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DETERMINANTS OF RURAL HOUSEHOLDS' FOOD SECURITY STATUS IN SOUTH AFRICA: LESSONS FROM COVID-19 SOCIAL RELIEF GRANT RECIPIENTS IN NIDS-CRAM WAVE 5

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ABSTRACT

The world experienced an unprecedented health shock (COVID-19) which caught everyone by surprise, and destabilized many sectors, especially the agri-food sector. This unpleasant situation caused upset in the food production and distribution chain, and continues to threaten the attainment of Sustainable Development Goal 2 which underscores zero hunger in society. Many people in South Africa were disproportionately affected with severe consequences on their livelihood activities, food security status, health status, and general welfare conditions; and as a result, social relief intervention was put in place or expanded. This study examined the factors influencing rural households' food security status among the recipients of social relief grants in rural areas of South Africa. The study used a secondary dataset from Wave 5 of National Income Dynamics Study - Coronavirus Rapid Mobile Survey (NIDS-CRAM). The research applied descriptive statistics to describe the respondents' socio-economic characteristics, and pattern of income flow. Food Insecurity Access Scale was employed to investigate the respondents' food security status, while multinomial logistic regression was used to explore the determinants of food security. The results showed that the majority of the respondents were black (99%), female-headed (54.15%), dwelling in flats (74.01%), with secondary education (88.6%), and heavily dependent on government grants (58.61%). Also, most households were food secure (71.69%) during the pandemic. Moreover, households headed by men were more food secure (62.84%) compared to the ones headed by the female counterparts (37.08%). Multinomial regression estimates revealed that formal education ($p < 0.1$), employment status ($p < 0.05$), dwelling type ($p < 0.01$), as well as household size ($p < 0.01$) significantly determined rural households' food security status. The study concluded that social relief grants significantly reduced the food insecurity situation among the rural households in South Africa, and recommended that the government should ensure the continuation of the social relief of distress grant to the vulnerable people who are mostly domiciled in the rural areas, especially women who are disproportionately affected by these health shocks.

Key words: Covid-19, social grant, rural households, food security, South Africa



INTRODUCTION

Covid-19 health shock was pivotal in exacerbating food shortages and general welfare distress, especially in the global south countries [1]. The pandemic undermined the drive by the United Nations to achieve Sustainable Development Goal (SDG) 2, which targets eradicating hunger by 2030 [2]. Before the Covid-19 pandemic, approximately 2 billion people faced mild or acute food insecurity [3]. The pandemic heightened this number by about 720 to 881 million people of which the majority are from developing countries, South Africa included [3, 4]. This caused massive income loss, creating severe global food security and nutrition problems [5]. Just like all other countries globally, South Africa was not spared. Statistics South Africa [5] also indicated that about one-fifth of the populations experienced moderate and/or severe food insufficiency. Severe food insecurity is activated when physical and economic access to food is lacking and people cannot meet their basic food needs in terms of quantity and quality. The quantity and quality of food consumed decreases as food insecurity increases, while some people take to skipping meals as a coping strategy in an intense situation [3]. In the most extreme cases, hunger is characterized by being unable to eat, and possibly not eating for an entire day due to a lack of money and other resources [6]. The pandemic surge presented multifaceted challenges to South Africa, hindering efforts to achieve a healthy population amid plummeting national output, rising food prices, increasing unemployment, and the need to feed millions who lost their incomes, especially in rural areas [7]. The early phase of the pandemic was marked by a rise in food prices and panic buying across South Africa [8], and the efforts made to improve food security at the national and household levels, especially in rural areas, has had an enormous knock-on effect [8].

The South African government introduced the R350 Covid-19 social relief distress grant to create a buffer for the citizens to cope with the disturbing effect of the pandemic [9]. It is essential to focus the analysis on the rural household because a report by Statistics South Africa indicated that 65% of the 39.26% of South Africans living in rural areas are poor [8]. Over 90% of households without food access in South Africa are Black Africans [8].

A wide array of studies on the nexus between Corona virus and income, unemployment and food security have been done in South Africa. Arndt *et al.* [7] examined the nexus between Covid-19, income distribution and food security using Social Accounting Matrix (SAM). The findings indicated that workers with low levels of education were severely affected. However, it lacks empirical analysis. Moreover, studies by Patrick *et al.* [8] and Ngumbela *et al.* [10] investigated the

vulnerabilities of South Africa using desktop coupling and thematic analysis, respectively. Also, other studies include van der Berg *et al.* [11] and Ngarava [12], which focused on food security in South Africa using the secondary data from National Income Dynamics Study-Coronavirus Rapid Mobile Survey (NIDS-CRAM). However, none of these studies focus on the effect of the Covid-19 SRD grant on rural households' recipients. Therefore, this research sought to investigate varying socio-economic dimensions of the rural-based recipients of Covid-19 relief grants, their food security status, and the factors that influence their food security status.

Review of Literature

Global attention has been focused on food insecurity for some time now since it exists in many countries [5]. The United Nations is working towards achieving SDG 2, which focuses on ending hunger by 2030 [13] which is in line with South Africa's vision as enshrined in its National Development Plan (NDP). Despite many obvious emerging global issues, and especially considering the ravaged Covid-19 pandemic, it appears impossible to achieve this in less than ten years [8]. In South Africa, there is household food insecurity, and according to Ngarava [12], in 2015, 26% of South African households were food insecure, and another 28% were also at risk of becoming so.

A more recent assessment by Inter-governmental Panel on Climate Change (IPCC) indicated that by December 2020, *"about 8.18 million people in South Africa were in a food insecurity crisis, and 1.16 million were in a state of emergency, while it was estimated that by March 2021, the number of people in the form of an emergency would rise to 2.2 million."* The chief reasons for the astronomic spike in the food insecurity situation were the Covid-19 pandemic, high food prices, drought, economic stagnation, and unemployment [12].

The advent of Covid-19 forced the government of South Africa to declare a National State of Disaster on March 15, 2020, while stringent lockdown measures followed immediately on March 27, 2020 [7]. Public gatherings were cancelled because of the policy which imposed travel restrictions, closed borders, and suspended schools [14]. Several industries suffered from a massive reduction in demand/supply due to the lockdown. Though the impact was felt across the board, the service industry was severely affected [7]. The fall in agricultural output, and rising unemployment worsened food security in South Africa, especially in rural areas [6].

To curtail the impact of Covid-19 on the food security, the government, through the South African Social Security Agency (SASSA), introduced the special R350



Covid-19 social relief of distress grant in 2020, and the grant was received by 11.3 million people every month [15]. This grant is vital because it targets unemployed South Africans who are not receiving any other assistance. Most unemployed people reside in rural areas, where 65% are classified as poor, and 90% lack food. These people primarily depend on farming, which was affected by the stringent restriction measures, impacting on the food production and resulting in severe food shortages [14].

Some studies have been conducted on the nexus between Covid-19 and food security in South Africa [8, 12, 16], and these studies have also identified the catastrophic consequences of the health pandemic on the African citizens in all facets of life. Notably, many people lost their lives, jobs, and incomes, resulting in acute food shortages. However, most of these studies did not emphasize the rural populations which were disproportionately affected due to lack of buffers, and other resources to mitigate the unexpected shocks. Therefore, the study will become the basis for policy formulation that will not be beneficial to rural families alone, but to the whole nation.

MATERIALS AND METHODS

The study utilized wave 5 secondary data from the National Income Dynamics Study-Coronavirus Rapid Mobile Survey (NIDS-CRAM). The data was collected from the 6th - 11th of April, 2021. The essence of the NIDS-CRAM survey was to investigate how Covid-19-induced lockdown measures socio-economically impacted South Africa [12]. The NIDS-CRAM used the Computer Assisted Telephonic Interview (CATI), which was repeatedly done for several months. The survey strove to collect data that is a representative sample of South Africans who are 18 years and above by utilizing the pre-existing sample of people from the longitudinal NIDS study conducted in 2017. The NIDS-CRAM was collected from May 2020 until May 11th 2021, and five waves of data were successfully collected.

Research Design, Sampling Techniques and Data Collection

This study used only wave 5 data from NIDS-CRAM, where 5862 respondents were successfully interviewed. Only 3154 and 431 people from the urban and rural areas, respectively received the R350 Covid-19 social relief of distress grant [9]. A sample of 431 respondents who were rural-based were extracted, and used in this study. The research adhered strictly to all the required ethical practices, given that University of Cape Town has ethical approval number: REC 20202/02/017, while University of Stellenbosch also has ethical approval number: REC 15433. Further, this study equally obtained ethical clearance from the University of Fort Hare with approval number: REC-270710-028-RA Level 01.



Data Analytical Techniques

Descriptive statistics (tables, figures, and pie charts) was used to describe the respondents' socio-economic characteristics, while household food insecurity access scale was used to profile the respondents into levels of food security status [17]. Then, multinomial logistic regression was applied to examine the determinants of rural households' food security status in South Africa.

Model Specification: Multinomial logistic regression (MNL)

Multinomial logistic regression is usually applied to model nominal response (outcomes) variables of interest, where the log odds of the outcomes are expressed as a linear combination of the hypothesized explanatory variables, as backed up by theoretical evidence [18]. This model permits the inclusion of two or more dependent variables. Also, MNL assumes a non-linearity association between the response, and explanatory variables [19]. In its modeling, MNL does not require that the independent variables be unbounded, and does not assume that error terms are normally distributed [19]. The estimates of variables in an MNL can be identified and compared to a baseline category of the dependent variable [18].

The model is as follows:

$$P_{ij} = \frac{\exp(\beta_j X_i)}{1 + \sum_{j=1}^4 \exp(\beta_j)} \text{ for } j = 0, 1, 2 \dots \dots \dots (1)$$

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$$P_{ij} = \frac{\exp(\beta_j X_i)}{1 + \sum_{j=1}^4 \exp(\beta_j)} \text{ for } j = 1, 2, 3 \text{ or } 4 \dots \dots \dots (1)$$

Where: X_i is a vector of i^{th} household's contextual socio-economic variables, and β_j is a vector of regression parameter estimates associated with alternative j .

Given the base category, the coefficients of the predictors are assumed to be zero. The likelihood that the household will fall into one category is given by:

$$P_i = \frac{1}{X_i} = \frac{1}{1 + \sum_{j=1}^4 \exp(\beta_j X_i)} \dots \dots \dots (2)$$

The probability that the household will fall into the other categories is expressed as:

$$P_i = (j = m/X_i) \frac{\exp(\beta_j X_i)}{1 + \sum_{j=1}^4 \exp(\beta_j X_i)} \dots \dots \dots m > 1 \dots \dots \dots (3)$$

The multinomial model for the estimation of food security status determinants is given as:

$$P_{ij} = \ln(P_j/P_i) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} \dots \dots \dots \beta_n X_{ni} + \epsilon_i$$

The subscript ii denotes the data's i^{th} observation. The model's intercept is 0, and the explanatory variables are $X_1, X_2,$ and $X_3... X_n$. The coefficients, on the other hand, represent the impact of specific explanatory variables on the log odds of the response variable. The description of variables used in this study is given in Table 1

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Figure 1 presents the descriptive results of the gender dynamics of household heads in the NIDS-CRAM study. As shown, male-headed households account for about 45.85% of the sampled respondents relative to 54.15% attributed to the female counterparts. The results agree with what Statistics South Africa [5] highlighted in one of the organization's publications.

In terms of age as shown in Figure 2, the results indicate that 41.1% of the household heads were less than 30 years of age, while 28.5% accounted for those in the age bracket 30-40 years. The findings also reveal that 17.6%, 11.14%, and 1.62% of the respondents were within the age-group of 41-50, 51-60 and above 61 years, respectively. This implies that most of the sampled respondents were in their active years. This is not surprising because the R350 Covid-19 social relief grant targeted unemployed people who were not receiving other types of grants, which primarily made most of the youths that are unemployed good candidates for such intervention. These results are also a testament to what Stats-SA [20] reported about dire situation of youth unemployment which was staggering at 45.6% in the second quarter of 2022, and the general unemployment rate was at 33.9%.

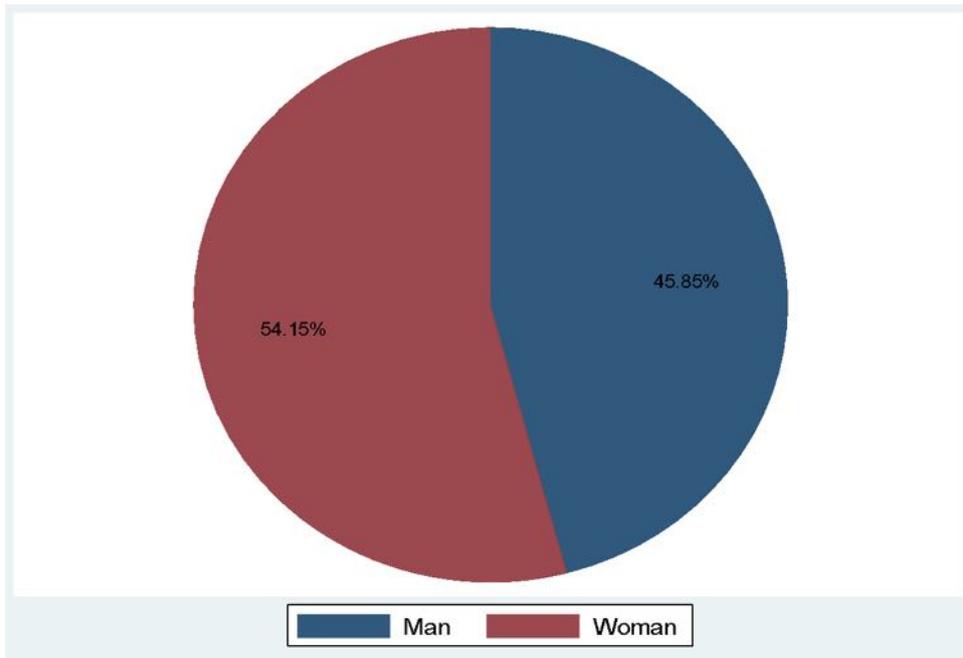


Figure 1: Gender of the respondents

Source: Data analysis, 2021

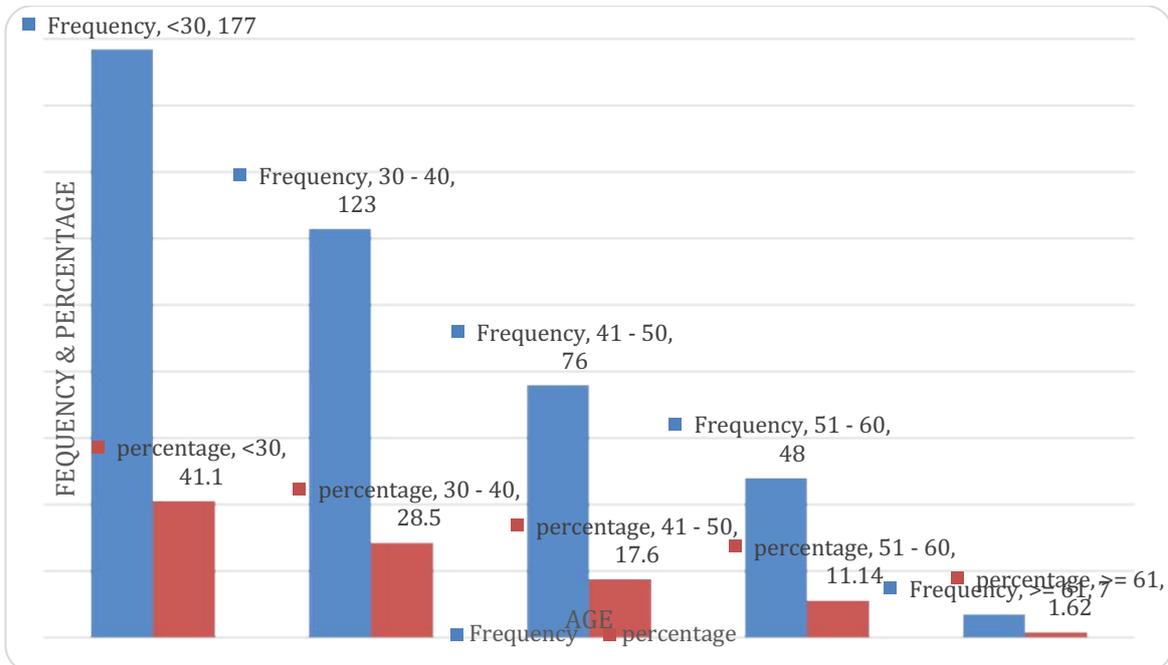


Figure 2: Age distribution

Source: Data analysis, 2021

Figure 3 shows that 32.71% of the respondents were married, compared to 67.29% who said they were not married. Of the married total, 62.41% were staying with their partners, while the 37.59% were not (Figure 4). The proportion of single

respondents was low, probably because the R350 Covid-19 social relief grant targeted the unemployed who were not receiving any form of other grants. This is to say that, older adults have their separate grants, while the youths mainly receive this social relief grant. To corroborate the findings, Ngarava [12] noted that marital status is pivotal in determining food security, and it was reported that married couples had a high chance of being food secure. As emphasized by the author, this situation was perhaps due to access to Covid-19 social relief grant by married individuals who were unemployed, compared to single individuals who may have been in employment.

Given the population dynamics, most respondents were Black/African (99%), colored, Asian/Indian, and white, accounting for 1% (Figure 5). Most of the respondents were Black/African because this study focused only on the rural populations of South Africa and that is where most black people live. Moreover, South Africa has a high inequality gap; hence, the whites' population resides mostly in the urban areas, because they can afford the luxury of living in the urban areas. In particular, race is a contributory factor to the inequality gap in South Africa, with Black/African populations being easily vulnerable to any shocks and unpleasant events [21].

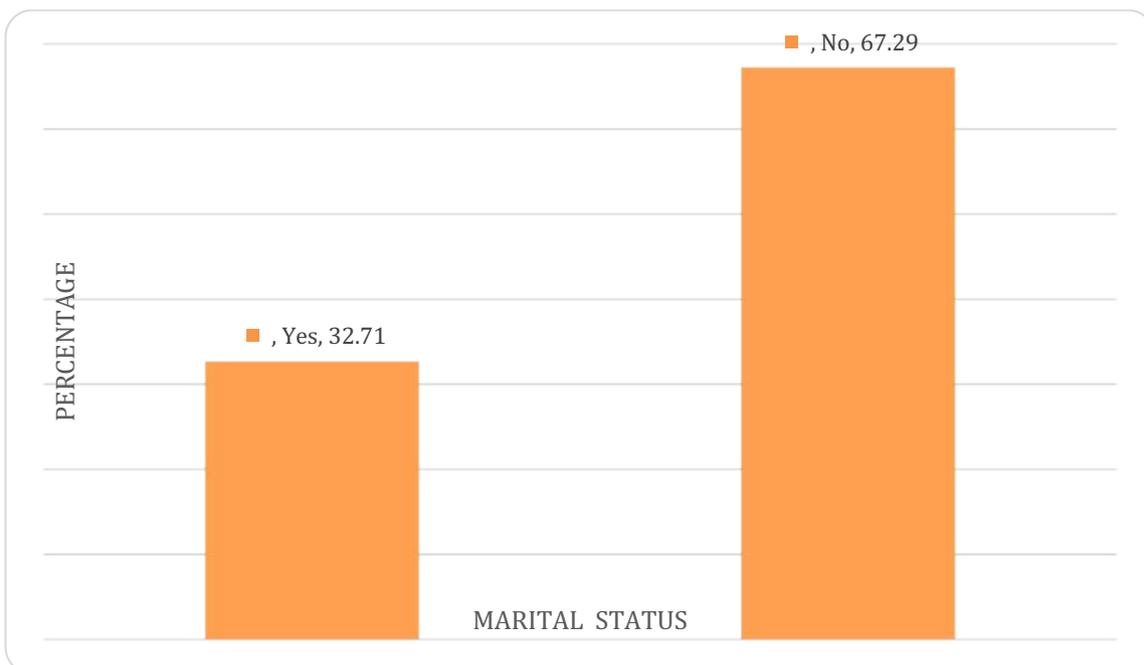


Figure 3: Marital status of respondents

Source: Data analysis, 2021

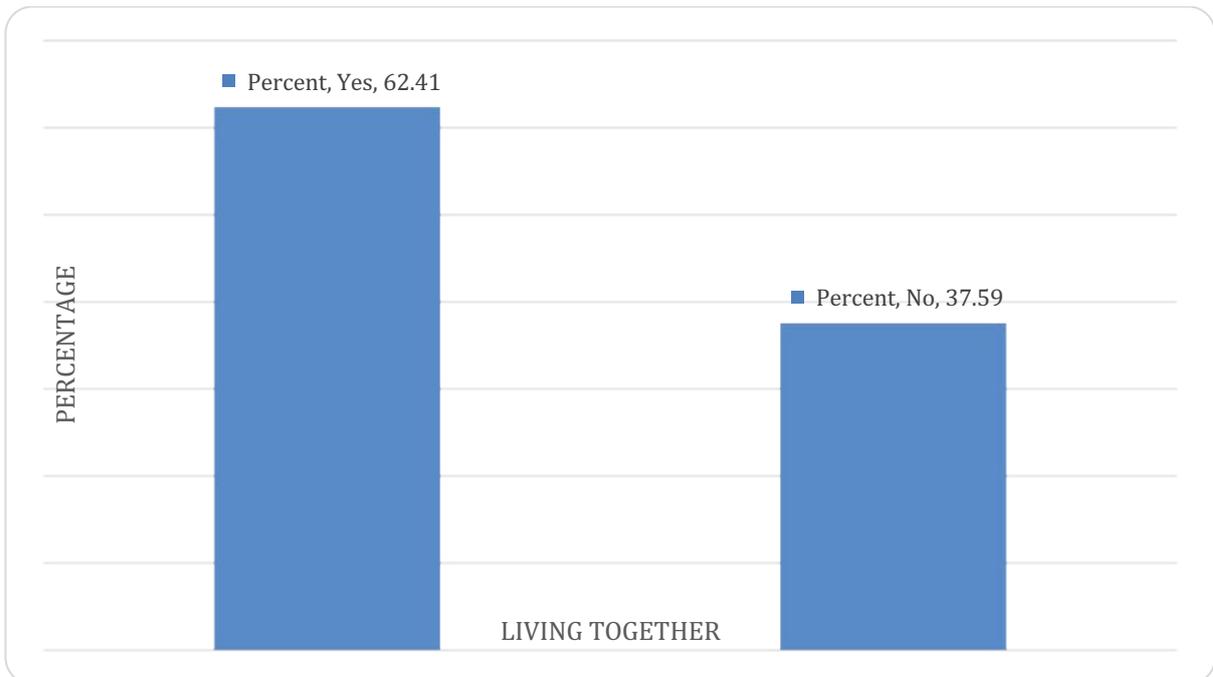


Figure 4: Married people staying with their partners

Source: Data analysis, 2021

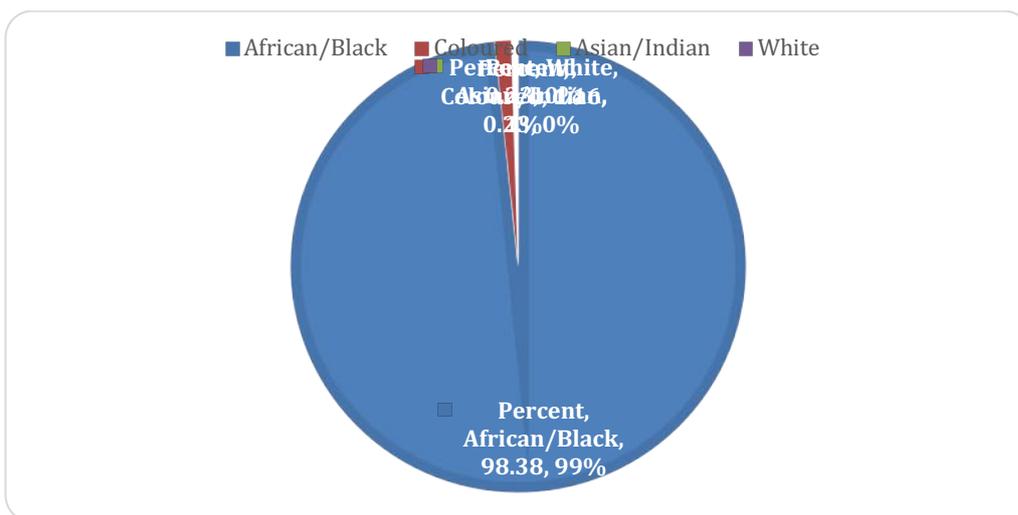


Figure 5: Population group of the respondents

Source: Data analysis, 2021

In terms of type of dwelling, the result shown in Figure 6 indicates that most (74.01%) of the sampled respondents resided in flats, followed by those residing in a traditional/mud hut, shack, and others, all accounting for 19.26%, 5.34% and 1.39%, respectively. A plausible reason for this could be as a result of the South African government effort to build what is termed “Reconstruction and

Development Programme (RDP) houses for rural people who earn less than R3500.

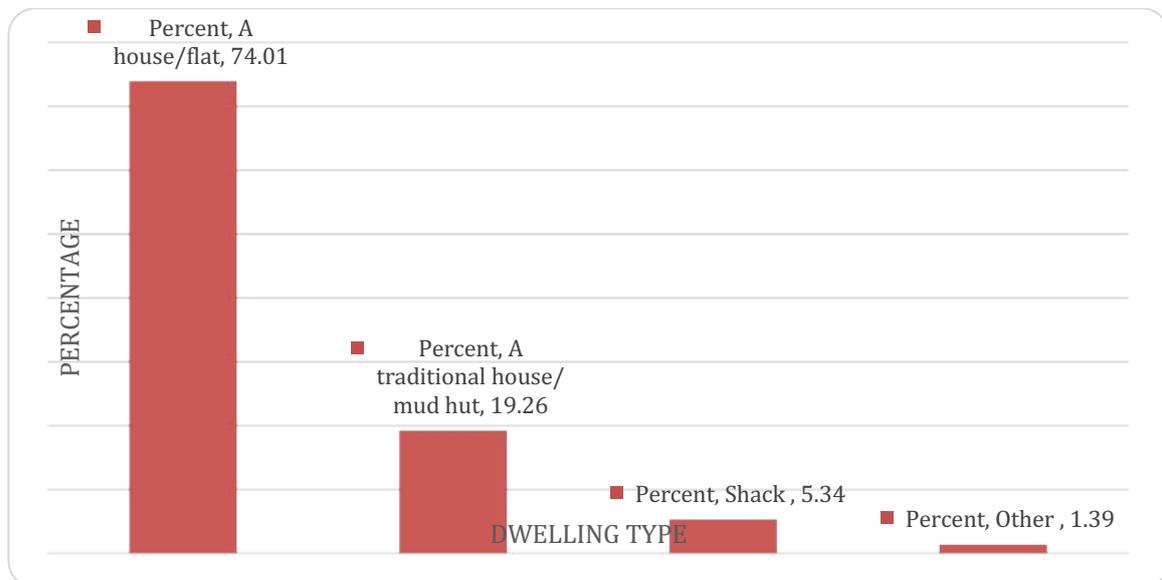


Figure 6: Dwelling type of the respondents

Source: Data analysis, 2021

Given the results indicated in Table 3 which show the educational attainment of the respondents, about 88.6% of the respondents attained a secondary level of education, followed by 8.8% who had a primary level of education. More so, 1.62% had no formal education, 0.69% had national vocational certificate and 0.23% had level 3 educational attainment. The implication of the finding is that most of the respondents who had high school qualification did not proceed to obtain higher education. Perhaps, many rural parents cannot afford the perceived financial obligations attached to university education for their children. Also, the prevalent high inequalities in South African society may have caused this observation. In support of this, De-Clercq [22] noted that people from the 'disadvantaged' rural communities in South Africa lack access to tertiary education due to financial constraints. Suffice it to say that, the rural Black South African population has low education attainment due to financial issues, and other inequality indicators [23].

The employment status and the main form of work of rural households in South Africa

Table 4 shows that most (78.42%) of the respondents were unemployed during the pandemic, while only 20.65% indicated active employment. Meanwhile, only 0.93% reported that they had retired. Similarly, from Figure 7, 12.8% of the respondents held regular jobs, while 43.29%, 35.37%, 4.3% and 1.22% had casual work, were self-employed, ran a business, and refused to answer, respectively. Findings from

a previous study indicate that health challenges caused restrictions, spiking job losses, which by extension had a debilitating effect on food production and distribution [7]. As of the second quarter of 2022, the unemployment rate in South Africa was around 33.9% [20]. Furthermore, acute food insecurity was also reported around this period among most families that rely on non-farm businesses and those with low-income families [12].

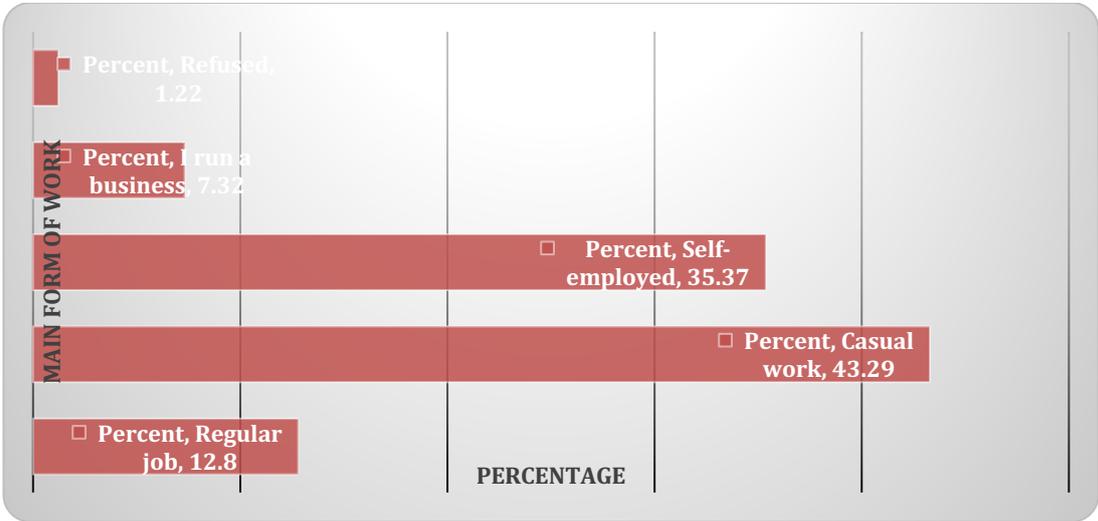


Figure 7: The main form of work for the respondents

Source: Data analysis, 2021

The primary source of income of the rural households

Figure 8 indicates that the primary source of respondents' income was government grants (58.61%), followed by employment (22.97%). Just about one-fifth of the respondents were actively employed. This directly impacted on their food security. Baldwin-Ragaven [24] also highlighted increased dependency on formal and informal grants by most families in South Africa, compared to active engagements in paid employment.

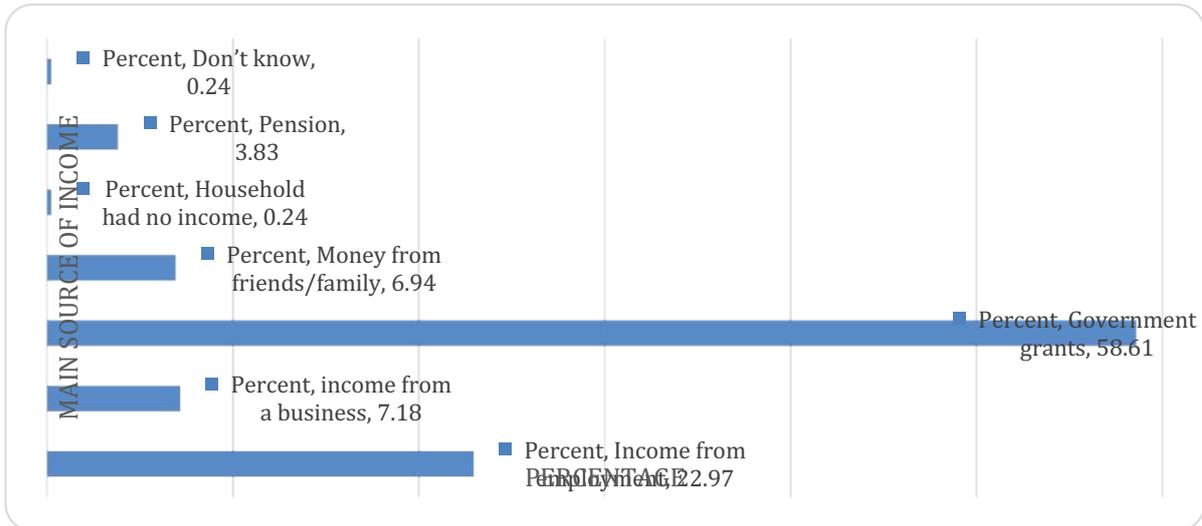


Figure 8: The primary source of income of the respondents

Source: Data analysis, 2021

Changes in rural household income in South Africa

Figure 9 shows that most (67.94%) of the respondents reported that their income remained unchanged, 17.1% reported a decrease, 9.33% indicated an increase, while 5.02% were indifferent as to whether there is a change (either increase or decrease) in their income flow. This observation could be attributed to the fact that the respondents were recipients of the R350 Covid-19 social relief of distress grant.

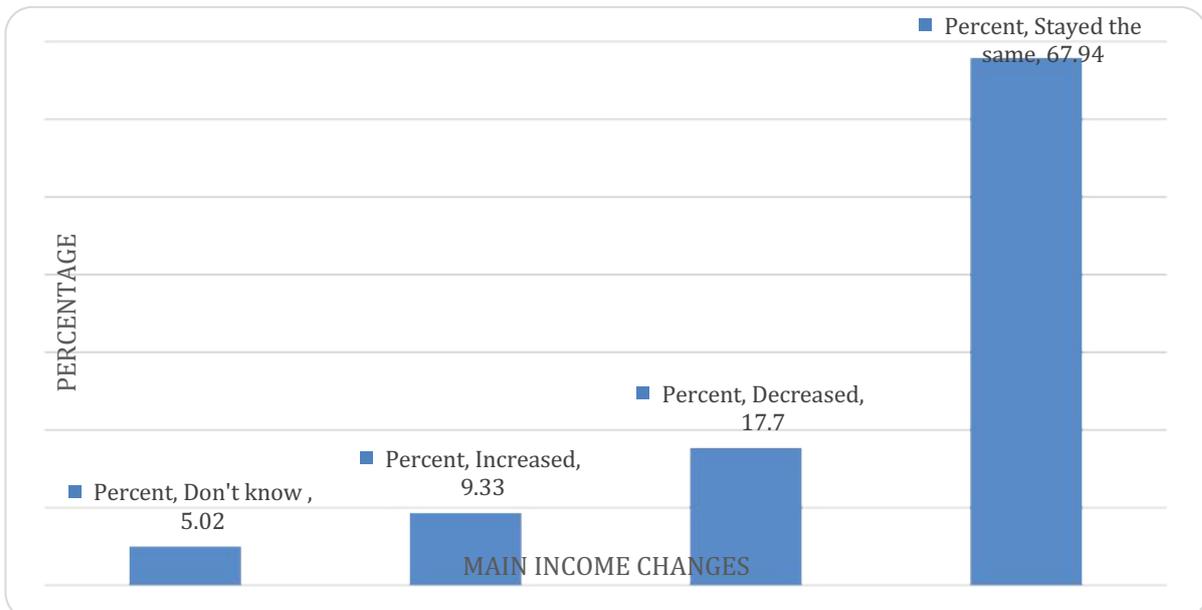


Figure 9: Changes in the income of the respondents

Source: Data analysis, 2021

Food security status of rural households in South Africa

The results in Table 5 reveal that most (71.69%) of the respondents were food secure, while only 23.67% were food insecure. This is in agreement with Ngarava [12] who also noted that R350 relief grants enhanced food security status in South Africa.

Food security status differentiated by gender

The results shown in Table 6 reveal vast differences in food security status across the gender line. About 13.9% of the male-headed households were food insecure compared to 9.7% of the female-headed households. Also, 45.7% of the male-headed households were food secure compared to 25.99% of the female counterparts. These findings are in line with van der Berg *et al.* [11] who stated that women-headed households were more vulnerable to food insecurity. In South Africa, there is high inequality in the labor markets. As reiterated by van der Berg *et al.* [11], male individuals earn more than their female counterparts, while in some scenarios, females end up being full-time housewives, which may likely impact negatively on their independence, and economic ability to afford whatever they need without the support of their husbands.

Determinants of rural households' food security status

The multinomial logistic regression model was used to investigate the factors influencing food security among rural households in South Africa. The study estimated three food security categories, which are: food insecure, moderately food secure, and food secure, coded 0, 1 and 2, respectively. It is important to stress that the food insecure category represents the base category in the estimation, and the estimates presented emanated from the Relative Risk Ratios (RRR). In this case, the RRR is depicting the risk of falling into the reference group in relation to the comparison group, as a result of a change in the explanatory variable in question.

Furthermore, an $RRR > 1$ indicates that the risk of the outcome of falling in the comparison group relative to the risk of the outcome falling in the reference group increases as the explanatory variable increases by a unit size [25]. However, an $RRR < 1$ indicates that the risk of the outcome of falling in the comparison group relative to the risk of falling in the reference group decreases as the variable increases by a unit size [25].

Given the findings in Table 7, access to formal education, employment status, type of dwelling, and household size were statistically significant variables influencing rural households' food security status. Therefore, further explanations will be focused on these significant influencing variables.

With respect to formal educational status, and comparing the chances of a rural household being moderately food secure or food insecure, formal education has a direct and significant ($p < 0.1$) effect on households' food security status, suggesting that the relative risk of falling in the moderate food secure category for households with formal education compared to those without formal education will increase by a factor of 3.444, all things being equal. This is expected because educated individuals have high chances securing lucrative jobs, and earning a decent income, thereby reducing the chances of being food insecure. The result agrees with Mbukwa [26] who reported that households become more food secure as the level of education increases. In addition, Ghanbari-Movahed *et al.* [27] also noted that education impacts on food security in rural regions by providing access to information on healthy eating during the Covid-19 pandemic. In fact, educated individuals are more likely to understand the need for a healthy diet, to increase their immunity against any diseases [27].

In terms of employment status, the result indicated a direct and significant ($p < 0.05$) effect on food security status of households. This suggests that at 95% confidence interval, the relative risk of falling in the food secure category for employed households compared to those who were not employed will increase by a factor of 2.456, *ceteris paribus*. Apparently, working individuals tend to have a more steady flow of income, compared to unemployed individuals. The result agrees with Ghanbari Movahed *et al.* [27] as well as Dunga and Dunga [28] who also noted in their respective studies that unemployed people tend to be food insecure compared to employed ones. On the other hand, this result disagrees with Santos *et al.* [29] who in their study reported no association between employment status, and being food insecure.

The results also indicated a direct and significant relationship between type of dwelling, and food security status. In particular, households living in flats have a relative risk of 8.176 (at 90% confidence interval) of falling into the moderately food secure, and a relative risk of households falling into the food secure group of 2.205 (at 99% confidence interval) and are both statistically significant at $p < 0.1$ and $p < 0.01$, respectively. Consistent with what Ngarava [12] reported in his study, any household staying in a flat is assumed to be relatively comfortable, and are more likely to be food secure.

Furthermore, household size was found to have a direct and significant relationship with households' food security status, given an RRR of 0.486. The implication of this result is that the relative risk of falling into moderately food secure continuum by households with large number of members, compared to the households with

small number of members is 0.486, while the relative risk of falling into food secure group by households with a large number of members, compared to the households with small members, is 139, and are both statistically significant at $p < 0.01$. This finding is in line with Dunga and Dunga [28] and Sekhampu [30] who also in their separate studies reported similar findings.

On another ground, this finding is mixed because households' members can indeed be a source of family labour. However, having such large numbers of members within the household can also be counter-productive in the event where households do not generate sufficient income to cater for all the family members; hence, may end up being vulnerable to food insecurity situations.

Post-hoc estimation

The study tested the model with goodness of fit test and given the fit-test statistics (LR-test), one can assert that the model containing the complete set of predictors represents a significant improvement in the fit, relative to a null model ($LR-\chi^2(14) = 67.69, p < 0.01$). One can further infer that at least one population slope is non-zero. In terms of the McFadden's Pseudo R^2 , one can assert that the whole model containing the predictors represents a 14.45% improvement in fit, relative to the null model since the food insecure group or category represents the baseline category. Since the *post-hoc* estimation has affirmed the reliability of the fitted model explaining the food security status of the respondents, coupled with the fact that approximately 72% of the Covid-19 social relief grant recipients were food secure, as earlier shown, it can be inferred that Covid-19 social relief grant improved the food security status of the grant's recipients.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

The objective of this study was to investigate the determinants of food security status among rural households in South Africa, given the aftermath of the health pandemic. This research utilized the wave 5 dataset from NIDS-CRAM. The study found that most of the sampled respondents were females, Black/African, and most resided in flat apartments or dwellings. Also, the respondents did not have tertiary education, especially at the University level, while they also relied on government grants, and most of them were also found to be self-employed. Moreover, the study found that a significant proportion of the households were food secure. Further, the study also indicated that formal education, employment status, dwelling type, and household size are important significant factors driving the rural households' food security status. Therefore, the study recommended policy driven actions on these important variables, and intensified action in the area of grants allocation to the resource poor, and vulnerable rural households. Importantly,



future research is needed to investigate the effect of the Covid-19 grant on food security status across different provinces, and between urban and rural areas.



Table 1: Description of variables

Variables	Variable type	Measurement	Expected sign
Dependent variables			Categories
j_0	Food insecure	0	N/A
j_1	Moderately food insecure	1	N/A
j_2	Food secure	2	N/A
Explanatory variables			
Age	Continuous	Head of household age	+/-
Gender	Binary	1 if male, 0 if female	-
Household size	Continuous	Total number of people in the household	-
Household income	Continuous	Total income received (Rand)	+
Household dwelling type	Binary	1 if flat/house, 0 if otherwise	+
Employment status	Binary	1 if employed, 0 if otherwise	+
Formal education	Binary	1 if educated, 0 if otherwise	+

Note: N/A - Not applicable

Table 2: Distribution of the respondents by the level of education

Level of education	Frequency	Percent
Primary level	38	8.8
Secondary	382	88.6
National vocational certificate	3	0.69
Abet level 3	1	0.23
No schooling	7	1.62
Total	431	100

Source: Data analysis, 2021

Table 3: The employment status of the respondents

Employment Status	Frequency	Percentage
Active	89	20.65
None	338	78.42
Retired	4	0.93
Total	431	100

Source: Data analysis, 2021

Table 4: Food security status of the respondents

Food security status	Frequency	Percentage
Food insecure	102	23.67
Moderate food secure	20	4.64
Food secure	309	71.69
Total	431	100

Source: Data analysis, 2021

Table 5: Food security status by gender

Food security status	Male	Female	Total
Food insecure	13.9%	9.7%	23.6%
Moderate food secure	3.24%	1.39%	4.63%
Food secure	45.7%	25.99%	71.69%
Total	62.84%	37.08%	100%

Source: Data analysis, 2021

Table 6: Determinants of food security: MNL Model Estimates

Variable	Moderately food secure		Food secure	
	RRR	P > z > z	RRR	P > z > z
Age	0.561	0.251	0.816	0.201
Household head	0.585	0.454	0.766	0.408
Marital status	0.333	0.225	0.794	0.474
Formal education	3.444	0.071*	0.672	0.240
Employment status	0.544	0.613	2.456	0.027**
Dwelling type	8.176	0.062*	2.205	0.006***
Household size	0.486	0.001***	1.139	0.006***
Constant	1.207	0.898	1.367	0.532

Source: Data analysis, 2021

Note: *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$ significance level

Table 7: Goodness of fit test

Number of observations	340
Likelihood ratio $\chi^2(14)$	67.69
Prob > χ^2	0.0000
Pseudo R^2	0.1445
Log-likelihood	-200 3505

Source: Data analysis, 2021

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