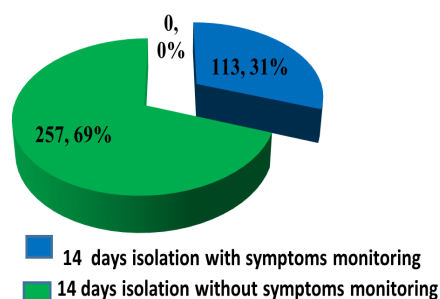
**Table 1:** Socio-Demographic Characteristics of Respondents

Socio-demographic factors		Frequency	Percentages
Age group	18-29	117	59.1%
	30-39	59	29.8%
	40 and above	22	11.1%
Gender	Male	69	34.8%
	Female	129	65.2%
Marital status	Single	62	31.2%
	Married	101	51.0%
	Divorced	11	5.6%
	Widowed	12	6.1%
	Separated	12	6.1%
	None	4	2.0%
	Primary	96	48.5%
Education level	Secondary	96	48.5%
	University	1	0.5%
	Missing value	1*	0.5%
	Farmer	124	62.6%
Occupation	Trader	38	19.2%
	Others	33	16.7%
	Unemployed	3	1.5%
	Category 1	10	5.1%
Ubudehe category	Category 2	94	47.5%
	Category 3	94	47.5%
	Catholic	68	34.3%
Religion	Protestant	106	53.5%
	Adventist	16	8.1%
	Muslim	2	1.0%
	Others	6	3.0%

The largest proportion (47.5%) of respondents were classified in Ubudehe category B equalized by Category C and Category A (5.1%). The occupation of the participants also varied where many of them were farmers (62.9%), 19.2% were traders, 16.7% had other occupations, and 1.5 had no employment. The largest portion was protestants (53.5%) followed by catholic (34.3%). Table 1 shows further details on socio-demographic characteristics.

Regarding knowledge of the respondents about actions taken by people upon contact with a confirmed case of COVID-19, 64% did not know, while 21% knew that the people are isolated for

14 days without symptoms monitoring, and 15% stated that they are put in 14 days isolation with symptoms monitoring, as presented in Figure 1.



**Figure 1:** Respondents' knowledge on action taken upon contact with a confirmed case of COVID-19

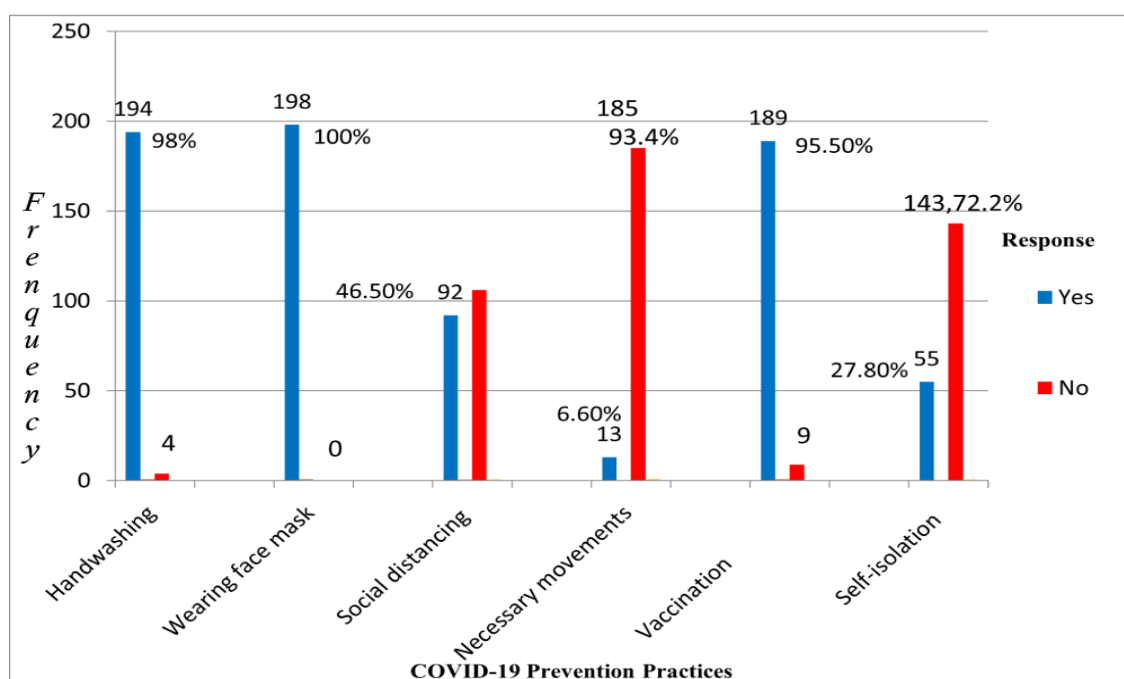


Figure 2: Practices of the respondents about COVID-19 prevention

### Practices of Respondents on Covid-19 Prevention

The respondents were also asked about their practices regarding COVID-19 preventive measures such as hand washing and wearing face masks (Figure 2). The majority of the respondents 98% (194) frequently washed their hands with clean water and soap or used sanitizers, and all

the respondents (100%) wore face masks before going outside their homes, while 46.5% of the respondents observed social distancing in public places and only 6.6% of respondents made necessary movements out of their homes. Almost all the respondents (95.5%) got at least 1 dose of the COVID-19 vaccine, 27.8% observed self-isolation with symptoms of COVID-19, while

Table 3: Successful notification and multiple partner listing by sex and marital status of index clients

Knowledge items	Response	Frequency	Percentage (%)
Have heard about COVID-19	Yes	198	100
	NO	0	0
Knows about COVID-19	Yes	179	90.4
	NO	19	9.6
Understands COVID-19 prevention measures	Yes	198	100
	No	0	0
Thinks COVID-19 is curable	Yes	196	99
	No	2	1
Knows that COVID-19 Vaccines are available	Yes	198	100
	No	0	0
Knows main modes of transmission COVID-19	Yes	159	80.3
	No	39	19.7
Recognizes symptoms of COVID-19	Yes	136	68.7
	No	62	31.3
Knows more than 4 main risk factors of COVID-19	Yes	189	95.5
	NO	19	4.5

72.2% (143) went directly to the health facility or Community Health Workers.

The knowledge of 198 respondents about COVID-19 prevention was assessed by asking questions on; general knowledge, causative agent, preventive measures, whether it is curable, availability of

vaccines, mode of transmission, recognizable symptoms, and associated risk factors (Table 2).

All respondents 100% had heard of COVID-19, knew that it could be prevented, and were aware of the existence of vaccines. Respectively, 90.4%, 95.5%, and 99% of the respondents know; about the causes and more than four associated risk factors of COVID-19 and think COVID-19 can be cured. Also, table 2 shows that 80.3% and 68.7% of the respondents know the main modes of transmission and recognize symptoms of COVID-19, respectively.

**Table 3: Comparing Knowledge and Practices in COVID-19 Prevention**

Category	Knowledge, n (%)	Practices, n (%)
Highly knowledgeable	198 (100)	6 (3)
Fair knowledge	0	189 (95.5)
Poor knowledge	0	3 (1.5)

### Overall Knowledge and Practices on COVID-19 Prevention

All the respondents (100%) were highly knowledgeable about COVID-19 prevention, while 3% had good practices, 95.5% had fair practices and only 1.5% had poor practices (Table 3).

## DISCUSSION

This study showed that the people in the Binunga community were knowledgeable (100%) about COVID-19, although the practices regarding self-isolation and social distance were poorly implemented. The study found that the majority of 90.4% knew the virus as the causative agent of Covid-19 and concurred with a study done in the Ivory Coast; out of 580 respondents, 90.6% knew that the causative agent of COVID-19 [16]. Furthermore, it was found that 68.7% of respondents knew that cough, fever, fatigue, and shortness of breath are the main symptoms of Covid-19, and 80.3% stated that droplets, fomites,

and direct contact with infected people are modes of transmission of COVID-19. This concurs with a study in Malawi where 62% knew that fever, dry cough, fatigue, and shortness of breath are the main symptoms of COVID-19 [17,18] and 76% stated that direct contact with infected people, droplets of infected people, and touching the surface of items infected by the virus is the main mode of transmission of COVID-19 [19]. This high knowledge of symptoms and modes of transmission of COVID-19 is due to the fact that in their community, such as markets, car parks, and trading centers were posters showing the symptoms of COVID-19 and everyday mass media messages about disease transmission and prevention. It was also found that the main source of COVID-19 information was from the community, friends, and health workers (98.3%) [7], and throughout the course of the pandemic, community health workers (CHWs) and youth volunteers were tasked to disseminate educative messages about COVID-19 [7].

The majority of respondents (95.5%) knew more than four main risk factors of COVID-19, notably advanced age and being young and having comorbidity. The finding is similar to a study in Saudi Arabia, where 92.2% showed that these groups had more risk of getting COVID-19 than other people [20]. Again, this study shows the importance of various health communications that address the mode of transmission.

The results of this study highlight a concerning issue regarding self-quarantine practices among the respondents. Only 64% of the participants were aware of the recommended 14-day isolation period after being in contact with a confirmed case of COVID-19. This suggests a lack of widespread understanding and adherence to this important preventive measure. Additionally, 21% of the respondents knew about the 14-day isolation period without symptoms monitoring, while 15% mentioned the need for isolation with symptoms monitoring. These findings indicate a potential problem with self-quarantine practices in the studied population. Despite efforts to control the spread of the pandemic in Rwanda, the researcher noted that the virus was still spreading across all districts, and the number of positive cases continued to rise. The low awareness and inconsistent understanding of self-quarantine measures observed in this study could contribute to the ongoing transmission of the virus. Addressing this issue requires targeted interventions and



educational campaigns to increase awareness and promote proper self-quarantine practices. Public health authorities in Rwanda may need to enhance communication strategies to ensure that individuals understand the importance of isolating themselves for the recommended duration, regardless of symptoms present, and actively monitor their health during this period. By improving adherence to self-quarantine measures, it is possible to reduce the transmission of COVID-19 and mitigate the rising number of positive cases in the country [7]. Regarding practices of respondents about COVID-19 prevention, the study showed that 98% of respondents frequently washed their hands with clean water and soap or sanitizers, and 100% wore face masks before going outside their houses. This finding is similar to a study done in China where of 170 respondents, 97.6% reported wearing face masks when going out in public places [21]. However, this contrasts with a study conducted in the Ivory Coast, where 51.2% of respondents washed their hands, and 48.9% wore their face masks in public [7]. Furthermore, this study revealed that 6.6% of the respondents made unnecessary movements, and 46.5% practiced social distancing while in public places. This is similar to findings in a study done in Malawi, where only 9% of respondents avoided unnecessary movements, and 33% practiced social distancing in public places [19]. This suggests a significant amount of respondents restricted their movements during the pandemic; less than half of the respondents adhered to the rules of social distancing.

Lastly, based on the information provided, there is a notable disparity between the knowledge and practices regarding COVID-19 prevention among the respondents. The data indicates that all respondents (100%) had a high knowledge of COVID-19 prevention. This suggests that they were well-informed about the preventive measures, such as wearing masks, practicing hand hygiene, and maintaining social distancing [22]. However, when it comes to translating that knowledge into practice, the numbers reveal a different picture. Only a small proportion of respondents (3%) demonstrated effective practices in implementing the preventive measures. This implies that despite being knowledgeable, a limited number of participants consistently followed the recommended preventive measures.

The majority of respondents (95.5%) were

categorized as having fair practices. This indicates that they may have some level of adherence to preventive measures but might not consistently follow them or may have room for improvement in certain aspects. It is concerning to note that a small percentage of respondents (1.5%) exhibited poor practices. This suggests that despite having the necessary knowledge, these individuals did not effectively implement preventive measures, potentially putting themselves and others at risk [23]. The comparison between knowledge and practices highlights the need for bridging the gap between awareness and action. It underscores the importance of not only providing education and knowledge about COVID-19 prevention but also promoting and supporting behavior change to ensure consistent and effective implementation of preventive measures.

The study used a cross-sectional design and was conducted in a single village, and as practices were not observed, the results cannot be used as a representation of the whole country of Rwanda. Nevertheless, the study has shed light on the importance of health communication in communicable disease prevention and control, specifically COVID-19.

We did not look at the attitude and perception in the study because we tried to reduce the number of inflated responses from the respondents.

## CONCLUSION

The findings of this study indicate that a significant proportion of residents in Binunga village are well-informed about various aspects of COVID-19, including its causes, preventive measures, available treatments, vaccine availability, modes of transmission, associated symptoms, and key risk factors. Moreover, the majority of residents actively practiced important preventive measures such as handwashing, mask-wearing, and vaccination. However, there is a need for increased adherence to social distancing measures and improved self-isolation practices when in contact with confirmed cases. Therefore, the study reveals that a substantial number of Binunga village residents know about COVID-19 and its preventive measures.

The Government Task Force on COVID-19 and Health Workers stationed in Binunga village should understand the reason behind the low

adherence to self-isolation after being in contact with a confirmed case of COVID-19.

Also, there is a need for the involvement of youth volunteers, health professionals, civil servants, religious leaders, etc., to keep engaging the community in practicing COVID-19 preventive measures. However, further research is needed to identify perceptions and attitudes associated with COVID-19.

Efforts should focus on designing interventions that target behavior change, address barriers to practice, and promote the adoption of good practices among the population. This could involve targeted awareness campaigns, community

engagement, and ongoing support to reinforce positive behaviors.

### Acknowledgments and funding

We extend special thanks to the Community Health Workers and village leaders in the Kinyinya sector, without whom data collection would not have been possible. Many thanks go to the community members who provided the information needed. Also, we recognize the College of Medicine and Health Sciences, University of Rwanda, for always prioritizing and encouraging faculty members to carry out research.

### REFERENCES

- [1] J. Sun et al., "COVID-19: Epidemiology, Evolution, and Cross-Disciplinary Perspectives," *Trends Mol. Med.*, vol. 26, no. 5, pp. 483–495, 2020, doi: 10.1016/j.molmed.2020.02.008.
- [2] H. T. Le et al., "Factors Associated with Community Awareness on COVID-19 in a Developing Country: Implications for Optimal Risk Communication," *Risk Manag. Healthc. Policy*, vol. 15, no. February, pp. 415–426, 2022, doi: 10.2147/RMHP.S356690.
- [3] S. Umakanthan, A. Chauhan, M. M. Gupta, P. K. Sahu, M. M. Bukelo, and V. K. Chattu, "COVID-19 pandemic containment in the Caribbean Region: A review of case-management and public health strategies," *AIMS Public Heal.*, vol. 8, no. 4, pp. 665–681, 2021, doi: 10.3934/publichealth.2021053.
- [4] M. R. Azizi, R. Atlasi, A. Ziapour, J. Abbas, and R. Naemi, "Innovative human resource management strategies during the COVID-19 pandemic: A systematic narrative review approach," *Heliyon*, vol. 7, no. 6, p. e07233, 2021, doi: 10.1016/j.heliyon.2021.e07233.
- [5] M. Vivalya et al., "Lockdown, social distancing and mental health during the covid-19 pandemic in African settings: The people perspectives, challenges, and opportunities in Democratic Republic of Congo (Preprint)," *JMIR Public Heal. Surveill.*, no. 1000002, pp. 19–21, 2020, doi: 10.2196/20785.
- [6] Y. Li, G. Liu, R. O. Egolet, R. Yang, Y. Huang, and Z. Zheng, "Knowledge, Attitudes, and Practices Related to COVID-19 Among Malawi Adults: A Community-Based Survey.," *Int. J. Environ. Res. Public Health*, vol. 18, no. 8, 2021, doi: 10.3390/ijerph18084090.
- [7] N. Pacifique, N. E. \*, Nkeshimana Menelas, Hitimana Nadia, Turatsinze David, Y. K. Byiringiro Fidele, Habinshtu Mike, Nyamusore Jose, Nyamwasa Daniel, and N. S. Mutesa Leon, "No Title Knowledge, attitudes and preventive practices towards COVID-19 among frontline healthcare workers in Rwanda," *Rw. Public Heal. Bul.*, vol. 2, no. 1, pp. 16–21, 2020.
- [8] WHO, "World health Organization. COVID-19 Weekly Epidemiological Update 47," *World Heal Organ. world health organization*, pp. 1–18, 2021.
- [9] C. Musanabaganwa et al., "One hundred thirty-Three observed COVID-19 deaths in 10 months: Unpacking lower than predicted mortality in Rwanda," *BMJ Glob. Heal.*, vol. 6, no. 2, pp. 1–6, 2021, doi: 10.1136/bmjgh-2020-004547.
- [10] WHO, "COVID-19 weekly epidemiological update.," *World Heal Organ. world health organization*, pp. 1–23, 2022.
- [11] N. Twinamasiko, R. Olum, A. M. Gwokyalya, I. Nakityo, E. Wasswa, and E. Sserunjogi, "Assessing Knowledge, Attitudes and Practices Towards COVID-19 Public Health Preventive Measures Among Patients at Mulago National Referral Hospital," *Risk Manag. Healthc. Policy*, vol. Volume 14, pp. 221–230, Jan. 2021, doi: 10.2147/RMHP.S287379.
- [12] R. GÜNER, İ. HASANOĞLU, and F. AKTAŞ, "COVID-19: Prevention and control measures in community," *TURKISH J. Med. Sci.*, vol. 50, no. SI-1, pp. 571–577, Apr. 2020, doi: 10.3906/sag-2004-146.
- [13] J. M. et al. B Mutume- N Vivalya, Okesina A A, Mutuka H, Muyisa L, Martia M, "Mental Health and Social Distancing During COVID-19 in African Settings," *J. Med. Res.*, vol. 7, no. 1, pp. 1–3, 2021.
- [14] S. M. Smith, "Determining Sample Size : How to Ensure You Got The Correct Sample Size. E-Book (c) Qualtrics Online Sample.," *Qual. Health Res.*, vol. 10, no. 1, pp. 3–5, 2013, [Online]. Available: <https://uncw.edu/irp/ie/resources/documents/qualtrics/determining-sample-size-2.pdf>
- [15] J. L. Jensen, I. E. Blanchard, B. L. Bigham, K. N. Dainty, D. Socha, and A. Carter, "Methodology for the development of a canadian national EMS research agenda," *BMC Emerg. Med.*, vol. 11, no. 1, p. 15, 2011, doi: 10.1186/1471-227X-11-15.
- [16] R. B. Yapi et al., "Knowledge, attitudes, and practices (Kap) regarding the covid-19 outbreak in côte d'ivoire: Understanding the non-compliance of populations with non-pharmaceutical interventions," *Int. J. Environ. Res. Public Health*, vol. 18, no. 9, pp.



1–21, 2021, doi: 10.3390/ijerph18094757.

[17] O. P. Mehta, P. Bhandari, A. Raut, S. E. O. Kacimi, and N. T. Huy, “Coronavirus Disease (COVID-19): Comprehensive Review of Clinical Presentation,” *Front. Public Heal.*, vol. 8, no. January, pp. 1–9, 2021, doi: 10.3389/fpubh.2020.582932.

[18] F. Jiang, L. Deng, L. Zhang, Y. Cai, C. W. Cheung, and Z. Xia, “Review of the Clinical Characteristics of Coronavirus Disease 2019 (COVID-19),” *J. Gen. Intern. Med.*, vol. 35, no. 5, pp. 1545–1549, 2020, doi: 10.1007/s11606-020-05762-w.

[19] F. of P. Health., “Good Public Health Practice framework,” what public health practice is. Faculty of Public Health., 2016.

[20] L. Cirrincione et al., “COVID-19 Pandemic: Prevention and Protection Measures to Be Adopted at the Workplace,” *Sustainability*, vol. 12, no. 9, p. 3603, Apr. 2020, doi: 10.3390/su12093603.

[21] P. Gellert and F. Tille, “What do we know so far? The role of health knowledge within theories of health literacy,” *Eur. Heal. Psychol.*, vol. 17, no. 6, pp. 266–274, 2015, [Online]. Available: [https://pdfs.semanticscholar.org/091c/9f58a507fd7a60ce14aee2e7397da7b9a26e.pdf?\\_ga=2.234445790.1557863600.1589130400-1802008879.1589130400](https://pdfs.semanticscholar.org/091c/9f58a507fd7a60ce14aee2e7397da7b9a26e.pdf?_ga=2.234445790.1557863600.1589130400-1802008879.1589130400)

[22] S. Kundu et al., “Knowledge, attitudes, and preventive practices toward the COVID-19 pandemic: an online survey among Bangladeshi residents,” *J. Public Heal.*, 2021, doi: 10.1007/s10389-021-01636-5.

[23] B. T. Flatie and A. Munshea, “Knowledge, Attitude, and Practice towards Malaria among People Attending Mekaneeyesus Primary Hospital, South Gondar, Northwestern Ethiopia: A Cross-Sectional Study,” *J. Parasitol. Res.*, vol. 2021, 2021, doi: 10.1155/2021/5580715.