# An Analysis of Factors Behind Variations in COVID-19 Infections Between Urban and Rural Areas of Zimbabwe in 2020

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## Abstract

The purpose of this study is to examine the answers provided by Zimbabwean medical professionals to a questionnaire regarding the variables driving the disparities in COVID-19 infections in Zimbabwe's urban and rural areas in 2020. The objective is to create appropriate, context-specific disease prevention and control plans at the district and provincial levels. A questionnaire survey study design consisting of closed-ended questions was utilized to collect data from medical professionals in Zimbabwe, specifically nurses and doctors, at the district and provincial levels. Microsoft Excel was used to examine the data. The findings show that urban areas had a higher number of COVID-19 cases in 2020 compared to rural ones. According to the results of the survey, a few other important factors that were linked to the urban COVID-19 outbreak were population density, ease of access to ports of entry, and the use of public transportation. A greater number of COVID-19 infections may have been recorded in urban than rural regions as a result of incorrect patient addresses found in a number of COVID-19 infection data. Out of the total of 27 respondents, twenty-one strongly agreed that the COVID-19 outbreak was caused by population density, while the remaining respondents agreed. The opinion that being close to points of entry, including airports and land borders, facilitated the spread of COVID-19 was strongly agreed and agreed upon by 20/27 and 7/27 respondents, respectively. The claim that the method of public transportation contributed to the spread of COVID-19 in metropolitan areas was agreed and strongly agreed upon by 9/27 and 14/27 respondents, respectively. 8/27 respondents strongly agreed that the reason there were more COVID-19 instances in urban provinces than in rural provinces was because there were more entertainment venues or places in urban areas than in rural ones. This viewpoint was agreed upon by 12/27 respondents. The results of the study suggest that the COVID-19 outbreak in Zimbabwe's urban provinces may have been facilitated by factors such as population density, accessibility to ports of entry, use of public transportation, and the availability of more leisure options in urban regions than in rural ones.

***Keywords:*** *Covid-19, Proximity, Ports of Entry, Rural Provinces, Spatial, Variations, Urban Provinces.*

## Introduction

The first COVID-19 infections were reported in China in December 2019 [1]. COVID-19 rapidly changed and spread throughout the world, turning into a pandemic [2]. Following the confirmation of the first COVID-19 case on March 20, 2020 [3], Zimbabwe experienced a steady increase in COVID-19 cases. As of December 31, 2020 [4],

there had been 13,867 cases, 11,250 recoveries, and 363 fatalities reported. As of December 19, 2023, the total number of COVID-19 cases and deaths in Zimbabwe was 265,975 and 5,730, respectively [5].

The COVID-19 public health emergency was officially declared over on May 5, 2023, by the Director General (DG) of the World Health Organization (WHO) [6, 7, 8]. However, the disease continued to pose a threat to global health because there was a chance that new infections could emerge and cause new waves of cases and fatalities [9] as some variants of SARS-CoV-2 are eminently lethal and have no geographical bounds [10]. As a result, it was stressed that all countries, including Zimbabwe, needed to remain on high alert in order to prevent further human casualties.

The disease monitoring and surveillance strategy of the Ministry of Health and Child Care (MOHCC) in Zimbabwe included the creation of Daily Situation Reports (SitReps) and the regular release of surveillance updates. COVID-19 infection rates varied geographically between urban and rural areas, with urban provinces reporting more cases than rural provinces, according to an examination of these data [11]. Even when COVID-19 control and preventive measures were uniformly adopted nationwide by the Zimbabwean government, this remained the situation. The aim of this research is to ascertain plausible reasons for the disparities in COVID-19 infection rates observed in Zimbabwe's rural and urban regions. A questionnaire survey consisting of closed-ended questions was employed to collect data, which was subsequently assessed for the purposes of offering appropriate context-specific preventive and control strategies.

## Methods

Study design: The study design includes a questionnaire survey consisting of closed-ended questions on six possible COVID-19 infection contributory factors that was completed by medical professionals, including nursing officers and doctors.

Study population: Medical doctors and nursing officers employed at the district and provincial levels of Zimbabwe's healthcare system comprised the study population.

Sampling and sample size: All 43 provincial and district medical professionals from the six provinces that were chosen were expected to respond to the survey; the sample size of 43 represented all the key informants (government medical practitioners) from the six targeted provinces; if all these could be reached and their responses captured, valid results that could be extrapolated to represent the whole of Zimbabwe would be achieved. Six of Zimbabwe's ten provinces supplied responses for the study. Four of Zimbabwe's eight rural provinces were chosen at random, while two of the country's urban provinces were chosen on purpose.

Data collection: The standard questionnaire, which collected quantitative data, was emailed to the respondents and returned by email to the researcher. The online mailing feature of the questionnaire survey approach led to its selection. When it came to collecting a lot of data, this approach was thought to be economical [12]. The primary survey questions addressed six different possible explanations for the higher proportion of COVID-19 cases reported in urban regions compared to rural provinces. The medical professionals were asked the following questions: 1) Did any member of your own family suffer from COVID-19? 2) Did you at any point in time treat COVID-19 patients? 3) Did you at any point in time oversee/supervise the treatment of COVID-19 patients? 4) Do you agree with the observation that some provinces had higher COVID-19 cases in 2020 than others? 5) To what extent do you agree with factors mentioned below as having contributed to differences in COVID-19 infections between rural and urban provinces of Zimbabwe? Data collected through the questionnaire was used to

characterize medical practitioners' opinions regarding potential variables that may have contributed to the higher number of COVID-19 cases reported in urban regions compared to rural ones. For the core closed-ended questions on possible factors that might have led to more COVID-19 cases being recorded in urban than in rural provinces, a Likert scale was used. After that, Microsoft Excel was used to examine the data.

**Inclusion and Exclusion Criteria**

Only medical professionals (nurses and doctors) at the district and provincial levels of the healthcare system who were instrumental in managing COVID-19 in Zimbabwe were the subject of the study. These came from the six chosen provinces—four randomly chosen rural provinces and two intentionally chosen urban provinces. Given their reputation as respected experts in the field of public health and their crucial role in the management of COVID-19 in Zimbabwe, these medical doctors and nurses were chosen as study participants.

**Data Collection and Analysis**

To gather information from the respondents, a standardized questionnaire consisting of closed-ended questions was emailed to them. The questionnaire was placed inside a Microsoft Excel spreadsheet that was created to make data entry easier. Data validation was done in order to facilitate the entry of answers to questions that required the selection of answers from a variety of options. The filtering icon in Excel was used to go through data and make graphs and tables.

**Permission and Ethical Considerations**

The Ministry of Health and Child Care in Zimbabwe gave formal approval for the study to be conducted. Approved under MRCZ/A/3095, the Zimbabwe Medical Research Council provided ethical approval. Prior to gathering any data, signed consent from the respondents was sought.

## Results

**Response Rate**

Of the 43 medical professionals who were supposed to be included in the study, twenty-seven (27) were able to reply; hence, 63% of respondents finished the survey, as indicated in Table 1. Given that survey questionnaires were emailed to respondents and returned to the researcher, a 63% response rate was deemed sufficient. Fincham [13], who contends that researchers should aim for response rates of roughly 60% for the majority of their studies, supports this point of view.

**Table 1.** Survey response rate

| Name of Province | Expected Responses | Responses Received |
|---|---|---|
| Midlands | 9 | 2 |
| Bulawayo Metropolitan | 5 | 5 |
| Harare Metropolitan | 5 | 5 |
| Masvingo | 8 | 3 |
| Matabeleland South | 8 | 5 |
| Matabeleland North | 8 | 7 |
| Total | 43 | 27 |

## Background Information about the Respondents

Less than one-third of the responders, or 8/27 were women, and the remaining 19 were men. They had four to forty-two years of professional experience in their current field, and their ages ranged from thirty to sixty-two. Additionally, 19 of the 27 respondents held a first degree, whereas 8 of the 27 respondents held a master's degree.

## Respondents' Background Information Related to COVID-19

All 27 respondents indicated they had personally observed or supervised the care of a COVID-19 patient; 26/27 respondents indicated at least one member of their family had been infected with the virus; a similar percentage indicated they had treated a COVID-19 patient at some point in the past; and all 27 respondents indicated that they agreed that there were more COVID-19 cases in urban provinces in 2020 than in rural provinces.

## Proximity to Ports of Entry as a Contributor to the Spread of COVID-19

Among the twenty-seven responders, 20/27 indicated that they strongly agreed that being in close proximity to points of entry, including airports and land borders, contributed to the COVID-19 pandemic. The remaining 7/27 respondents indicated that they agreed with the finding as depicted in Figure 1.
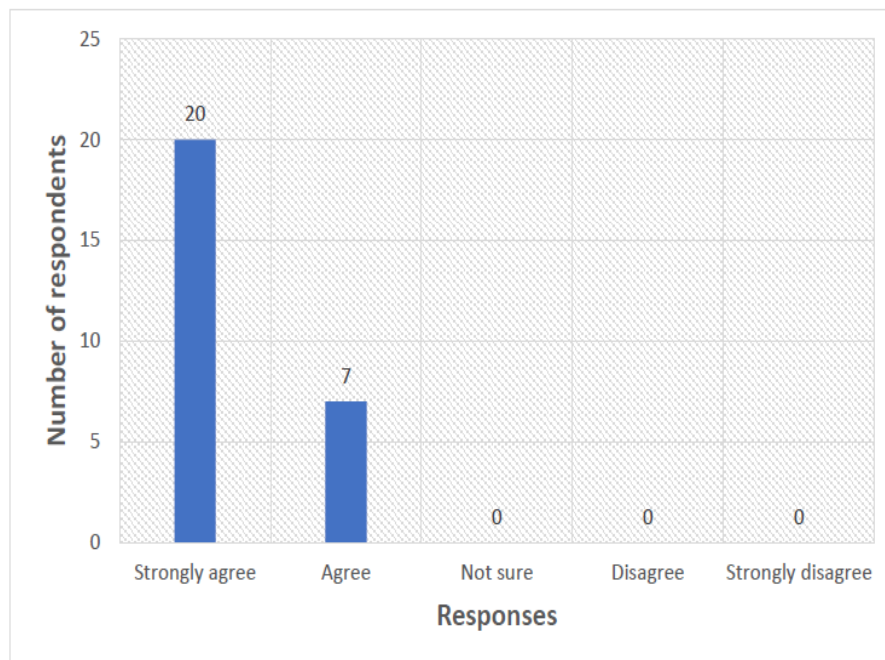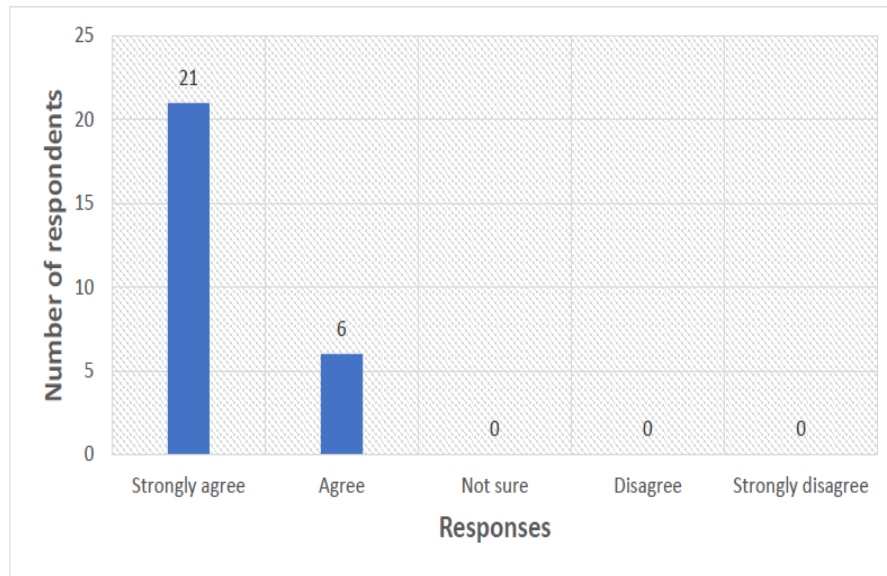


**Figure 1.** Respondents' Responses to Proximity to Ports of Entry as a Contributor to the Spread of Covid-19 in Zimbabwe, 2023

## Population Density as a Contributor to the Spread of COVID-19

21/27 respondents indicated that they strongly agreed that the COVID-19 outbreak was caused by population density, while the remaining respondents indicated that they agreed.
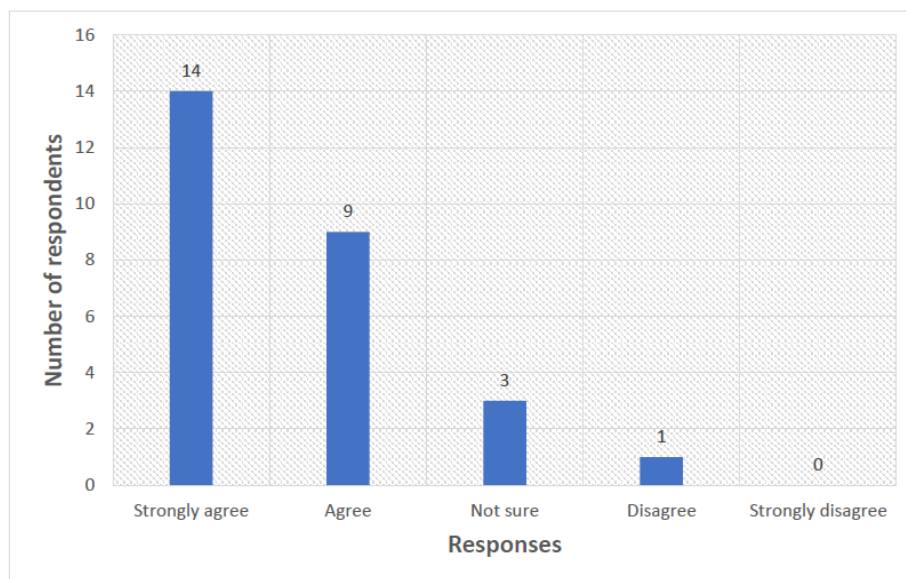
**Figure 2.** Participants' Responses to Population Density as a Contributor to the Spread of COVID-19 in Zimbabwe, 2023

**Mode of Public Transport as a Contributor to the Spread of COVID-19**

The following responses from respondents to the question of whether or not public transportation contributed to the spread of COVID-19 are displayed in Figure 3: 9/27 people agreed with the statement, 3/27 were unsure, 1/27 disagreed, and 14/27 strongly agreed.
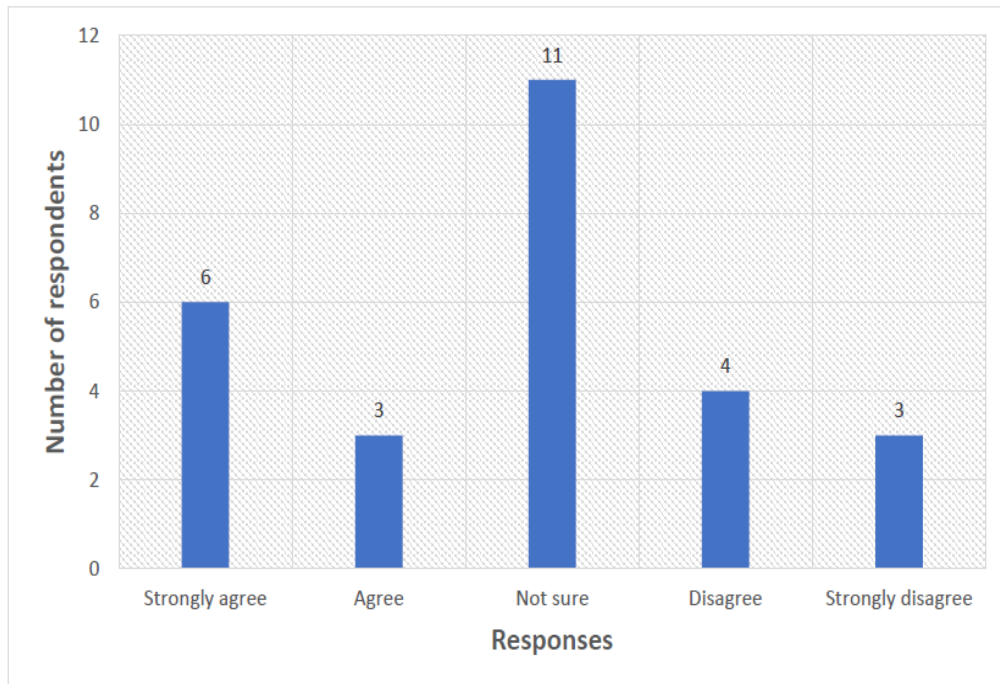


**Figure 3.** Mode of public transport as a contributor to the spread of COVID-19

**Inaccurate Addresses from Patients as a Contributor to More Covid-19 Cases Recorded in Urban Areas Compared to Rural Areas**

The following answers were given to the question of whether or not erroneous patient addresses caused more COVID-19 instances to be reported in urban than rural locations, as seen in Figure 4: 4/27 disagreed, 3/27 strongly disagreed, 11/27 were unsure, 6/27 strongly agreed, and 3/27 agreed.
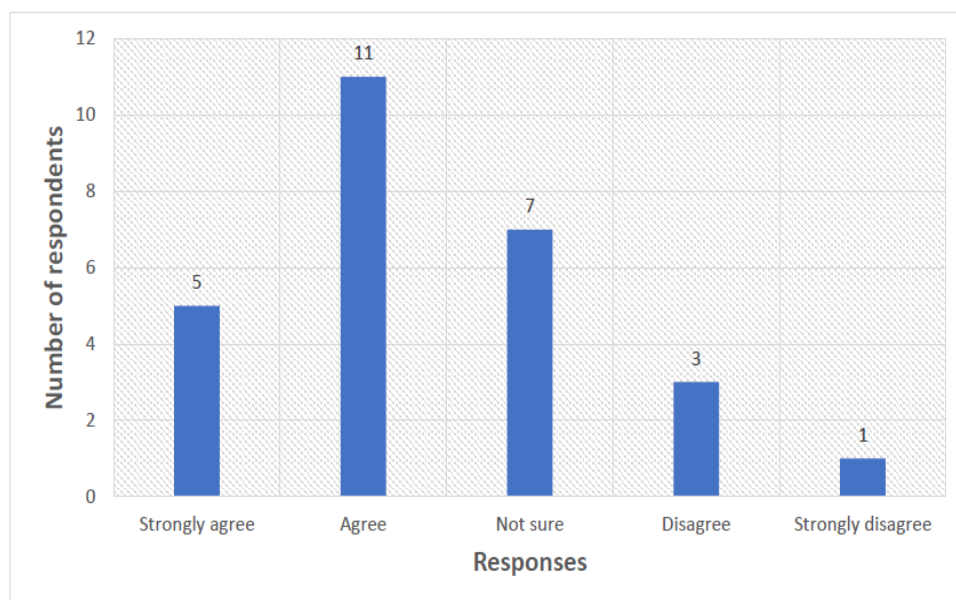
**Figure 4.** Inaccurate Patients' Addresses as a Contributor to Recording of More COVID-19 Cases in Urban Areas Compared to Rural Areas of Zimbabwe, 2023

**Inaccurate COVID-19 Infection Records as a Contributor to More COVID-19 Cases Recorded in Urban Areas Compared to Rural Areas**

Figure 5 presents the conclusions indicating a greater number of COVID-19 cases were recorded in urban regions than in rural areas due to inaccurate COVID-19 infection data. These findings represent the opinions of 5/27, 11/27, 7/27, 3/27, and 1/27 of the respondents, respectively.



**Figure 5.** Inaccurate COVID-19 Infection Records as a Contributor to More COVID-19 Cases Recorded in Urban Areas Compared to Rural Areas of Zimbabwe, 2023

**Availability of Places of Entertainment In Urban Areas Compared to Rural Areas as a Contributor to Higher Numbers of COVID-19 Cases in Urban Provinces Compared to Rural Provinces**

Out of all the respondents, 8/27 indicated that they strongly agreed that the reason why there were more COVID-19 cases in urban provinces than in rural provinces was because there were more entertainment venues or places in urban areas than in rural counties. 12/27 respondents indicated that they agreed with the preceding assumption, as shown in Figure 6, while 5/27 and 2/27 respondents were unsure and disagreed with it respectively.
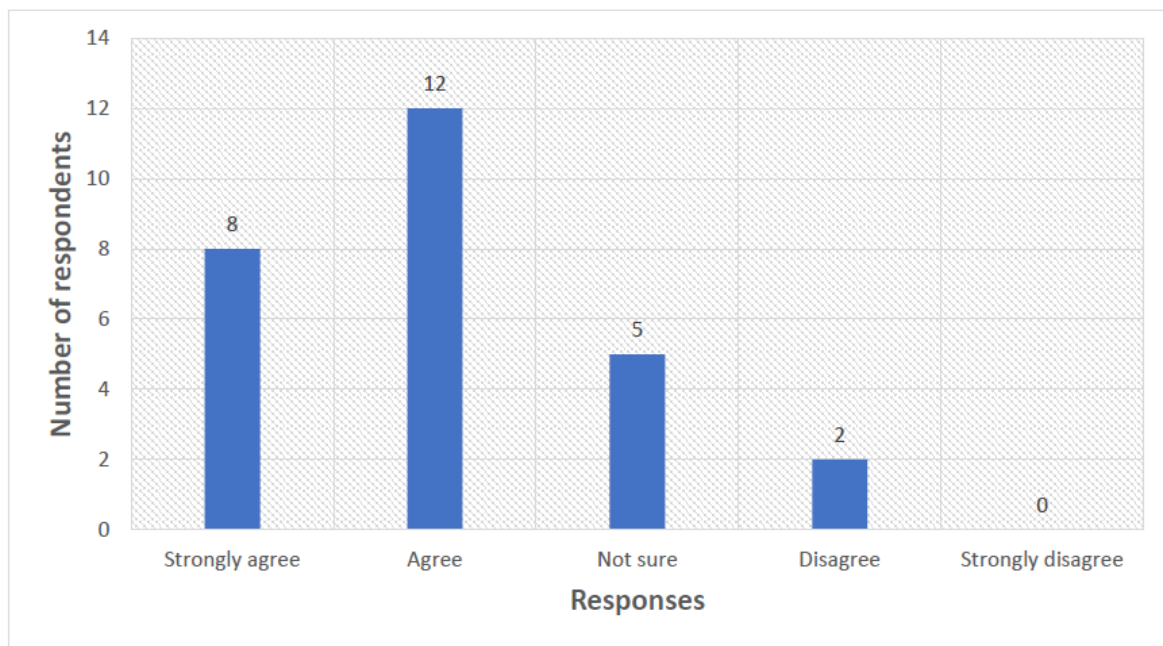


**Figure 6.** Availability of more entertainment places in urban areas compared to rural areas as a contributor to higher numbers of COVID-19 cases in urban provinces compared to rural provinces of Zimbabwe, 2023

## Discussion

This study aimed to identify the reasons behind the higher number of COVID-19 cases reported in Zimbabwe's urban provinces in 2020 compared to the rural areas of the nation. To choose the appropriate course of action for the control and prevention of the disease, it is imperative to identify these characteristics. This will make it possible to develop and implement context-specific COVID-19 control and preventive measures that take into consideration the elements that have been discovered. The elements identified in this study will help us better understand the factors that lead to the spread of COVID-19, which will help policymakers and implementation partners develop solutions that are specific to the needs of both urban and rural areas.

According to the study's findings, all the 27 respondents indicated that metropolitan provinces had a higher number of COVID-19 cases in 2020 compared to rural ones. This finding is supported by findings from another study which found out that the number of cases reported was higher in provinces with higher overall levels of urbanization than in areas with lower levels of urbanization [1]. Additionally, the survey results indicate that the COVID-19 pandemic was mostly caused by the availability of more entertainment in urban areas, population density, use of public transport, and proximity to ports of entry. Furthermore, due to inaccurate patient addresses and insufficient COVID-19 infection records, there may have been more COVID-19 cases reported in urban regions than in rural ones.

Experts in medicine indicated that the number of COVID-19 cases in urban provinces was higher than in rural ones. Because of their proximity to ports of entry, Zimbabwe's metropolitan provinces saw a higher number of COVID-19 cases than their rural equivalents, as the findings section above illustrates. The urban provinces, which include the metropolitan cities of Bulawayo and Harare, are situated nearer ports of entry than their rural equivalents. The busiest airport in the country, Robert Gabriel Mugabe International Airport, is located in the Harare metropolitan area. The second busiest airport in the country, Joshua Mqabuko Nkomo International Airport, is located in the province of Bulawayo. The principal land border between South Africa and Zimbabwe, the Beitbridge border post, also allows for more unfettered reciprocal movement.

Beitbridge border post is the busiest land border, and with more COVID-19 cases being reported from South Africa than Zimbabwe, this meant that Bulawayo metropolitan province which is located closer to the border remained at high risk. The second wave of the COVID-19 epidemic struck Zimbabwe from December 2020 to January 2021 [14], severely impairing public health after the country's initial stringent restrictions that forbade travel abroad. Three primary factors contributed to the wave's propagation: increased mobility, human complacency, and inadequate border surveillance [14]. The importance of being close to ports of entry in the virus's spread is further highlighted by a different US study that found counties within 25 miles of an airport had 1.392 times the rate of COVID-19 cases and 1.545 times the rate of COVID-19 deaths compared to counties more than 50 miles from an airport [15]. Our findings are consistent with those of Zhang and colleagues, who found a favorable relationship between the frequency of air travel and high-speed rail services from Wuhan, China, and the number of COVID-19 cases in the destination cities [16].

The COVID-19 outbreak in Zimbabwe was found to be influenced by population density as well. In Zimbabwe, the population density in the urban provinces is higher than that in the rural areas. Manicaland province, one of Zimbabwe's eight rural provinces, has 56 inhabitants per square kilometer, compared to 2,783 and 1,390 in the urban provinces of Bulawayo and Harare, respectively [17]. In greater metropolitan regions, the danger of disease outbreaks and rapid disease spread is increased by higher population densities and congested living circumstances [18]. In addition, current research on urban political ecologies shows a substantial correlation between different forms of urbanization and a higher risk of infectious diseases [19]. Furthermore, some studies indicate that population density rather than population growth has a greater impact on the transmission of infectious diseases [20, 21]. Another study conducted in Malaysia also found that population density played a role in the spread of COVID-19 cases, which lends more credence to the idea that it does so [22]. Although a few studies have found no correlation between population density and COVID-19 infections like the one by Uddin and Ahmed [23], most of the studies have generally produced similar results that indicate a positive correlation between COVID-19 infections and population density.

The research additionally demonstrated that the COVID-19 epidemic was influenced by the use of public transportation. This could also explain why there were more COVID-19 cases reported in cities than in rural areas. Compared to those who live in rural areas, urban residents use public transportation more frequently. The COVID-19 outbreak, especially in metropolitan areas, may have been significantly influenced by the usage of public transit in addition to other variables such as not donning face masks. The assertion is consistent with multiple research findings that suggest public transportation may serve as a conduit for viral

transmission [24], prompting regulatory or voluntary initiatives to suspend or limit its use [25]. Nonetheless, a lot of individuals rely on public transit as their primary or only means of mobility, which increases risk inequality and the virus's ongoing spread [26, 27]. Shen et al. [28] have provided additional support for the results of this study by pointing out that restricted places like public transportation vehicles can facilitate the spread of infectious diseases from person to person. As a result, numerous nations have documented numerous clusters of cases involving respiratory viruses, such as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infections, on public transportation vehicles [28]. A Nottingham study found that taking public transportation within five days of the onset of symptoms raised the risk of contracting general influenza by a factor of six. Within five days after the onset of symptoms, most people do not have the flu but are still contagious, which raises the risk of contracting influenza [29]. According to other investigations, COVID-19 was contracted while riding a bus [30]. Recent research for SARS-CoV-2 revealed a large and significant correlation between COVID-19 and train travel [31].

One possible explanation for the higher prevalence of COVID-19 in urban areas compared to rural provinces is the greater availability of leisure and entertainment options in metropolitan areas. In Zimbabwe, people frequently go to nightclubs, sports bars, and soccer stadiums for entertainment. People in metropolitan areas continued to patronize these entertainment venues in spite of the movement restrictions put in place by the Zimbabwean government through lock downs. These locations are usually packed, which raises the possibility of COVID-19 infections and deaths. These findings are consistent with studies on the transmissibility of COVID-19, which found that indoor congregate settings were more favorable for the virus's spread [32].

These settings are similar to overcrowding homes in that multiple individuals share a small area, there is less ventilation, and a significant amount of time is spent with the same group of individuals [33]. According to a study done on the 2013 Hajj, people who are crowded are more likely to contract infections like influenza, coronavirus, and rhinovirus [34]. Social distancing has been widely regarded as a preventive and control measure for COVID-19 since the virus is mostly spread through close contact and by droplets or aerosols emitted when people cough, sneeze, or talk [35, 36]. The COVID-19 pandemic drove people indoors, which had a disastrous impact on all social meeting places, including bars, beaches, sports facilities, and event locations [37]. The folks that visit these places were impacted by this. It became necessary to limit gatherings in these contexts because COVID-19 spread so easily because it was almost hard to maintain the necessary social distance [37].

The higher number of COVID-19 cases in urban areas compared to rural provinces may also be explained by erroneous COVID-19 records. People who live in rural areas of Zimbabwe usually use traditional medicines when they are sick. This finding is supported by Ngarivhume and companions [38], who contend that most people, especially in rural regions, cure ailments like malaria with traditional plant-based remedies. Due to this, a sizable fraction of COVID-19 cases in isolated provinces would not have been recorded, reported, or authenticated. In contrast, people who live in cities often go to hospitals as soon as they are sick, whether it's from an infection or something else.

The inaccurate COVID-19 data may have resulted from patients' failure to disclose their actual residential addresses to healthcare practitioners, particularly in urban provinces. People who are sent for specialist care from rural to metropolitan areas frequently provide the residential addresses of their relatives who live in towns. Because of this, there's a strong

chance that some COVID-19 patients from rural regions were wrongly classified as urban instances.

## Conclusion

The study's conclusions show that the COVID-19 pandemic's urbanization in Zimbabwe was largely caused by the number of entertainment venues that are more readily available in urban areas than in rural ones, population density, accessibility to ports of entry, and use of public transport. Given that more COVID-19 cases were reported in urban areas than in rural ones, there may have been variations in COVID-19 infection rates between urban and rural locations. Perhaps because of inaccurate addresses and insufficient COVID-19 infection records, more COVID-19 cases were reported in urban provinces than in rural ones. Most patients usually provide the addresses of their city-dwelling relatives to the medical staff. Instead of adopting a broad strategy to manage COVID-19, the report advises the Zimbabwean government to create location-specific control and preventative measures for the current and forthcoming pandemics. Given the higher incidence of disease in urban regions, these places ought to receive more funding and care.

## Conflict of Interest Statement

The authors claim they don't have any conflicting agendas. All co-authors have evaluated the paper and attested to its accuracy; they have no conflicts of interest to report. We certify that the material is wholly original with no intention of being published by another publication.

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