Coronavirus Disease of 2019 (COVID-19) and Household Food Security in High-Density Residential Areas of Lusaka: Experiences From Ng'ombe Settlement

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ABSTRACT

Comparable to the rest of the world, African countries are orbiting from the health, economic and social effects of COVID-19. The continent's administrations responded to COVID-19 guidelines by imposing restrictions to limit the spread of the virus. COVID-19 and measures responses to the pandemic, undermine food production, processing and marketing, but the most concerning experiences are on the demand-side, economic and physical access to food. Food and Agriculture Organisation's (FAO) 'four pillars' availability, accessibility, stability and utilisation provide a complete framework for analysing food security. However, the paper was looking at how people in high-density residential areas are experiencing food security during the COVID-19 period. The main aim was to assess the experiences of residents of high-density urban residential areas of Lusaka in terms of household food security before and during the COVID-19 pandemic era. The study used the convergent research design. Structured interviews were used to collect data from the respondents using questionnaires administered to a sample of 235 Ng'ombe residents. Key informants were selected purposively from Ng'ombe Urban Health Centre, Ng'ombe Catholic Church, the Food and Agriculture Organisation (FAO), the Ministry of Agriculture and the World Food Programme (WFP) officials. Data was collected using semi-structured interviews with a tool called an interview guide. The data was analysed using descriptive statistics, paired t-test and chi-square using R statistical computing software and Excel. The results were presented using tables, pie charts and graphs. The study revealed that Ng'ombe residents had a devastating experience during the COVID-19 era, which included a reduction in income, hunger, job losses, skipped or reduced meal sizes and compromised diet. Also, pinpointing areas for governments and other actors to intervene in the food system to protect the food security of households left vulnerable by COVID-19, for example, empowering

the affected households with money for businesses and job creation.

INTRODUCTION

The provision of food has always been a challenge facing man [1]. About 820 million people face hunger daily worldwide, and more than two billion people lack vital nutrients, affecting their health and life expectancy [2]. The root causes of food insecurity are complex. They are linked to a range of carefully linked factors, such as poverty, low access to basic social services, epidemics and inadequacy of some public policies [3, 4].

The 1996 World Food Summit defined food security as "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious foods that meet their dietary needs and food preferences for a healthy life"[5]. This definition integrates several needs: availability of food, access to food, food stability and utilisation. There are many factors in today's global environment that worsen food security [6]. In Zambia, the poverty situation is worsened by other concurrent crises, such as diseases, economic shocks and many more [7]. It is true that we live in an age where we are growing and producing more food than ever before [8]. We have enough food to feed the world's population, but it is not distributed properly, nor is all food culturally appropriate globally [9]. According to Sriram and Tarasuk [10], local food access differs dramatically, and the greatest difference exists between developed and developing countries and between high and low residential areas.

The primary reason for this inequity is an income-related difference between these populations [11]. It must be stated, though, that in every country of the world, there is hunger, which often falls along economic and social lines.

Coronavirus disease 2019 (COVID-19) is defined as an illness caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [12]. It was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, in China. It was initially reported to the World Health Organisation (WHO) on December 31, 2019 [12]. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency. On March 11, 2020, the WHO declared COVID-19 a global pandemic [13]. The disease has since become an unprecedented public health crisis that has led to economic and social crises. Zambia reported its first two cases of COVID-19 in Lusaka on 18 March 2020. As of 20 March 2021, Zambia's cumulative number of COVID-19 was as follows Coronavirus cases: 86, 273 deaths, 1,178 recovered: 83,110, countrywide. The COVID-19 pandemic is a health crisis threatening food and nutrition security, especially in developing countries like Zambia [14]. Several countries have instituted temporary restrictions on travel to slow the spread of this new disease throughout the rest of the world, making it difficult for poor countries and residential areas to access food [15]. The pandemic is affecting all four pillars of food security: availability (is the supply of food adequate?), access (can people obtain the food they need?), utilisation (do people have enough intakes of nutrients?) and stability (can people

access food at all times?) COVID-19 is most directly and severely impacting access to food, even though impacts are also felt through disruptions to availability; shifts in consumer demand toward cheaper, less nutritious foods and food price instability [16]. The extent of the damage and losses resulting from the pandemic differ from one sector to another and from one country to another, but what certainly counts most to people during crises is to meet their food needs rather than any other [17].

The main threats COVID-19 poses to food security suggest critical responses that policymakers should consider to prevent this global health crisis from becoming a global food crisis [18]. Adebanwi W. *et al.,* [19] argue that food demand and thus, food security are greatly affected due to mobility restrictions, reduced purchasing power and with a greater impact on the most vulnerable population groups. Unless immediate action is taken, we could see a global food emergency due to COVID-19 [20]. The main aim of this study is to assess the experiences of residents of high-density urban residential areas of Ng'ombe high-density residential area in terms of household food security in the face of the COVID-19 pandemic.

MATERIALS AND METHODS
Research Strategy
To gain an in-depth understanding of the topic, this study used the convergent parallel design. The research process was symbolised as quantitative and qualitative [21]. A convergent parallel design entails that the researcher concurrently conducts the quantitative and qualitative elements in the same phase of the research process, weighs the methods equally, analyses the two components independently and interprets the results together [22]. The advantages of mixed method research are that it validates the quality of conclusions derived from one type of study by checking it against mixed designs. It also balances the shortcomings of one method utilising the supremacy of the other method [23].

Selection of Respondents
This study used Stratified sampling. Stratified sampling involves dividing the population into subpopulations. It allows you to draw more precise conclusions by ensuring that every subgroup is properly represented in the sample [24]. To use this sampling method, you divide the population into subgroups (called strata). Based on the overall proportions of the population, you calculate how many people should be sampled from each subgroup. Then, you use random sampling to select a sample from each subgroup [24]. This sampling type was selected because Ng'ombe, settlement houses are in irregular patterns. It was also used because it is a fair sampling method, and if applied appropriately, it helps reduce any bias involved compared to any other sampling method. Also, the internal and external validity is high, and it is easy to analyse data [25]. Ng'ombe has approximately 150,000 residents [26]. The sample size for this was 235. The sample size was calculated using the Raosoft online sample calculator at a 5% margin error and 95% confidence level with 150,000 total populations.

Purposive sampling was used to select ten key informants. The purposive sampling technique, also called judgment sampling, is the deliberate choice of participants due to the qualities

the participant possesses. It is a non-random technique that does not need underlying theories or a set number of participants [25]. Key informants were selected purposefully from Ng'ombe health center, Ng'ombe Catholic Church, Food and Agriculture Organisation (FAO), Ministry of Agriculture and World Food Programme (WFP) officials.

Data Collection

Data collection is the process of gathering and measuring information on variables of interest in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes [27]. Semi-structured interviews were used to collect data from the key informants.

A semi-structured interview is a data collection method that relies on asking questions within a predetermined thematic framework. However, the questions are not set in order or phrasing. Semi-structured interviews introduce more detail and richness due to their more open-ended nature [28]. Participants in this study were asked to clarify, elaborate, or rephrase their answers if need be. They were done by using an instrument called a semi-structured interview guide.

Structured interviews were used to collect data from the respondents using a questionnaire [28]. A structured interview is a type of interview in which the interviewer asks a particular set of predetermined questions. In structured interviews, questions are planned and created in advance, which means that all candidates are asked the same questions in the same order. Since in structured interviews, all the candidates are asked the same questions, it is easy to compare their answers. It also creates less stress for the interviewer to come up with

questions on the spot.

Data Analysis

Paired t-test and chi-square were used to analyse data. The paired sample t-test, sometimes called the dependent sample t-test, is a statistical procedure used to determine whether the mean difference between two sets of observations is zero [29]. A chi-square (χ^2) statistic is a test that measures how a model compares to actual observed data. The data used in calculating a chi-square statistic must be random, raw, mutually exclusive, drawn from independent variables, and drawn from a large enough sample. Thematic analysis was used to analyse qualitative data. Thematic analysis is a method for analysing qualitative data that entails searching across a data set to identify, analyse, and report repeated patterns [30]. It is a method for describing data, but it also involves interpretation in the processes of selecting codes and constructing themes [31].

The data was transcribed and coded into themes. Then thematic analysis method was used to analyse the data, and the inferences were drawn [28].

RESULTS

Characteristics of Respondents

This study investigated a sample of 235 respondents from Ng'ombe high-density residential areas. This constituted 32.3% female-headed households and 67.7% male-headed households. The minimum and maximum ages for the respondents were 25 and 71, respectively, with a mean age of 41 years. The distribution of the age variable by gender is given in Table 1 below.

Table 1: Respondents Age Distribution-Summary

Gender	% Counts	Minimum	Median	Mean	Stdv	Maximum
Female	32.3	25.0	44.0	44.1	10.16	71.0
Male	67.7	25.0	39.0	40.9	9.730	64.0

Source: Field data, 2021

Gender and Marital Status

Out of the 76 females observed, only nine were married, 41 were singles, and 26 were widowed. Of the male, out of 159 male respondents, 130 were married, 20 were single and nine widowed. Therefore, the researcher concluded that in this residential area, a large number of men are married, and most of the females are single. The distribution of the marital status variable by gender is shown in table 2 below.

Head of the Household Level of Education

A further analysis was done to check on the education level attained by the respondents. The analysis revealed that a significant number had attained up to secondary level education, and none of the females attained tertiary education. It also showed that 17.1% of the females are illiterate compared to only 2.5% of males. Therefore, this shows that men are more educated in this residential area than women. Education levels also affect the food security. If the head of the house, especially a woman, is not educated, she will have less knowledge of how to cook a nutritious meal. Details are given in Figure 1 below.

Table 2: Tabulated Statistics: Gender, Marital status

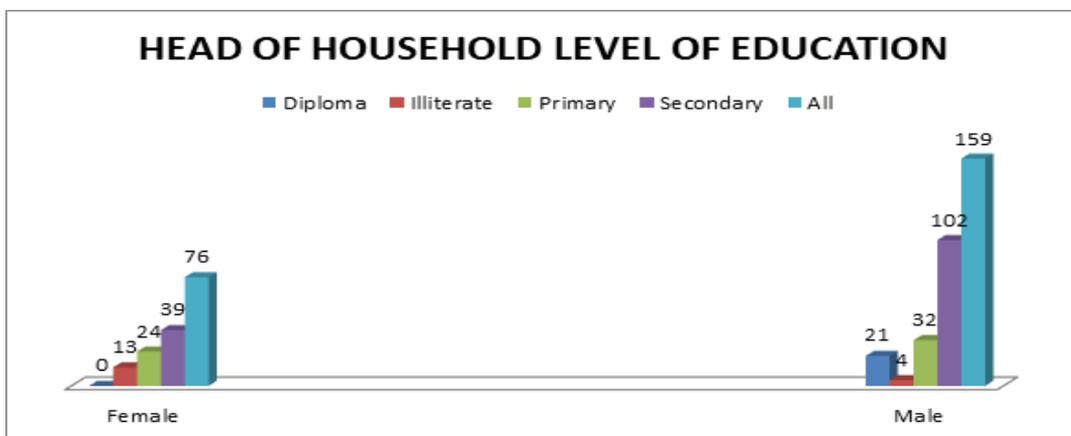|	Married	Single	Widowed	All
Female	9	41	26	76
Male	130	20	9	159
All	139	61	35	235

Source: Field data, 2021

Figure1: Respondent's Education Level-counts
(Source: Field data, 2021)

Head of the House's Nutrition Knowledge

Nutrition knowledge was one of the most important variables in this investigation to help assess the food security in high-density residential areas of Lusaka. Approximately 52% of the respondents confirmed having nutrition knowledge and they are able to balance their meals. Table 3 shows the counts of nutrition knowledge by gender. The plot shows that a larger proportion of males lacked nutrition knowledge. On the contrary, a larger proportion of females had nutrition knowledge.

Further, a chi-square test was carried out at a 5% level of significance, to investigate whether nutrition knowledge depends on gender. The test results gave a p-value of 29.88% (clearly greater than 5%), revealing no significant dependence between nutrition knowledge and gender. See Figure 2.

Table 3: Respondent's Nutrition Knowledge-Counts

	Nutrition Knowledge		
Gender	No	Yes	Total
Female	32	44	76
Male	80	79	159
Total	112	123	235

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Pearson's Chi-squared test with Yates' continuity
correction

data:  Gender and Nutrition_K
X-squared = 1.0796, df = 1, p-value = 0.2988
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Figure 2: A Chi-Square Test Output
(Source: Field Data)

Effects of COVID-19

The largest proportion, 46.0% of the respondents stated that they experienced hunger during the COVID-19 era. Obviously, this has a detrimental effect on food security as people are not only having a shortage of food but also a lack of nutritious food. About 18.3% stated that the effect of COVID-19 has been restricting movements, hindering them from doing their normal daily business. Figure 3 displays the details of the results of this analysis.
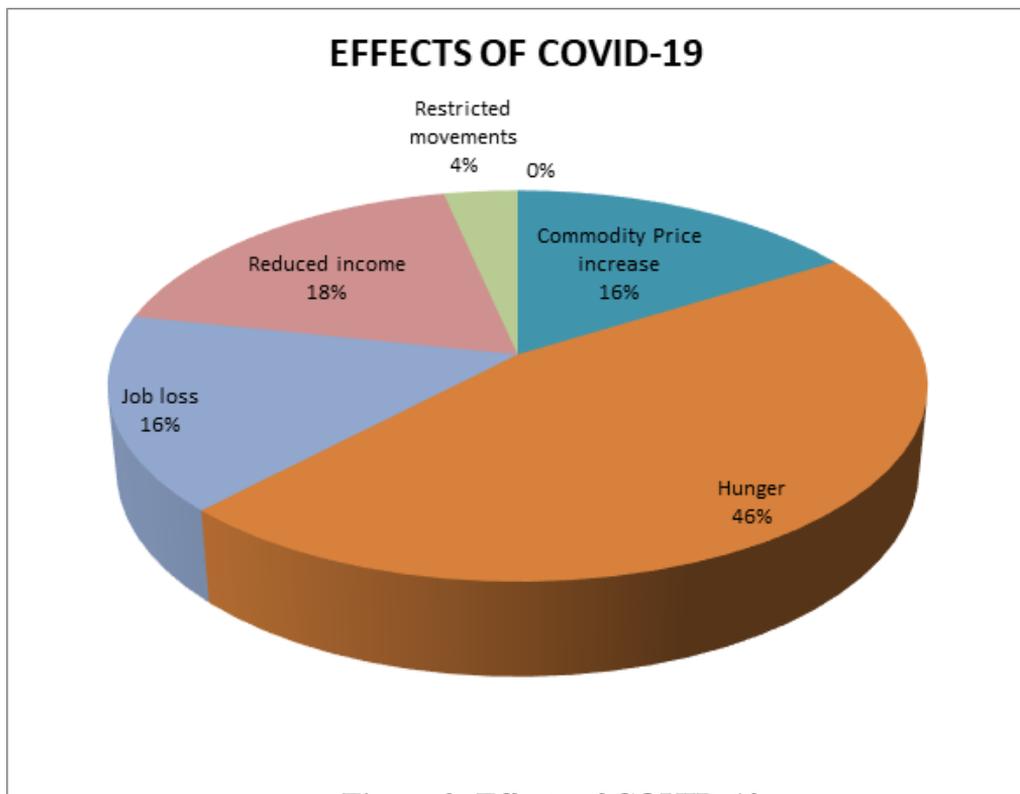

Figure 3: Effects of COVID-19
(Source: Field data, 2021)

Income Provider

Figures 4a and 4b show the number of income providers per household before and during COVID-19, respectively.

Figure 4a shows that each household on average had two income sources, and some households that had at least 4 or 5 income providers showing no statistically significant change. In Figure 4b, no household had 4 and 5 income providers. The number of families with only one income provider increased from 130 to 195. This could be the case that most household members lost jobs or their businesses during the COVID-19 era, making it impossible to provide any income in their households. This is likely to have a negative impact on household food security as overall income reduced.
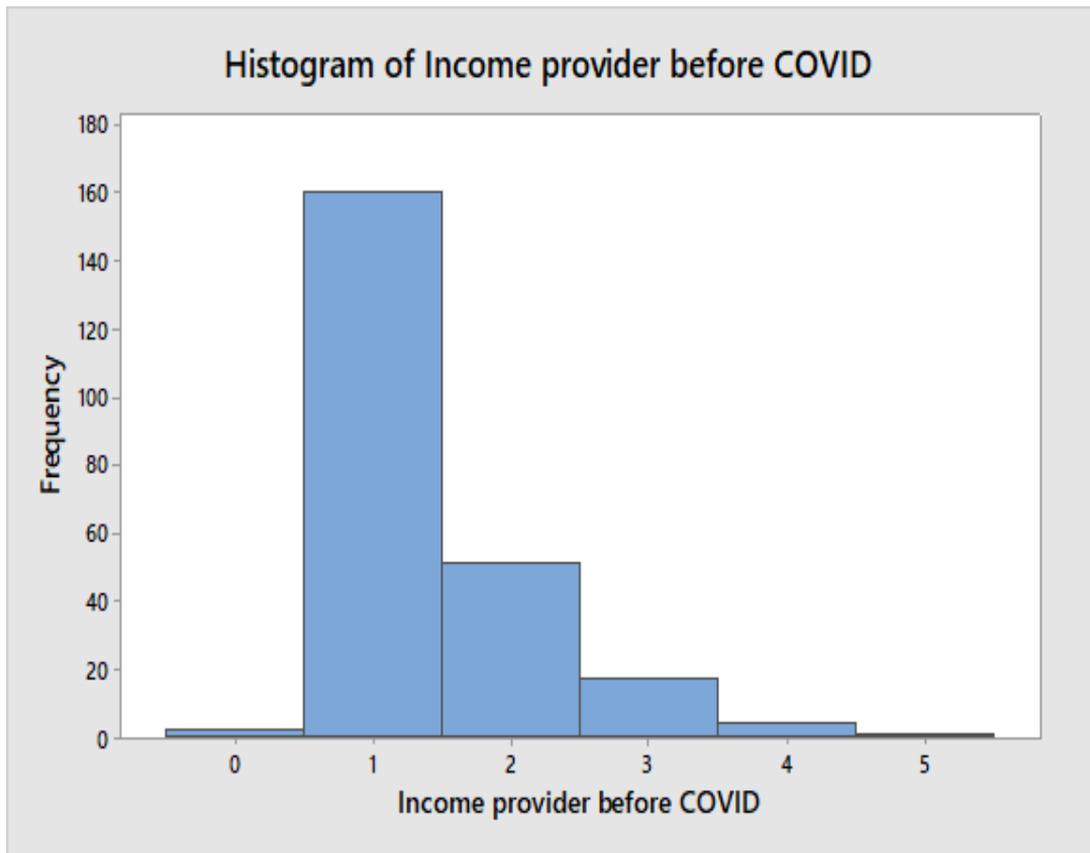

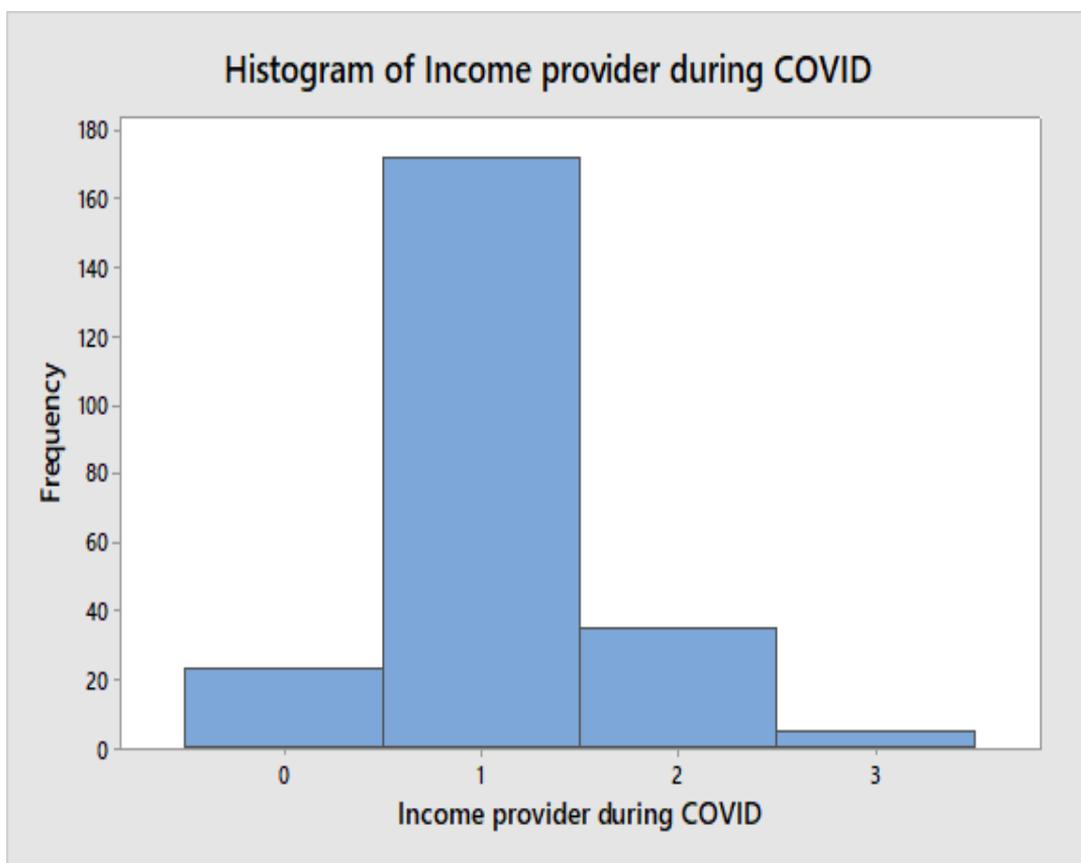Figure 4a: Income Providers (Counts before COVID-19)
Source: Field data, 2021

Figure 4b: Income Providers (Counts during COVID-19)
(Source: Field data, 2021)

Income before and during COVID-19
The researcher found it fit to analyse the monthly income before and during COVID-19 as this might have an impact on food security in high-density residential areas. Figure 5 shows the histograms of income (both original and log-transformed income). The two histograms in the first row are highly positively skewed. That is, very few people earned monthly income above K2,500 both before and during COVID-19. A log transformation was done to obtain an approximately symmetric distribution of income for further analysis. The second row shows the two histograms approximately symmetric. So, a paired t-test requirement was met; that is, data must be approximately normally distributed.

A paired t-test, at a 5% significance level, was carried out to determine whether there was a significant difference in income earned before and during COVID-19 as shown in Figure.

The test results revealed (p-value is less than 5%) a significant difference in

the income earned before and during COVID-19. In fact, both limits of the confidence interval, (-0.2341946, -0.1628773) are negative (see figure 6), implying that monthly income during the COVID-19 era significantly reduced.

This may have a detrimental effect on food security as households may not afford enough nutritious food for their households.
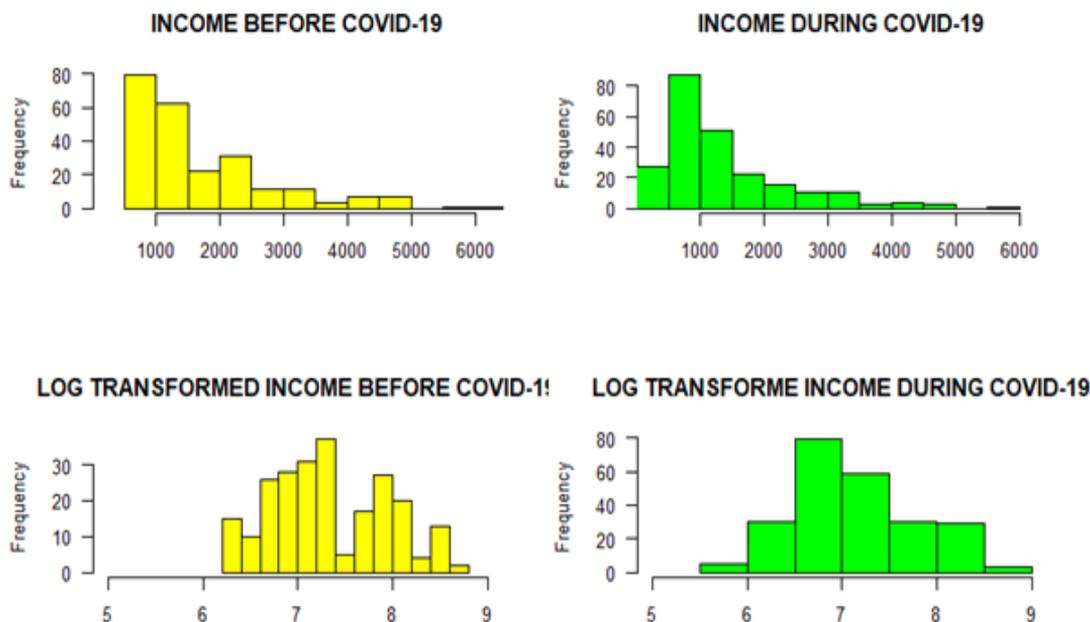

Figure 5: Income Before and During COVID-19
Source: Field data, 2021

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Paired t-test

data:  LincomeD and LincomeB
t = -10.969, df = 234, p-value < 2.2e-16
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.2341946 -0.1628773
sample estimates:
mean of the differences
          -0.1985359
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Figure 6: Showing an Output of The T-Test
Source: Field data, 2021

Nutrition Change

Respondents were also asked whether there was a change in the nutrients (Carbohydrates, Proteins and Vitamins) during the COVID-19 era. Generally, the majority said they observed a decrease in all cases, and none observed an increase. This means that the majority had no variety of food, and even the little food they bought reduced further. Those who said that the nutrients remained the same were the landlords and the face masks tailors. Their nutrients could not increase but remained the same because the food prices increased during COVID-19. See Table 4.

Table 4: Nutritional Change (Counts during COVID-19)

	Nutrients		
Change	Carbohydrates	Vitamins	Proteins
Increase	0	0	0
Same	16	22	20
Decrease	219	213	215

(Source: Field data, 2021)

Nature of the Job

Figure 7 below shows the job types of the respondents before and during the COVID-19 era. Generally, the picture shows that most people lost their jobs during the COVID-19, except for landlords, which remained the same. Piecework increased during COVID-19 because a lot of people, when they lost their jobs, decided to look for piecework. The majority were involved in general trading before and during the COVID-19 era, but the number increased during COVID-19. We can, therefore, deduce that a lot of people lost their jobs during COVID-19, resorting to piecework and trade.
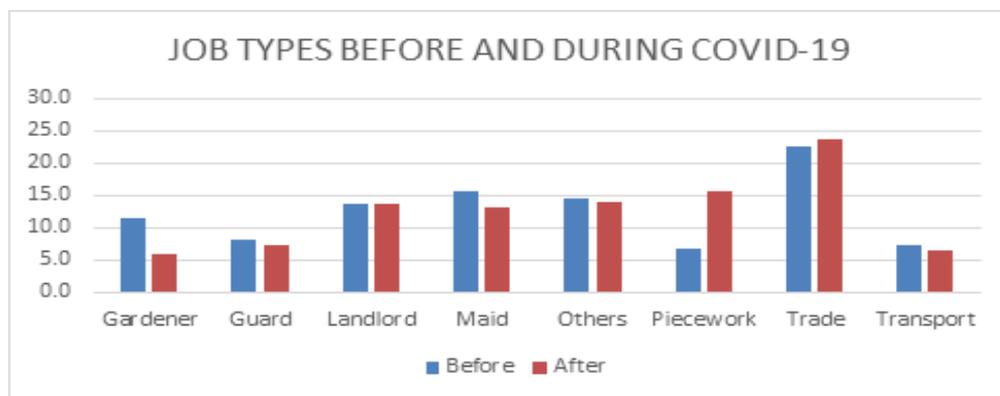

Figure 7: Job Types Before and During COVID-19
Source: Field data, 2021

Food Cut

The respondents were asked whether there was a reduction in the food provision in the households. The majority (178 out of 235) of the respondents stated that there was a reduction in the quantities of food consumed daily. They also said that they cut some meals and also reduced the size of the meals so that their food could stay for a longer period. Figure 8 shows the number of households, which cut or reduced food provision during the COVID-19 era.

Figure 8: Number of People Who Said Yes They Reduced or Cut Their Meals During Covid-19 and Those That Said No.
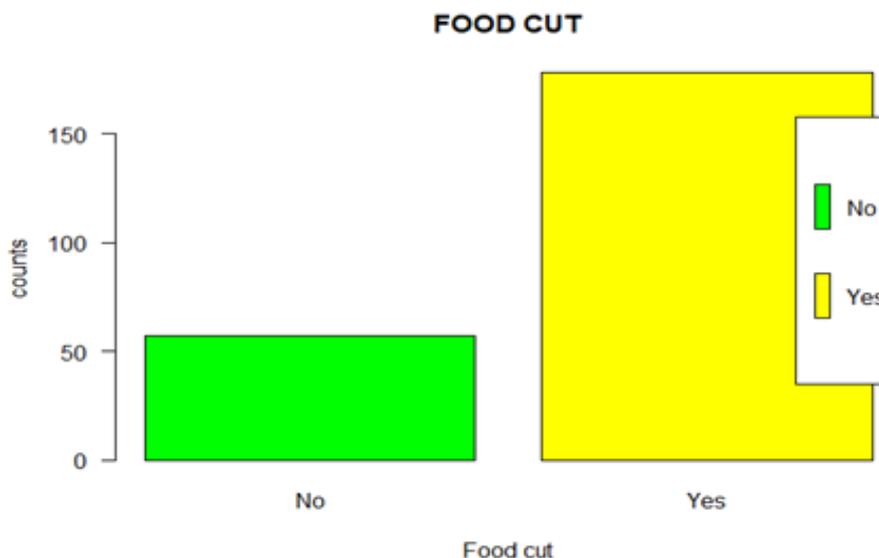
Source: Field data, 2021

Coping Strategies

The respondents were also asked about how they are strategising in terms of food during this COVID-19. The majority stated that they strategised by borrowing food from family or friends to supplement the food quantities to provide for their families. Very few families said that they strategies by buying foods, which do not go bad easily. See Figure 9 showing strategies used to provide for their families during the COVID-19 era.
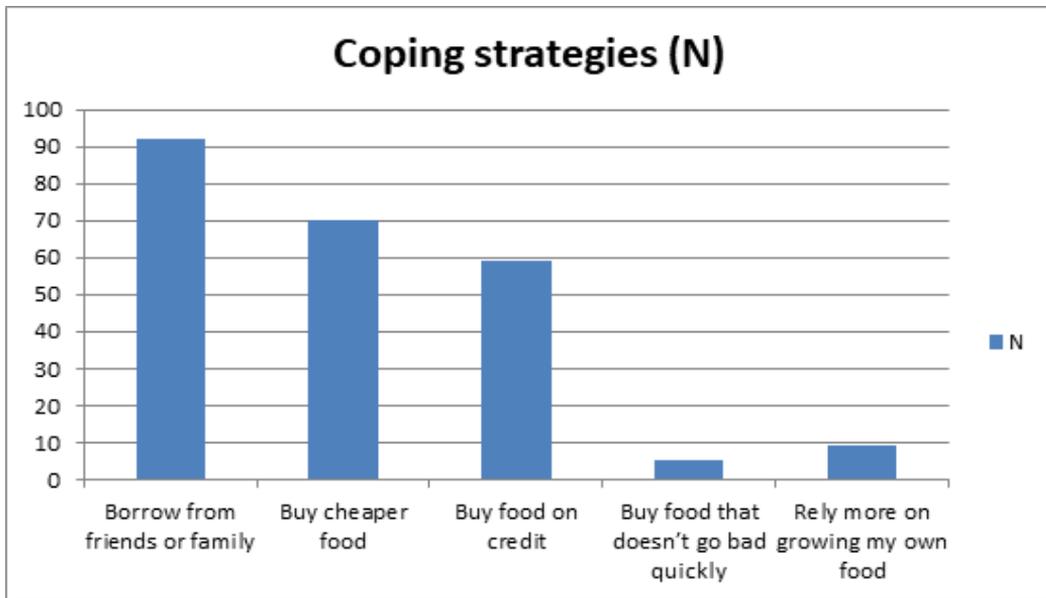
Figure 9: Food Cut and Strategies
Source: Field data, 2021

Diarrhoea Cases

The bar charts in Figure 10 show the number of Diarrhoea cases per household before and during COVID-19. The number of households, which recorded two or more diarrhoea cases significantly increased during COVID-19 era. This implies that the food consumed in this residential area was not nutritious enough during the COVID-19 period.
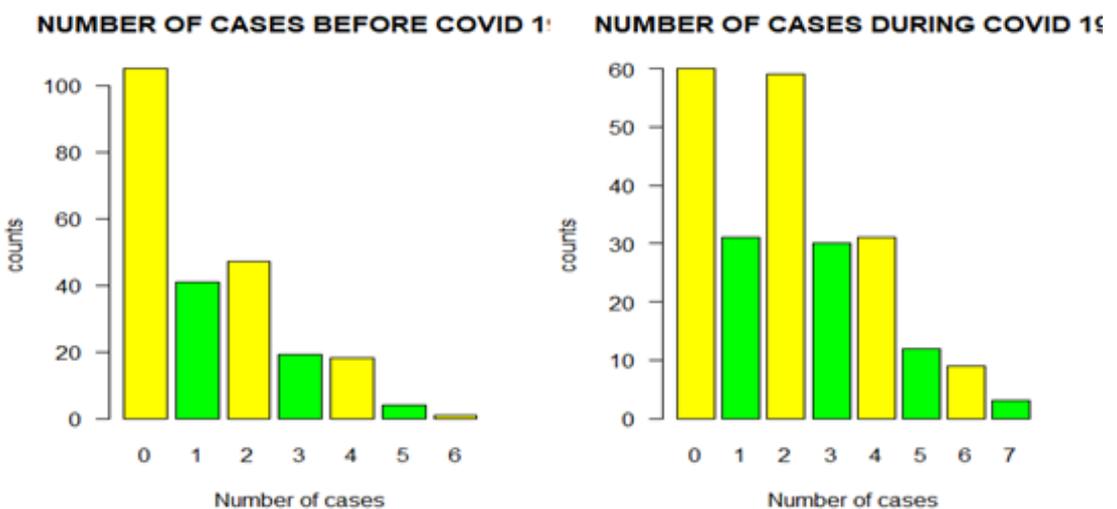

Figure 10: Show the Number of Diarrhoea Cases per Household
Source: Field data, 2021

DISCUSSION OF THE FINDINGS

Results of this study indicate that there was a significant impact of the pandemic on the community's economy. The impact of the COVID-19 pandemic mostly was a reduction in income, respondents had lower incomes than before the COVID-19 pandemic due to job losses, reduced worked hours or pay cuts. A study conducted by [32] also stated that about 44% of firms in Zambia reported decreasing the total number of temporary workers since the pandemic began. Furthermore, about 91% of firms reported having experienced decreased liquidity or cash-flow availability since the onset of the pandemic. A similar thing was also reported by a study conducted in Vietnam, which stated that most of the respondents (66.9%) had a decrease in household income due to COVID-19 [33].

Regarding food security, this study showed that respondents had various levels of food insecurity during the COVID-19 pandemic. Food insecurity during the COVID-19 pandemic also occurred in various countries in the world with a relatively similar prevalence. In Bangladesh, there was an increase in the number of families experiencing food insecurity during the COVID-19 pandemic by 51.7% [34]. A study conducted in the USA showed that out of 3219 respondents, 32.3% of households had very low food security, and 67.7% of the households had low food security since COVID-19 [35].

Food shortages during the pandemic affected household food consumption. In this study, households with food shortages tend to consume less varied foods. In addition, there were those who ate less food and some did not eat any food in a day. Changes in household food consumption during the pandemic also occurred in Uganda. Research conducted by Kansiime [36] indicated that during the pandemic (COVID-19), a reduction in the frequency of consumption of a variety of food groups mainly occurred in low-income families. The results of this study also reported that during the COVID-19 pandemic, there was less access to food, so respondents tended to reduce the amount of food [37]. Changes in food consumption among vulnerable groups also occurred in this study. This study also revealed that family income during the pandemic had a significant relationship with household food security. Households with low income (below the Zambian minimum domestic wage level) were more likely to experience food insecurity than households with higher income. A study in Bangladesh also shows that income loss was positively correlated with household food insecurity [38]. Family income directly affects family's purchasing power [39], and low income family tends to eat less varied food [40]. The type of impact of the pandemic, in this case, reduced income and stopped working, also had a significant relationship with food security. This finding is in line with research conducted by Kundu *et al.,* [41], which showed that employment and income are potential predictors of low food security scores. Mulako *et al.,* [42] also emphasised that job losses and reduced income hindered access to food. Another variable that had a significant

relationship with household food security was the age of the respondents [43]. In this study, respondents aged less than 30 years had a two times higher risk of experiencing food insecurity than their older counterparts.

Most of the older people built houses and shops to let; hence, the income, although little, is a bit stable in Ng'ombe settlement. Similar results were also reported by Elsahoryi [44] in Jordan; age was associated with food insecurity status, with younger respondents (18–30 years old) being more likely to experience severe food insecurity. Research by [45], however, showed different results where households with older household heads were more food insecure than households with younger household heads. Age is associated with the economic condition of the family namely, the age of older respondents tend to have a more established economy when compared to younger ages [45]. The number of income providers during the pandemic in this study became the control variable in the relationship between the independent variables and food security. The number of income providers affected the amount of income received by the family, which then affected the household's food security. Pakravan-Charvadeh and Movahed [46] also reported that during the COVID-19 outbreak, the number of income providers was directly related to food security. The number of households, which recorded diarrhoea cases significantly increased during COVID-19 era as compared to before [47]. This implied that the food consumed during the time of study in this residential area was not nutritious enough during this COVID-19 period and we can conclude that there was food insecurity in this area. Barrett *et al.,* [48] in 'Actions now can curb food systems fallout from COVID-19'also recorded an increase in diarrhoea cases during COVID-19 and his conclusion was as a result of a reduction in nutritious food.

CONCLUSION

The findings in this study show that respondents experienced restricted movements hindered them to do their normal daily businesses which bring food on their tables. Most of the households experienced hunger during this COVID-19 period due to job loss and pay cuts and erosion of diet quality in comparison to pre COVID-19. A paired t-test at 5% level of significance was carried out to determine whether there was a significant difference in income earned before and during COVID-19. The t-test results showed that there was a significant reduction in the income during the COVID-19. Some of the strategies that most of the residents put across in order to survive during this period were: cutting meals, skipping some meals and buying cheaper foods. Therefore, this study concludes that the people of Ng'ombe residential area experienced hunger, reduced income, reduction in nutritious food and diarrhea cases significantly increased during the COVID-19 era.

DECLARATIONS

The authors declare no competing interests.

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This research did not receive any

AUTHORS CONTRIBUTION

Lead author

Contributed in terms of conceptualising the study, drafting the tools, collection of data and cleaning it and drafting the manuscript and gave the rest to read.

Second author

Contributed in terms of theoretical aspect and the write up

Third author

Contributed in data analysis and the write up.

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