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Research Article

Knowledge and Attitudes towards COVID-19 Prevention Measures among Residents of Lusaka District in Zambia

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ABSTRACT

Improved knowledge and attitude towards COVID-19 preventive measures have been shown to slow down transmission rates and improve public health outcomes. Yet, there is a lack of information regarding knowledge and attitudes towards COVID-19 prevention measures among the general population in Zambia. This study assessed the knowledge and attitudes towards COVID-19 prevention measures among residents of the Lusaka District, Zambia. This cross-sectional study involved 453 participants from 20th August to 10th October 2021 using previously validated questionnaires. Data were analyzed using Stata 16.1 (Stata Corp, College Station, TX, United States). Structural equation modelling (SEM) was used to analyze relationships between latent variables (knowledge and attitude). Of the 453 participants, 52.3% were female. Overall knowledge of COVID-19 prevention measures was 85.2% while attitude was 46.2%. SEM showed no evidence of an association between knowledge of COVID-19 preventive measures and attitudes towards the preventive measures (r=0.01, p=0.071). However, there was a significant association between young adults vs adults and the frequency of hand sanitizing using alcohol-based hand rub (p=0.036). Additionally, there was evidence of a difference between the frequency of covering the mouth with a bent elbow when coughing or sneezing and the age group, with adults doing this practice more often than young adults (p=0.011). Finally, young adults had the highest average scores for attitude; 2.54 (SD=1.39), compared to adults; 2.22 (SD=1.43) (p=0.027). Despite knowledge of COVID-19 prevention measures being relatively high among Lusaka residents, their attitudes towards these measures were sub-optimal and can potentially affect preventive measures currently in place.

Keywords: attitudes, coronavirus, COVID-19, knowledge, Lusaka, prevention measures

INTRODUCTION

The ongoing coronavirus disease 2019 (COVID-19) pandemic was first reported in China and has spread to the rest of the globe (Guner et al., 2020). Due to its rapid spread globally, the World Health Organisation (WHO) declared it a pandemic (Cucinotta & Vanelli, 2020; Mwila et al., 2021; Sohrabi et al., 2020). The COVID-19 pandemic has presented society with unprecedented challenges and upended life in various devastating ways. In addition, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) continues to spread around the world, with over 180 million confirmed infection cases and over 3.9 million deaths as of early July 2021 (Halperin et al., 2021).

The rapid spread of SARS-CoV-2 was thought to be linked to a lack of knowledge and non-adherence to the prevention measures required to contain it (Lufungulo et al., 2021; Sialubanje et al., 2022). To this effect, measures were targeted at educating the public on preventive measures such as the frequent wearing face masks, especially in public places, washing hands adequately with soap and running water, hand sanitising with alcohol-based hand sanitisers, physical and social distancing, and staying at home (Guner et al., 2020; Mwila et al., 2021; Talic et al., 2021). These measures were recommended by the WHO to member states (Chileshe et al., 2020; Talic et al., 2021). Strict adherence to preventive measures in countries where these preventive measures were implemented had a positive impact on reducing the spread of the virus (Saadatjoo et al., 2021).

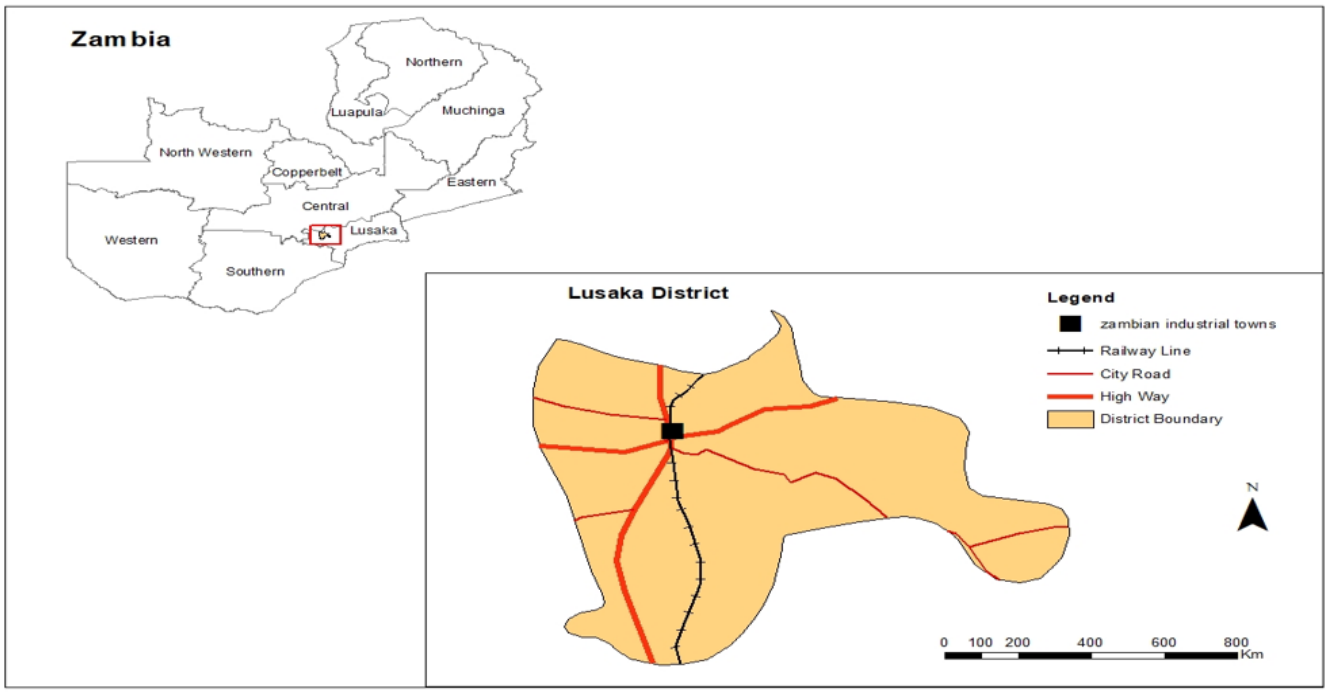

Figure 1. Map of Lusaka District showing sampling sites

Evidence has shown that wearing face masks at all times when in public reduces the transmission of SARS-CoV-2 (Izzetti et al., 2020). Similarly, there is evidence that practising hand hygiene (handwashing and hand sanitising) reduces the transmission of the virus (Guner et al., 2020). Besides, infected individuals who cover their mouth and nostrils when coughing or sneezing prevent the transmission of the virus to others. Furthermore, during the initial outbreak of COVID-19 in 2020, studies reported that physical and/or social distancing was very effective in preventing the spread of the infection (Chung & Chan, 2021; Van Den Berg et al., 2021). Additionally, evidence has shown that the successful implementation of social distancing leads to approximately 20-40% transmission of SARS-CoV-2 (Sun & Zhai, 2020).

Zambia, a country in Sub-Saharan Africa, is plagued by a slew of communicable and non-communicable diseases (Mudenda et al., 2022a; Mukanu et al., 2017; Mutale et al., 2018; Pengpid & Peltzer, 2020). These diseases have led to increased morbidity and mortality, thereby negatively affecting the country. During the COVID-19 waves of infections, Zambia recorded very high numbers of cases and mortalities (Mudenda et al., 2022a). We speculate that the increased number of cases in Zambia could be linked to non-adherence to the stipulated preventive measures, although this hypothesis has never been tested. Non-adherence to prevention measures due to work and living conditions, water and sanitation challenges, social movements, networks and interactions, and negative atttitudes has contributed to an increase in the number of cases in Zambia (Sialubanje et al., 2022).

Moreover, in December 2021, Zambia, like many Southern African countries, recorded the Omicron variant which is highly transmissible and easily evade the immune response (Viana et al., 2022). Besides, current evidence indicates a low uptake of the COVID-19 vaccine (Mudenda et al., 2022a, 2022b). The vaccine's low uptake could be due to individuals' having reservations about it (Mudenda et al., 2022b). Therefore, vaccine hesitancy and non-adherence to preventive measures have negatively affected the fight against COVID-19. Assessing the public's knowledge and attitudes towards the stipulated guidelines is crucial in identifying gaps and strengthening ongoing prevention efforts aimed at controlling the spread of COVID-19 in Zambia.

Therefore, this study was conducted to assess the knowledge and attitude towards the COVID-19 preventive measures among Lusaka residents of Zambia.

MATERIALS AND METHODS

Study Design, Setting, and Population

We conducted a cross-sectional study among adult Zambians in the Lusaka district of Zambia from 20th August to 10th October 2021. Lusaka District is in Lusaka Province (**Figure 1**), the Capital City of Zambia. It was the first COVID-19 epicentre in Zambia and contributed to the majority of the cases (Mulenga et al., 2021). To be eligible, a participant needed to be 18 years and above, a resident of the Lusaka District and provided written informed consent.

Sample Size Determination and Sampling Technique

Sample size determination was done using Cochrane's formula, $n = \frac{Z^2 p \times (1-p)}{d^2}$. A literature search indicated the non-existence of similar studies that were done on knowledge and attitudes towards COVID-19 prevention measures in Zambia. Therefore, we used a conservative expected proportion of 50% and the following assumptions; 5% acceptable margin of error, 95% confidence level, 10% non-response and a design effect of 1. We estimated that a minimum of 423 participants would be sufficient for the study. The participants were sampled using the purposive sampling method.

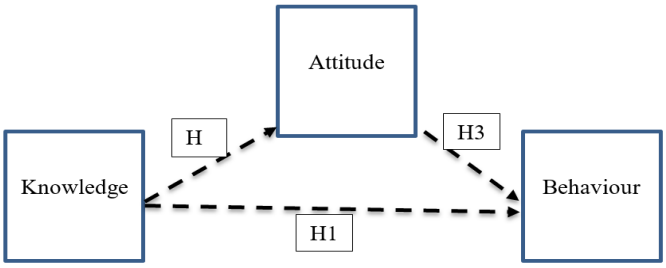

Figure 2. Hypothesised link between knowledge of COVID-19 preventive measures, attitude towards them, and behavior change among Lusaka residents

Data Collection Tool

The data collection tool was adapted from two similar studies done in Egypt and Ethiopia (Abdelhafiz et al., 2020; Matovu et al., 2021). Two experts from the University of Zambia revised the data collection tool to ensure content and face validity were achieved. For validation, a pilot study was conducted among 20 adults within Lusaka District. The participants of the pilot study were excluded from the current study. The participants were interviewed in English, and, where necessary, in local languages (Bemba and Nyanja). The adapted questionnaires had acceptable reliability as shown by a Cronbach's alpha test of 0.72 and 0.82. Data collection was done by two data collectors who were trained by the principal investigator on the data collection tool, objectives of the survey and the data collection process. Each face-to-face interview lasted for a period of 15 to 20 minutes. The questionnaire was divided into three sections, i.e. section A; was used to collect data on socio-demographic characteristics of participants. Section B; was used to collect data on participants' knowledge of COVID-19 prevention measures. Section C; was used to collect data on participants' attitudes towards COVID-19 prevention measures.

Study Measures

Knowledge and attitude were measured based on similar studies (Abdelhafiz et al., 2020; Matovu et al., 2021). A score of one point was given if the respondent gave the right response and zero for wrong responses for knowledge questions. A positive response for the attitude questions was given a score of one while a negative response had a score of zero. Other variables collected were age, education, employment, religion, marital status and sex of participants. We categorised the age of participants based on WHO criteria and other similar studies to make it easier to compare the findings. Using the traditional education theory, we assumed that an individual's knowledge could influence attitude, affecting behaviour (**Figure 2**). In addition, we assumed that the expected covariance matrix in the traditional education theory does not differ from our sample covariance matrix. Based on these assumptions, we hypothesised that knowledge regarding COVID-19 preventive measures has a positive direct effect on both the attitude (H2>0) and behaviours (H1>0) towards COVID-19 preventive measures. Similarly, attitude towards COVID-19 preventive measures directly affects behaviours (H3>0). Finally, the knowledge of COVID-19 preventive measures has an indirect effect (H2+H3>0) on behavior through the attitude towards preventive measures.

Statistical Analysis

Data were entered in Excel spread sheet and analyzed using Stata 16.1 (Stata Corp, College Station, TX, United States). The responses from participants were described using frequencies with percentages and mean scores with standard deviation (SD).

The Shapiro-Wilk test was used to assess the normality of continuous data. The student t-test assessed the mean differences in the overall scores since data was normally distributed among young adults and adults. Finally, the proportions of correct responses between the participants were compared using the Pearson's Chi-square test or Fisher's exact test as appropriate.

To test our hypothesis about the traditional education theory, we used structural equation modeling (SEM) as participants' knowledge and attitude towards COVID-19 preventive measures cover several facets, and SEM can simultaneously model several explanatory variables and outcomes.

We used direct variables (age, education, and questions on knowledge and attitude) to estimate the latent variables (knowledge and attitude). This approach allowed us to capture both direct and indirect effects (Albassam et al., 2018). The overall model fit was assessed using likelihood ratio x^2=66.7 (df=61), p=0.288; comparative fit index (CFI) CFI=0.990; root mean standard error of approximation (RMSEA)=0.014 (95% CI=0.001, 0.033); and Tucker-Lewis index (TLI) = 0.987, all suggesting model fit (Liu et al., 2019).

We standardized all path coefficient values, ranging from -1 to +1 and interpreted similarly to standardized regression coefficients. A p-value of <0.05 (two-tailed) was considered statistically significant for all statistical analyses at a 95% confidence level.

Ethical Statement

Ethical approval was obtained from the University of Zambia Health Sciences Research Ethics Committee (UNZAHSREC). The approval was granted under a protocol identification code of 202112030102. Participation in this study was voluntarily and only individuals who provided informed consent were enrolled at no cost. For privacy and confidentiality, unique codes were used for participant identification.

RESULTS

The study included 453 participants. Slightly above half, 236/451 (52.3%) of the respondents were female, and 249/453 (55.0%) were unemployed. The majority, 311/453 (68.7%), were adults aged 24 years or more, 371/453 (81.9%) were not married, and 397/443 (87.6%) attained a tertiary level of education. Furthermore, nearly everyone 443/453 (97.8%) was of Christian faith (**Table 1**).

Knowledge of COVID-19 Preventive Measures

Table 2 shows the percentage of correct responses to knowledge questions. Overall, the average knowledge of respondents with regards to COVID-19 preventive measures

Table 1. Socio-demographic characteristics

Variable	Level	Frequency (%)
Sex	Female	236 (52.3)
	Male	215 (47.7)
Age (years)	Young adults (16-23)[a]	142 (31.4)
	Adults (≥24 years)	311 (68.7)
Religion	Other[b]	10 (2.2)
	Christianity	443 (97.8)
Education	Primary	1 (0.2)
	Secondary	55 (12.1)
	Tertiary	397 (87.6)
Employed	No	249 55.0)
	Yes	204 (45.0)
Marital status	Unmarried	371 (81.9)
	Married	82 (18.1)

Note. [a]Classification based on previous studies; [b]Includes minor religions i.e., Islam, Hindu, etc.

was 5.11 (0.99) mean (SD), translating to 5.11/6 (85.2%). There was no evidence of a difference in knowledge scores between young adults and adults regarding all the knowledge questions. Most participants, 304/453 (97.8%) responded correctly to the question on the prevention of COVID-19 infection through adequate hand washing, sanitising, and wearing face masks. The least correctly responded to was the prevention of COVID-19 infection by taking antibiotics such as azithromycin and antimalarials like hydroxychloroquine.

Attitudes towards COVID-19 Preventive Measures

Table 3 shows the percentage of correct responses to attitude questions. Overall, the participants showed a poor attitude towards the COVID-19 preventive measures. The average attitude score was 2.31 (1.43) mean (SD), translating to 2.31/5 (46.2%). The average attitude scores were, however, significantly higher, 2.54/5 (50.8%) among young adults compared to adults, 2.22/5 (44.4%) (p=0.027). In addition, we noted a significant association between the age groups and the frequency of hand sanitising using alcohol-based hand rub (p=0.036). Additionally, there was evidence of a difference between the frequency of covering the mouth with a bent elbow when coughing or sneezing and the age group, with adults doing this practice more often than young adults (p=0.011).

Association between Knowledge and Attitudes towards COVID-19 Prevention Measures

In this study, parameter estimation was conducted using the method of maximum likelihood. The overall model likelihood ratio x^2=66.7 (df=61), p=0.288; CFI=0.990; RMSEA=0.014 (95% CI=0.001, 0.033); and TLI=0.987 all suggesting model fit.

Overall, there was no evidence of an association between knowledge of COVID-19 preventive measures and attitude towards the preventive measures (r=0.01, p=0.071). All six knowledge questions (**Table 2**) were positively correlated with overall knowledge (p<0.001) except question three (p=0.565) and four (p=0.404).

Concerning attitude questions (**Table 3**), all the five questions were positively and significantly correlated with attitude (p<0.001). There was no evidence to suggest that age (r=-13.5, p=0.416) and education (r=-0.11, p=0.905) influences knowledge of COVID-19 preventive measures. Nevertheless, we noted a moderate correlation between age and education (r=0.40, p<0.001). Similarly, first to second and third to fourth questions on knowledge were significantly correlated (r=0.01, p<0.001) and (r=0.06, p<0.001), respectively albeit weakly (**Figure 2**).

Table 2. Knowledge of COVID-19 preventive measures

Knowledge questions	Total n (%)	Young adults n (%)	Adults n (%)	p-value
Can you prevent COVID-19 through adequate handwashing, sanitizing, & wearing of face masks?	443(97.8)	139(97.9)	304(97.8)	0.926[a]
Can you prevent COVID-19 by sneezing or coughing through a bent elbow, self-isolation when experiencing symptoms, physical distancing, & avoiding touching mouth, eyes, & hugging friends?	436(96.3)	138(97.2)	298(95.8)	0.600[b]
Can you prevent COVID-19 by getting a COVID-19 vaccine	344(76.1)	106(74.7)	238(76.8)	0.653[b]
Is COVID-19 vaccination a preventive measure against COVID-19?	394(87.0)	119(83.8)	275(88.4)	0.175[b]
Can you prevent COVID-19 by taking antibiotics such as azithromycin and antimalarials such as hydroxychloroquine?	305(67.3)	91(64.1)	214(68.8)	0.320[b]
Can you prevent COVID-19 by taking ivermectin?	392 (87.1)	123(87.2)	269(87.1)	0.958[b]
Overall mean score (SD)	5.11(0.99)	5.05(0.98)	5.15(0.99)	0.322[c]

Note. [a]Fishers exact test; [b]Pearson's Chi-square test; & [c]Student t-test

Table 3. Attitudes towards COVID-19 preventive measures

Attitude questions	Total n (%)	Young adults n (%)	Adults n (%)	p-value[a]
I usually wear a face mask when in a public place to protect myself from the risk of infection	314(69.3)	105(73.9)	209(67.2)	0.149[a]
I usually sanitise my hands with an alcohol-based hand rub	166(36.6)	62(43.7)	104(33.4)	0.036[a]
I wash my hands regularly with soap & running water	215(47.5)	70(49.3)	145(46.6)	0.597[a]
I often cover my mouth with a bent elbow when coughing or sneezing	290(64.0)	103(72.5)	187(60.1)	0.011[a]
I often avoid gatherings of more than five people	67(14.8)	21(14.8)	46(14.8)	0.999[a]
Overall mean score (SD)	2.32 (1.43)	2.54 (1.39)	2.22 (1.43)	0.027[b]

Note. [a]p-values from Pearson's Chi-square test & [b]Student t-test

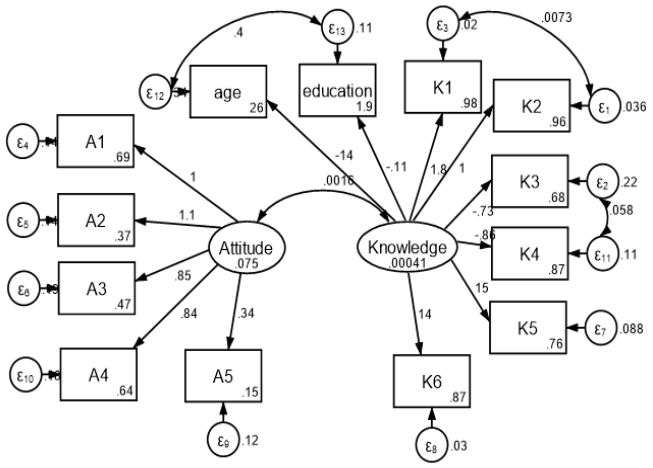

Figure 2. Structural equation model of the knowledge and attitudes towards COVID-19 infection preventive measures (n=453). Note: Goodness of model fit x^2=66.7 (df=61), p=0.288; CFI=0.990; TLI=0.987; and RMSEA=0.014 (95% CI=0.001, 0.033). Standardized parameter estimates represent the relationships, with oval representing latent variables and boxes indicating measured variables. All relationships are significant at the p<0.01, except for K3 (p=0.565) and K4 (p=0.404). RMSEA, CFI; TLI; K1-K6 are questions on knowledge (**Table 2**); and A1-A5 are questions on attitude (**Table 3**)

DISCUSSION

This study was conducted to assess the knowledge and attitude towards COVID-19 prevention measures among Lusaka residents in Zambia. The study found that participants' overall knowledge regarding COVID-19 prevention measures was good (85.2%). Besides, the majority of the participants knew that COVID-19 can be prevented by practising good hand hygiene, coughing and sneezing through a bent elbow, physical and social distancing, and taking a COVID-19 vaccine. However, the study found that the overall attitude towards COVID-19 preventive measures was 46.2%, indicating a poor attitude. Also, many participants reported negative attitudes towards hand sanitizing, washing, and avoiding crowded areas.

The current study findings on COVID-19 preventive measures among Lusaka residents are consistent with similar studies (Abeya et al., 2021; Apanga & Kumbeni, 2021; Romney, 2001; Ssebuufu et al., 2020; Zamil et al., 2022). The good knowledge reported in our study and similar studies could be due to continuous public education on the prevention measures. Good knowledge regarding COVID-19 prevention measures can lead to improved adherence to the recommended prevention measures (Apanga & Kumbeni, 2021; Zamil et al., 2022). Our study found a low prevalence of 14.8% of participants' knowledge of COVID-19 prevention measures. This prevalence is lower compared to that reported in Ethiopia 27.1% (Feleke et al., 2021), Uganda 16.1% (Ssebuufu et al., 2020), and Malaysia 19.5% (Azlan et al., 2020). The lower knowledge level could be due to differences in socioeconomic status and education level of the participants.

The participants in our study were aware that wearing face masks in public can help prevent contracting COVID-19 or transmitting SARS-CoV-2. Face masks are currently being used in COVID-19 prevention plans in many nations, including Zambia. Face masks work by creating a physical barrier between the mouth and nose and any pollutants in the immediate area (Ho, 2012; Romney, 2001). A study conducted by Kumar et al. (2020) revealed that 93.9% of the respondents knew that wearing face masks in public was one way of protecting oneself from contracting COVID-19. Similarly, another study found that the majority of the respondents believed that face masks were effective in preventing the spread of droplets (Larebo & Abame, 2021). The primary advantages of wearing a mask include minimizing the spread of the virus by someone who is infected, whether they are aware of it or not (Desai & Aronoff, 2020; Javid et al., 2020).

Our study also found that the majority of the participants knew that COVID-19 can be prevented by practising good hand hygiene. There is strong evidence that following a stringent handwashing program minimizes the likelihood of infection transmission (Sreshtaa et al., 2021). Handwashing with antimicrobial soaps or alcohol-based sanitisers is an effective way to prevent the spread of microbial diseases (Gupta & Lipner, 2020). To prevent the spread of COVID-19, the WHO and the Centres for Disease Control and Prevention (CDC) recommend hand washing with soap and water after coughing/sneezing, visiting a public place, touching surfaces outside the home, and caring for sick people, as well as before and after eating (CDC, 2021).

The current study found that the majority of the participants identified coughing or sneezing through a bent elbow, self-isolation (social distancing or quarantine) when experiencing symptoms, and physical distancing as measures that can help prevent COVID-19. Similarly, coughing or sneezing through a bent elbow has been reported to be among the preventive measures that reduce the transmission of SARS-CoV-2 (Hernández-García & Giménez-Júlvez, 2020). Consistent with our study, self-isolation has been reported as a key intervention strategy for COVID-19 both at the household and community level (Denford et al., 2021). Therefore, individuals must be aware of these preventive measures so that the spread of COVID-19 is reduced.

In the current study, we found that many participants knew that COVID-19 vaccines could help prevent the disease and that they were a preventive measure. Individuals who know that COVID-19 vaccines can prevent virus transmission are likely to accept the vaccine (Alqudeimat et al., 2021). Our findings are similar to other results where participants knew that the COVID-19 vaccination could protect them from SARS-CoV-2 (Lazarus et al., 2021; Mohamed et al., 2021). Vaccines have been used from time to time to promote immunity against several infections. However, in a country like Zambia, COVID-19 vaccines have been received with mixed feelings, leading to increased vaccine hesitancy (Mudenda et al., 2022b). Vaccine hesitancy in Zambia has been fuelled by concerns about vaccines' safety and effectiveness (Chileshe et al., 2021; Mudenda et al., 2022b). Thus, there is a need for healthcare authorities to educate the public on the importance of vaccinations and curb vaccine hesitancy (Carcelen et al., 2021).

Our study found that many participants indicated that taking antibiotics such as azithromycin, antimalarials such as hydroxychloroquine, and ivermectin (an antiparastic) was a preventive practice against COVID-19. Unfortunately, this was incorrect because the aforementioned drugs cannot be used as a COVID-19 prevention method. A Cochrane review showed that hydroxychloroquine increases the risk of adverse events compared to placebo in the prevention of COVID-19 in people who have been exposed to SARS-CoV-2 (Singh et al., 2021). A separate Cochrane review showed that the efficacy and safety of ivermectin used to prevent or treat COVID-19 is uncertain due to studies that were few, some of which were of poor quality (Popp et al., 2021a). This was also reported by a review conducted by Hikaambo et al. (2021) in which it was established that there was a paucity of evidence to support the use of ivermectin (Hikaambo et al., 2021). A Cochrane review of the effectiveness of azithromycin in the treatment of COVID-19 found that the drug is not effective for this use (Popp et al., 2021b).

Our study found negative attitudes towards the COVID-19 prevention measures. The negative attitude towards COVID-19 preventive measures reported in our study may be attributed to the socioeconomic status of our participants, most of whom were unemployed. Hence, they may not manage to buy hand sanitisers regularly and need to be in public places to physically conduct business to provide for their families. A study in Ethiopia reported similar findings, with the majority of participants having a negative attitude towards COVID-19 prevention measures (Abeya et al., 2021). The implication is that this may lead to a failure by individuals to observe the recommended guidelines, and thus, easily contract COVID-19. Non-adherence to the COVID-19 prevention measures puts individuals at risk of contracting the disease and also transmitting the virus (Júnior et al., 2021; Yehualashet et al., 2021). These findings are in agreement with what other studies found in Congo DR (Ditekemena et al., 2021), Ethiopia (Yehualashet et al., 2021), and Peru (Zegarra-Valdivia et al., 2020). Such poor attitudes towards preventive measures were observed mainly in those who were unemployed, perceived that they were less susceptible to COVID-19, were less educated, and with other people at home. We speculate that these similarities may be due to the said groups experiencing similar economic constraints. Masks, soaps, and hand-sanitisers cost money, and therefore, those who are unemployed would rather spend the little money acquired on perceived more important things than on face masks and hand-sanitisers. The other possible contributing factor could be the perceived ineffectiveness of the preventive measures as people continue to see waves of the pandemic with infections even among those who adhere to COVID-19 preventive measures (Taylor & Asmundson, 2021). Pandemic fatigue could also explain this observed poor attitude towards COVID-19 prevention measures (Petherick et al., 2021). However, the findings of this study contradict those of previous studies conducted in Nigeria (Reuben et al., 2021), Uganda (Ssebuufu et al., 2020), Bangladesh (Ferdous et al., 2020), Saudi Arabia (Alahdal et al., 2020), Vietnam (Nguyen et al., 2020), and Germany (Zipprich et al., 2020) that demonstrated a good attitude and adherence to COVID-19 preventive measures. This difference could be attributed firstly to stringent enforcement of these measures by respective governments and the usage of various platforms to inform the population about the benefits of following the set-out guidelines. Further, the financial status of the said countries is far better than Zambia's and, because of this, the majority of the population can easily access face-masks and hand-sanitisers, which would contribute to the observed good adherence to preventive measures. Therefore, to increase the adherence and improve the attitude of Lusaka residents towards prevention measures for COVID-19, there is a need to evaluate the socio-economic factors that would explain this finding. Reducing the cost of face masks and hand-sanitisers would help many individuals afford them and ultimately improve their attitude.

The public's adherence to the control measures is critical in limiting the virus's transmission, and it is heavily influenced and affected by their level of information, risk perception, and practices regarding the COVID-19 pandemic (Khasawneh et al., 2020). The current study found that participants had negative attitudes towards hand sanitising, hand washing, and avoiding crowded areas or gatherings of many people. This is contrary to a study conducted in Jordan which indicated that regular hand washing, avoiding attending public gatherings, and staying at home were the most adopted strategies by the participants to protect themselves from becoming infected with COVID-19 (Khasawneh et al., 2020). A study in Iran also revealed a positive attitude towards hand washing and avoiding crowded places by the participants as a preventive measure against contracting COVID-19 (Taghrir et al., 2020). Similarly, the majority of respondents in studies conducted in Saudi Arabia (Al-Wutayd et al., 2021), Italy (Scampoli et al., 2021), and the Philippines (Lau et al., 2020), indicated that washing hands and avoiding crowded places are important COVID-19 preventive measures.

Our current study found that many participants had positive attitudes towards wearing face masks and covering their mouths when coughing or sneezing. These findings are similar to the findings in Bangladesh, where the participants had positive attitudes towards COVID-19 preventive measures (Ferdous et al., 2020). In Nigeria, good attitudes towards COVID-19 preventive measures were also found among participants (Reuben et al., 2021). These findings are similar and could be due to robust health education on the preventive measures put in place during the period of the pandemic. Additionally, another study in Ethiopia found that most of the participants had a positive attitude towards wearing face masks as they were willing to learn the correct steps of face mask-wearing and believed that face masks should be carefully put on and taken off (Larebo & Abame, 2021). In a study conducted in Pakistan (Salman et al., 2020), covering the mouth when coughing was also seen as a way of preventing the spread of COVID-19. Hence, frequent wearing of face maks is critical in the prevention of respiratory tract infections (Matuschek et al., 2020).

Using the traditional education theory, we hypothesised that an individual's knowledge could influence their attitude, affecting their behaviour in the present study. However, our findings were not consistent with this theory. We found no evidence of an association between knowledge and attitude towards COVID-19 preventive measures. These findings are consistent with other findings that suggest people tend to

express negative emotions, such as anxiety, depression, and panic, during a pandemic that could affect their attitude (Blendon et al., 2004). However, these results contrast with a recent study in China (Zhong et al., 2020) and Saudi Arabia (Al-Hanawi et al., 2020), where most participants thought that the virus could be successfully controlled and were convinced that their government would control the pandemic.

Evidence shows that in tackling pandemics, public knowledge is essential (Chirwa, 2020). Therefore, by assessing the knowledge about COVID-19 preventive measures, more profound insights into existing public attitudes towards preventive measures have been gained. In the current setting, identifying gaps and strengthening ongoing prevention efforts aimed at educational programs may not be very effective, as our findings did not support the traditional education theory. As a result, there is an urgent need for extensive studies that can assist in identifying characteristics that influence the public's attitude, which is critical in the adoption of healthy practices and responsive behaviour.

Weaknesses and Strengths of the Study

To the best of our knowledge, this is the first study to be conducted in Zambia's first COVID-19 epicentre. Therefore, this study highlights the knowledge and attitudes of residents of Lusaka regarding COVID-19 prevention guidelines. The findings can be used to develop strategies that improve the uptake of these measures. However, the study was done in one province, thereby limiting the generalisation of the findings to other parts of Zambia.

CONCLUSION

The current study found that many participants had good knowledge despite negative attitudes towards the COVID-19 prevention measures. This calls for continuous sensitisation of the public on the preventive measures and the importance of adhering to these measures. Therefore, targeted interventions towards positive behavioural change are required to address this, and in the future, relevant stakeholders should factor in this aspect as they design COVID-19 related strategic policies.

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Availability of data and materials: All data generated or analyzed during this study are available for sharing when appropriate request is directed to corresponding author.

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