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Abiodun Olusola Omotayo
North West University, South Africa

and

Adebayo Isaiah Ogunniyi
University of Ibadan, Nigeria

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List of abbreviations and acronyms

CSG	Child Support Grant
COVID-19	Corona Virus Disease 2019
DiD	Difference-in-Differences
FAO	Food and Agricultural Organization of the United Nations
FE	Fixed Effects
FGT	Foster-Greer-Thorbecke
IFAD	International Fund for Agricultural Development
ILO	International Labour Organization
MPCTHI	Mean Per Capita Total Household Income
NIDS	National Income Dynamics Study
NIDS-CRAM	NIDS-Coronavirus Rapid Mobile Survey
NSFAS	National Student Financial Aid Scheme
OAP	Old Age Pension Grant
PCHI	Per Capita Household Income
SAH	Self Assessment Health
SASSG	South Africa Social Security Grant
SDGs	Sustainable Development Goals
WHO	World Health Organization
ZAR	South Africa Rand

Abstract

The COVID-19 pandemic resulted in significant income loss for many people, and deepened poverty for individuals and vulnerable populations who were adversely affected through job losses. In South Africa, income loss made it harder to acquire health care and a healthy food, which had a negative impact on health outcomes. This study hypothesized that the COVID-19 shocks disproportionately affects the poor's health, hence the need to know the impact of social protection programmes and interventions through the South Africa Social Security Grant (SASSG). Herewith, we employed the nationally represented, robust and reliable National Income Dynamics Study (NIDS) data set which was conducted in 2017 (pre-COVID-19), with the 1st wave of the NIDS-Coronavirus Rapid Mobile Survey (NIDS-CRAM) conducted in 2021 (during COVID-19). The household's per capita total income was used to generate poverty lines, while concentration curves and indices were employed to explain the income-health inequalities. The Difference-in-Difference with fixed effects model was used to estimate the impact of SASSG on the COVID-19 poverty stressors and self-reported health status. Given the significance and magnitude of institutional variables in determining the socioeconomic inequalities in poor health, addressing hunger, income inequality, and unemployment slightly helped to mitigate income-health inequalities during the COVID-19 shocks. We found that the social protection intervention in South Africa (SASSG) cushioned the impact of the COVID-19 pandemic in the context of poverty stressors and self-reported health status. Therefore, we advocate for programmes in South Africa that focus on reducing poverty and health disparities connected to income, as well as more proactive social protection programmes.
Key words: COVID-19 shocks; Health capital; Income inequality; Redistribution relationships; Social security grant; South Africa.

1. Introduction

The COVID-19 pandemic has significantly affected the lives of people around the globe, having delivered an enormous shock to the global economy, triggering the deepest recession in eight decades, almost three times as deep as that of 2009 (Krstic et al., 2020; Aktar et al., 2021; Dieppe, 2021; Ozili 2021). There is still a lot of uncertainty about how the situation will develop in the upcoming years despite countries rushing to implement steps to address the crisis (Dutta & Fischer, 2021). Widespread social and economic disruptions had a significant influence on human wellbeing coupled with the pandemic's direct consequences on health and death (Ortiz-Juarez et al., 2020; Sumner et al., 2020; Van Bavel et al., 2020; Workie et al., 2020). Although, the international policy solutions received a huge public attention while the national and local institutions need to intentionally carry out these initiatives in the coming years for a prompt economic recovery (Peña et al., 2020).

Similar to the COVID-19 incidence in the western counterparts, the COVID-19 pandemic had a huge impact on South Africa, which led to the implementation of strict lockdowns (Van Bavel et al., 2020). Following the declaration of a State of National Disaster on 15 March 2020, the nation entered a complete state of lockdown on 26 March 2020, with only necessary travel and services permitted (Orrù, 2020; Sumner et al., 2020). Resultantly, there was a noticeable reduction in economic activity during South Africa's coronavirus pandemic years, which has had an impact on the workforce and household livelihood outcomes. According to the 2021 Statistics South Africa (Stats SA) survey, the COVID-19 pandemic had a drastic impact on income in at least two ways: income generation completely ceased and income decreased (Posel et al., 2021), with three millions people losing their jobs and 25% of the surveyed participants reporting a reduction in income during restriction in economic activities (Visagie et al., 2021). Hence, the poor and vulnerable were the more negatively impacted categories of people in the nation.

Given the existing deep socioeconomic inequalities in South Africa, it is highly probable that the poverty and income-related health inequalities outcomes of the poor were more worsened relative to the rich during the crisis (Das, 2021). Establishing the influence of social protection programmes in the reduction of the economic and health crisis in South Africa is crucial because the pandemic's uneven effects are not exclusive to South Africa or COVID-19. Therefore, it may be assumed that people who were already vulnerable—such as those who lost their jobs and in precarious work—live in subpar neighbourhoods and homes, and are generally poor. Hence are more likely to bear the brunt of the epidemic more than those who were relatively rich. However, this is not unexpected considering the fact that the pandemic has impacted numerous communities through forced confinement due to lockdowns and disengagement from the labour market (Nwosu & Oyenubi 2021).

Meanwhile, studies (Abdoul-Azize & El Gamil, 2021; Banks et al., 2021; Busso et al., 2021; Mendez-Lopez et al., 2022) underlined that an effective social protection intervention in response to COVID-19 shocks is crucial to mitigating the detrimental impacts of the pandemic on lives and livelihoods of the people. Specifically, studies on sustaining livelihoods (Bambra et al., 2020; Blundell et al., 2020; Nwosu & Oyenubi, 2021) call for the introduction of social protection interventions to safeguard incomes and prevent the use of bad coping mechanisms that can worsen poverty and income-related health disparities. To examine the effects of participation in the South Africa Social Security Grant (SASSG) on poverty status and income-health inequality, the study herewith employed the Difference-in-Difference with Fixed Effects model on two panel data sets: the NIDS-2017 and the NIDS-CRAM-2021.

The utilized data set is nationally representative, with the goal of informing policy through quick, trustworthy research on South Africa's economy in the context of the COVID-19 shock. Additionally, this study ascertained the income-related health inequality associated with the COVID-19 pandemic. The study compared the poverty status and income-related health inequality as well as self-reported health status[1] before and during the pandemic using panel data that links individuals over the two periods, as well as the effect of the social protection programmes in the reduction of the effects of COVID-19. Regarding the health outcomes, estimation was based on descriptive and was done at a social level[2] while the self-reported health status estimation was beyond descriptive and was done at individual level.[3] Therefore, we hypothesized that the poor were disproportionately more likely to report having poor health than other groups, and that the degree of disparity increased throughout the COVID-19 era compared to the pre-COVID era. Therefore, the impact of the social protection programmes on poverty during the pre- and COVID-19 eras was analysed to provide recommendations to mitigate the effects and reduce poverty in South Africa.

1 Self-reported health status refers to an individual's assessment or perception of their own health. It is typically measured through surveys or questionnaires that ask individuals to rate their health on a scale, such as excellent, good, fair, or poor.

2 We computed the concentration index for before and after COVID-19, and plotted their associated Lorenz curves.

3 We estimated the impact of SASSG on one's chance of falling into (self-reported) poor health using the DiD identification strategy with the FE approach and the logistic regression procedure.

2. Literature review

There is emerging evidence that the adverse effects of the COVID-19 measures permeates the economic, welfare, and human capital development on various levels, such as economic activity disruptions and loss of sales, loss of employment or a decrease in income, and the reduced availability for work due to the need to care for children (when schools were closed) and sick household members (Ajibo, 2020; Andam et al., 2020; Bartik et al., 2020; Fagbemi, 2021; Morgan & Trinh, 2021; Ogisi & Begho, 2021). The International Labour Organization (ILO), the Food and Agricultural Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), and the World Health Organization (WHO) issued a joint statement that highlighted the massive loss of livelihoods as businesses experience existential crises and the significant percentage of the global workforce that lost their jobs and means of livelihood as a result of the COVID-19 pandemic, with the informal sector being more at risk as they have little to no access to formal employment (Alhashimi et al., 2021; Micinski, 2021).

South Africa accounts for almost half of all reported coronavirus infections on the African continent, which was due to the fact that the country has a much higher testing capacity than most nations in the region (Schwettmann, 2020). Studies also reported that the actual number of coronavirus infections on the African continent could be significantly higher than the reported cases due to lack of adequate record and health facilities (Rutayisire et al., 2020). However, with the rising poverty and setbacks on development outcomes, such as welfare and access to health services, the pandemic is a threat to the gains on human capital (Akseer et al., 2020; Corral & Gatti, 2020; Heidkamp et al., 2021). The rise in mortality rates associated with the pandemic has translated into the loss of primary care givers, which has made households more susceptible to the threats of poverty, malnutrition, poor health, depression, violence, and child marriage (Okoi & Bwawa, 2020; Hillis et al., 2021).

Currently, there is a slow but increasing body of scientific studies on the effect of COVID-19 on household's economy as well as its adverse effects on human capital investments in South Africa. In assessing access to health care, studies such as Lal et al. (2020), Okoi and Bwawa (2020), Propper et al. (2020), Mishra et al. (2021), and Nwosu and Oyenubi (2021) noted that poor health status and existing health inequalities have been further aggravated by the pandemic. The decline in income levels and increasing poverty among households has increased the financial barrier for health, resulting in both unmet needs and financial hardship for people using both private and public sector health services (WHO, 2019). In South Africa, reduced probability of health care facilities stems from the already strained public health systems, as the health sector remain underfunded (Lal et al., 2021), while the number of in-patients remained high due to the pandemic (WHO, 2019; Cai & Choi, 2020; Tsalis et al., 2020). This reduction, therefore, threatened to reverse the progress made in South Africa and around the world toward improving health outcomes, due to the visible disruptions from the pandemics (Amimo et al., 2021; Graetz et al., 2021). At the height of the various waves, people were prevented from accessing health services for chronic conditions, and perhaps the poor were greater disadvantaged compared to the rich.

Low income households in South Africa were quickly faced with a decision between trying to earn money to avoid shortage and accepting the possibility of contracting the infection, in spite of the official lockdowns, because food insecure households receive no or very little social protection support (Arndt et al., 2020). The pandemic remarkably swift and severe shocks from the perspectives of public health, income distribution, and food security highlight the importance of having transfer policies in place that supports the vulnerable households (Arndt et al., 2020). In order to understand the extent of income- health inequality as well as the effects of the social protection programmes in reducing the effect of job loss and poverty in South Africa, this article fills the current research gaps on the COVID-19 impacts on poverty and income. Due in part to the COVID-19 induced shocks over the past years, South Africa's current performance falls short of meeting its Sustainable Development Goals (SDGs) targets. The report presents recommendations for social protection programmes to help the poor in South Africa who are struggling with poverty and economic inequality.

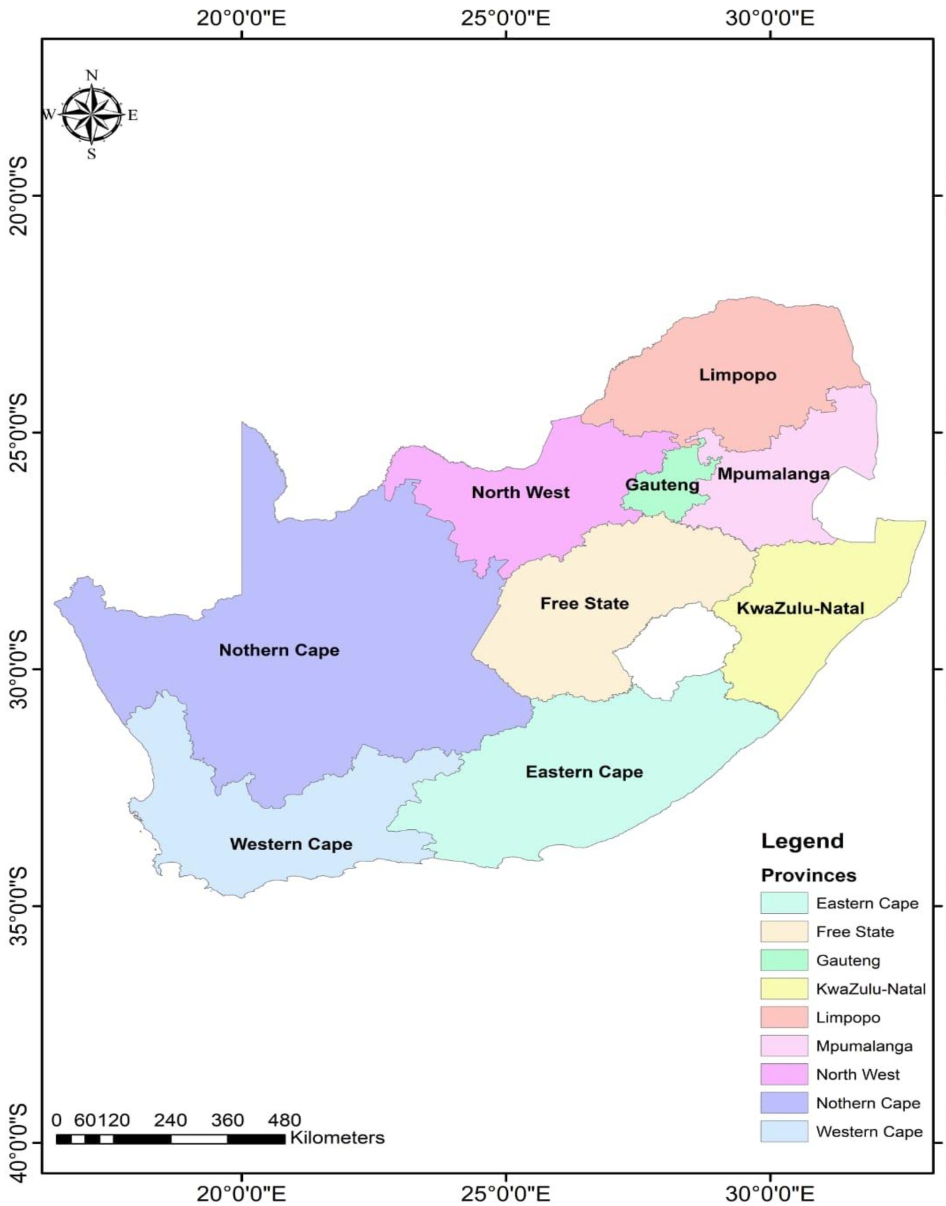
3. Research methodology

Study area

A country in sub-Saharan Africa, South Africa is predicted to have a population of over 60 million people and a land area of 1,220,813 square kilometres (Omotayo et al., 2020; Omotayo et al., 2021). Its nine provinces (Figure 1), each of which is endowed with a unique set of natural resources, determine the main occupation and population distribution of the country. According to Pradervand and Van der Elst (2008) it is bordered to the south by a coastline that stretches 2,798 kilometres (1,739 miles) along the South Atlantic and Indian Oceans, to the north by the neighbouring nations of Namibia, Botswana, and Zimbabwe, and to the east and northeast by Mozambique and Eswatini. In South Africa, the life expectancy in 2009 was 71 years for the white and 48 years for the black counterparts, according to the South African Institute of Race Relations (Zuma & Ramaphosa, 2014).

Evidently, approximately 9% of South Africa's GDP is spent on health care services, one of the countries with the highest COVID-19 infection rates worldwide. South Africa was adversely impacted by the COVID-19 to such an extent that the gains made by the country in the 26 years since the start of its democracy were reversed by the virus. Additionally, it occurred at a time when its economy was facing significant difficulties due to sluggish development and insufficient income redistribution, making the country a major unequal country globally (Cooper et al., 2021). Furthermore, South Africa's poverty and inequality are projected to get worse due to the COVID-19 outbreak and its ripple effects (Mbunge, 2020). Regrettably, South Africa's COVID-19 context thus exhibits both poverty and income-related health inequities, necessitating sustainable policy that addresses both for prompt economic recovery.

Figure 1: South Africa's geography that shows the country's nine provinces



Data description and statistics

The most recent wave of the South Africa NIDS panel (wave 5, 2017)[4] and the NIDS-CRAM (2021) were both used in this study. The wave 5 adult sample of NIDS, NIDS-

4 Owing to a sample top-up done in wave 5 of NIDS due to non-random attrition (resulting in a top-up of the white, Indian, and high-income population), and that NIDS-CRAM was based on the NIDS wave 5 sample, a suitable comparison would be between NIDS wave 5 (not earlier waves of NIDS) and NIDS-CRAM data sets.

CRAM, is a nationally representative survey that targeted over 17,000 adults (with roughly 7,000 successful interviews done). It is a high frequency data set that was gathered monthly between May and October 2020 through a series of panel phone polls. The polls gathered information on demographics, grant receipts, migration, employment, hunger, and COVID-19 risk perceptions and behaviour. The NIDS-CRAM panel study had five waves, totalling 8,051 observations, and tracked the same subjects throughout three waves in 2020 (waves 1–3) and two waves in 2021 (waves 4 and 5). The study, though, was limited to people with non-missing data for the variables included in the analysis, in order to improve comparability between the data sets (Table 1). An estimation sample of 4,056 observations was produced as a consequence. The sample strategy included two stages of stratified cluster sampling.

The results show that the average income of the surveyed households had a sharp drop from 4145.63 ZAR to 2344.34 ZAR, with more households accessing social security grants (Table 1). This shows that the inequality regarding health increased between the pre- and COVID-19 eras, indicating that the pandemic might have increased health related cost. The result indicates that 69.49% of households had access to social protection grants during the pandemic compared to the 34.89% pre-COVID-19. This suggests that there were interventions by the Government of South Africa to reduce the impact of shocks induced by COVID-19. The poor health status, based on self-reported health status, increased from approximately 9% pre-COVID-19 to 27.8% during the pandemic. Similarly, the results regarding the experience of hunger shows that both households (8.89% versus 19.07%) and children (less than 18 years) experienced more hunger during the pandemic than the pre-pandemic. The results suggest that the COVID-19 pandemic may have affected the households' livelihood outcomes, especially health, food security, and income. Different poverty line that was computed for the two survey rounds was developed using the Foster-Greer-Thorbecke (FGT) approach. The study further calculated a relative poverty line, defined as two-thirds of the mean per capita total household income (MPCTHI).

This study acknowledges the inadequacy of the use of the income in place of expenditure. However, the study is constrained due to the unavailability of the expenditure in the data set. Our assumption is that outcomes of this study will not be affected by this identified shortcoming as many previous studies have validated the use of the same approach. The mean of the per capita total household income of the respondents was estimated at 4,145.63 ZAR (see Table 1), while the two-thirds MPCTHI was estimated to be 2,345.55 ZAR in pre-COVID-19 era. Similarly, in the pandemic period, the MPCTHI was estimated at 2,344.34 ZAR, while the two-thirds MPCTHI was 1,447.69 ZAR. As indicated in Table A4, therefore, any household that had MPCTHI below or equal to 2,345.55 ZAR or 1,447.69 ZAR was considered to be poor in the pre- and COVID-19 period, respectively, while a household with MPCTHI above these amounts is considered non-poor during these periods.

Table 1: Summary statistics of variables

Variables	Pre-COVID-19	During COVID-19
Interest variables		
Average income (South Africa rands)	4,145.63	2,344.34
Access to Social Security Grant (%)	34.89	69.49
Concentration index	0.23	0.57
Poverty class		
Poverty headcount (α=0)	0.208	0.334
Poverty gap (α =1)	0.149	0.273
Poverty severity (α =2)	0.091	0.123
Poverty line (South African rands)	2,777.57 ZAR	1,570.70 ZAR
Self-reported health status		
Poor health [%]	9.04	27.45
Household experienced hunger	8.89	19.07
Children (under 18 years) experienced hunger	5.29	15.49
Selected control variables		
Age (in years)	41.89	44.90
Education (in years)	11.44	13.92
Household size	4.11	5.27
Employed and earning income (%)	43.89	29.89
Gender (male)	38.35	39.22
African/Black	86.49	82.49
Coloured	8.39	7.69
Asian/Indian	0.75	0.78
White	4.28	4.33
Sample size	2030	2026

Measurement of poverty

To profile the poverty status of the household, we adopted the income approach[5]. Our main indicator of poverty was the total household income, with the poverty line—the threshold below which a household could be considered poor—as our starting point. Due to the lack of a national poverty line and the fact that the absolute poverty threshold of US$1.25 per day does not apply to this type of study, we calculated a relative poverty threshold of two-thirds of the mean per capita total household income, following previous studies (Obisesan, 2013; Awotide et al., 2015). The literature uses a variety of poverty metrics, including those developed by Sen (1976), Foster et al. (1984), and Foster and Shorrocks (1988). Evidently, the FGT (1984), also known as the

5 Although in several developing country studies, consumption spending has been favoured to income as a measure of socioeconomic status, we were unable to utilize consumption expenditure in this study since it was not included in the NIDS-CRAM survey.

p-alpha (P_α) class of poverty measure, is the most widely used, as the α is subgroup decomposable and is a policy parameter that can be modified to roughly reflect the poverty “aversion”. Hence, this study used the standard FGT (1984) to generate the poverty profile and status of the households. FGT takes the form:

$$P_\alpha(y,z) = \frac{1}{N}\sum_{i=1}^{n}\left(\frac{Z-Y_i}{Z}\right)^\alpha \tag{1}$$

Where:
Z = the relative asset poverty line;
n= number of the household below the poverty line;
N = Total number of households in the sample;
Y_i = estimated per capita household income of the i^{th} household;

Z-Y_i = poverty gap of the i^{th} household;
$\frac{Z-Y_i}{Z}$ = poverty gap ratio;
α = poverty aversion parameter, with values: 0, 1, 2;
α = 0, gives the poverty headcount;
α =1, gives the poverty depth;
α =2, gives the poverty severity index.

Hence, a household that fell beneath the poverty line was given 1, indicating poor; while a household on and above the poverty line was assigned 0, indicating non-poor. We report in Table 1 the poverty headcount, gap, and severity indices which were computed using Equation 1[6]. Additionally, we measured poverty through the lens of whether or not any member of a household goes hungry due to food unavailability, and if any individual (<18 years) goes hungry due to unavailability of food.

Income-related health inequality measurement

The concentration curves, which show the cumulative proportion of the population that self-reported being in poor health against the cumulative population shares, ranked by household income per capita, were used in this study to capture income-related health inequality. The line of equality is shown as a 45-degree angle. If the concentration curve falls on this line, it implies that there is a proportional distribution of bad health across the income distribution. However, O'donnell et al. (2008) pointed out that the concentration curve would sit above (below) the 45-degree line

6 Additional poverty analysis is further explored in tables A2, A3, and A5 (in the appendix) for interested readers.

if poor health is more than proportionately concentrated on the poor (rich). While studies (Wagstaff et al., 1989; Kakwani et al., 1997) have argued that it cannot be used to quantify the magnitude of such income-related inequality, the concentration curve is important in depicting income-related inequality at each point in the income distribution for a health outcome of interest.

Furthermore, dominance cannot be determined where concentration curves intersect. Due to these factors, it is crucial to estimate the concentration index in order to measure the degree of income-related disparity in the target health outcome using a summary index. So, as a substitute for income as a factor in health, we estimate concentration indices. In order to quantify health inequality, household income per capita was utilized as a socioeconomic status indicator. Following is how the concentration index was calculated:

$$CI_s = \frac{2}{\theta_s} cov\,(S, r) \tag{2}$$

Where: CI_s refers to the concentration index of Self Assessment Health (SAH); θ_s to the mean of SAH, and r is the fractional rank of the individual/household in the income distribution. The concentration index is calculated as the product of the fractional rank of the individual in the income distribution and the fractional covariance of the health result, divided by the mean of the health outcome. For ratio-scale variables, the concentration index often falls between the [-1,+1] range. A negative (positive) index denotes a proportionate distribution of poor health across income classes, analogous to the concentration curve that coincides with the line of equality, while a zero concentration index denotes a pro-poor (pro-rich) distribution of poor health, analogous to the concentration curve lying above (below) the line of equality(O'donnell et al., 2008).

Empirical strategies

We analysed the historical evolutions of poverty and self-reported health status across SASSG[7] beneficiary and non-beneficiary households in order to evaluate the effects of SASSG involvement on both poverty and self-reported health status under COVID-19. The difference-in-difference specification we used was as follows:

$$Pov_{ht} = \theta_o Post_t + \theta_1 SASSG_h * Post_t + \theta_2 SASSG_h + (\epsilon_{ht} + \delta_h) \tag{3}$$

7 The main South Africa Social Security Grant (SASSG) considered are Child Support Grant (CSG), Old Age Pension Grant (OAP), Disability Grant, Foster Child Grant, Care Dependency Grant, R350 COVID-19 Social Relief of Distress, Grant in Aid, and NSFAS[National Student Financial Aid Scheme]

$$HIQ_{ht} = \theta_o Post_t + \theta_1 SASSG_h * Post_t + \theta_2 SASSG_h + (\epsilon_{ht} + \delta_h) \quad (4)$$

Where: Pov_{ht} (in Equation 3) and HIQ_{ht} (in Equation 4) stand for poverty and i self-reported health status for household h and round t, respectively. δ_h stands for household fixed-effects, which capture all time-invariant differences between SASSG beneficiaries and non-beneficiaries. $SASSG_h$ represents households' access to SASSG transfers. $Post_t$ is a dummy variable, assuming a value of 1 for the phone survey conducted during the COVID-19 pandemic (henceforth COVID-19 round) and 0 for the pre- COVID-19 round.

The parameter linked to this time dummy represents overall trends in poverty and income disparities across rounds, including those brought on by seasonality in our sample, adjustments to coping mechanisms, or other reasons unrelated to the COVID-19 epidemic. The time trend may also reflect potential variations in our important outcomes caused by variations in the kind of surveys conducted (phone or in-person). Such variations can be significant given that the data were gathered using the "usual" face-to-face survey during the pre-COVID-19 round and a phone survey during the COVID-19 round. These differences can be accurately captured by this time trend, particularly if they hold true for SASSG recipients and non-beneficiaries alike.

The key parameter of interest in Equation 3 and Equation 4 is θ_1. This indicator identifies potential variations between SASSG recipients and non-beneficiaries in the historical evolution of poverty and self-reported health status outcomes. The SASSG's protective effect against poverty and the decline in self-reported health status brought on by the COVID-19 pandemic can be inferred from this parameter in the absence of unobservable time-varying variables that have distinct effects on SASSG beneficiaries. This estimation technique assumes that the poverty and self-reported health status of SASSG and non-SASSG beneficiaries would have followed comparable trends in the absence of the pandemic. By applying the same specification with our pre-COVID-19 surveys (2017 National Income Dynamics Study), we were able to verify this assumption.

All of our specifications included a variable that assesses whether households were impacted by risks to business or income, and we adjusted for observable possible time-varying confounders like the locust invasion that afflicted some areas of the nation. We were able to test the robustness of our findings to potential time-varying unobserved factors by using alternate definitions of access to SASSG. We estimated both linear and nonlinear specifications because our outcome variables were measured as binary and integer values. More specifically, we calculated the fixed-effects logit regressions and the usual linear fixed-effects model.

The nonlinear techniques used a completely parametric approach to adjust for time-invariant differences across households, whereas the linear fixed-effects model retrieved time-invariant differences without making any functional form assumptions. As a result of the nonlinear models' discarding of observations with time-invariant dependent variables, the sample sizes used to calculate our results differed significantly. These variations demonstrate how resistant our conclusions are to certain parametric choices, model specifications, and assumptions. The effects of the epidemic and the part SASSG plays in reducing them are anticipated to differ depending on the socioeconomic makeup of the home. We performed our preferred specification in Equation 3 and Equation 4 for many variables of heterogeneity, including wealth quintiles and distance of location of residence, in order to uncover such potential differential impact of SASSG across diverse groups of families.

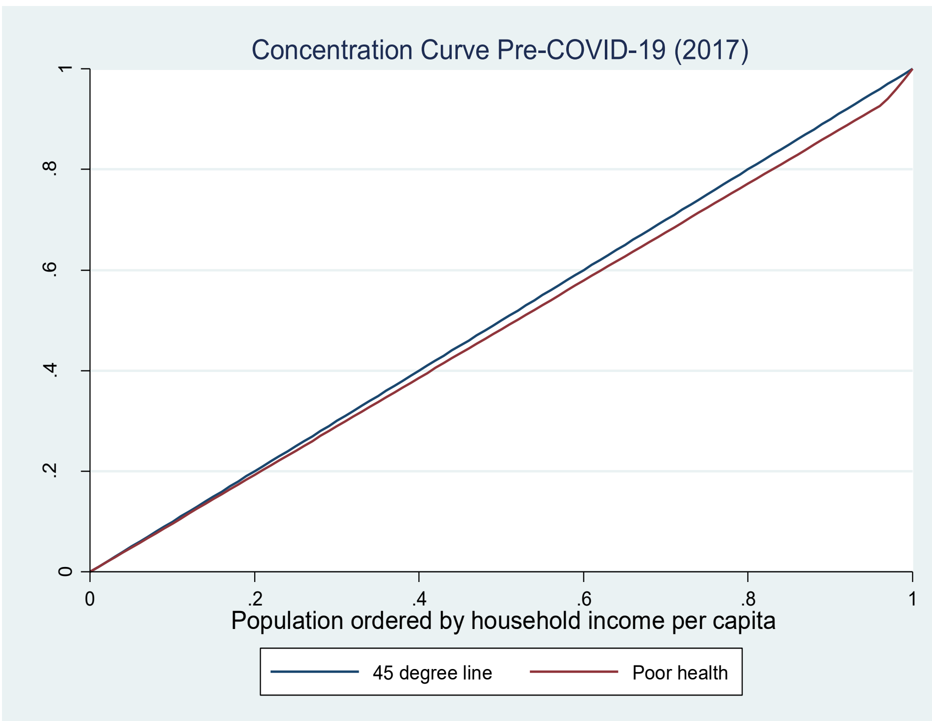
We attempted to understand factors influencing access to SASSG. Specifically, the study analysed the essential drivers of having access to SASSG. We hypothesized that, access to SASSG is a function of the household characteristics ($MHCi$) such as household size, age, and years of education; individual characteristics (MCi) location dummies (LDi) such as provinces and area of residence; indicator of wealth of the household (WDi), proxied with per capita household income; and μ is the error term. The equation representing the factor influencing access to SASSG is specified as follows:

$$\text{SASSG}_{it} = MHC_{it} + MC_{it} + LD_{it} + WD_{it} + \mu_{it} \quad (5)$$

4. Results and discussion

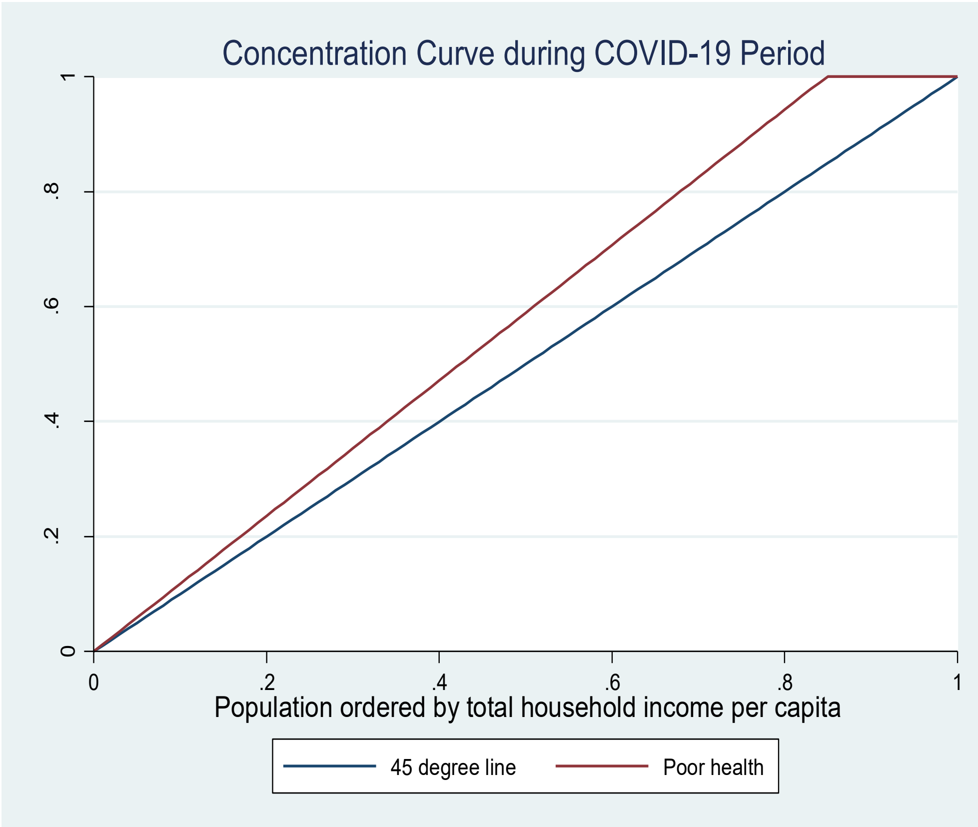
Figure 2 and Figure 3 present the pre and during COVID-19 concentration curves, respectively. As can be seen in Figure 2 and Figure 3, both curves were largely located close to the 45-degree line, indicating that income-related health inequalities[8] was more impacted on the poor. For the COVID-19 era, the curve is well above the line of equality. Since the COVID-19 era concentration index was generally above the equality line, the 2017 index curve was mostly synchronous with the line of equality for most parts of the poorest percentile; the result suggest that concentration index in the COVID-19 era would be more pro-poor than during the pre-COVID era. The result shows that health inequality in South Africa, not only more than doubled—moving from 0.23 to 0.57 (see Table 1)—after the pandemic, but also it went from below the perfect equality line (pro-poor) to above it (pro-rich).

Figure 2: Concentration curve pre-COVID-19 era (2017)



8 We further explore health status in tables A1, A2, and A6 (in the appendix).

Figure 3: Concentration curve during COVID-19 era (2020)



Difference-in-differences estimations of the impact of South Africa Social Security Grant (SASSG) on household poverty

The difference-in-difference estimates, comparing the temporal evolution of household poverty of SASSG beneficiaries and non-beneficiaries (Table 2) while controlling for time-invariant household characteristics, were reported, as well as the regression results in the main text and results of factors influencing household poverty (fixed-effects logit regression) presented in Table A1 (in the appendix). Table 2 reports the household poverty; we present in column 1 the result of the poverty dummy variable emerging from the FGT approach. In columns 2 and 3, also as a proxy of poverty, we used responses regarding the household member going hungry due to lack of food as well as for children, respectively. Two imperative conclusions emerged from these results of our estimation in Table 2. First, the proportion of poor households increased by 20.1 percentage points in the 2020 round compared to the 2017 period (column 1, row 2). In addition, the proportion of household member that goes hungry due to lack of food increased by 7.6 percentage points and specific to children went up by 29.8 percentage points (columns 2 & 3). Second, the inclusion of the SASSG significantly counterbalanced all of the adverse alteration induced by the COVID-19. Furthermore, the magnitude of the coefficient θ_1 was -0.163 in column 1 (row 3), indicating that benefitting from the SASSG significantly reduced the likelihood that the household was poor by 16.3 percentage points. Previous studies (Awan et al., 2022; Pouw & Bender, 2022; Ecker et al., 2023) have found that social protection access plays a protecting role on households by reducing poverty, especially in the context of shocks such as COVID-19 pandemic and when social protection interventions are effective in the targeting systems. On the other hand, adding coefficients θ_0 and θ_1 together shows that the likelihood of getting poor increased by 20.1 percentage points for non-SASSG households and by 3.8 (= 20.1 less 16.3) percentage points for SASSG households. However, the result in column 3 shows that the inclusion of SASSG reduced the likelihood of household member going hungry due to lack of food by -0.028. The result suggests that, in terms of magnitude, receiving the SASSG significantly reduces the likelihood of household member going hungry due to lack of food by 2.8 percentage points. Meanwhile, the results in column 4 indicate the likelihood of children going hungry due to lack of food reduces by 11.1 percentage points.

Table 2: Difference-in-differences estimations of the impact of South Africa Social Security Grant (SASSG) on household poverty

	Poverty (1/0)	Goes Hungry Due to Lack of Food	Children Go Hungry Due to Lack of Food
Post pandemic dummy, 2020 round	0.201***	0.076***	0.298***
	(0.023)	(0.003)	(0.004)
SASSG-Post	-0.163***	-0.028**	-0.111***
	0.007	0.011	0.020
Constant	0.100***	0.227***	0.149***
	0.023	0.041	0.013
Individual and households' characteristics	Yes	Yes	Yes
Provincial dummies	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes
Other control variables	Yes	Yes	Yes
R-squared	0.32	0.18	0.23
Number	4056	4056	4056

Notes: Estimations are based on South Africa NIDS 2017 and 2020 NIDS-CRAM household data. All estimations are adjusted by sampling weights to account for nonresponses in the phone survey. Values out of parentheses are associated with the coefficients described in Equation 1. Values in parentheses are standard errors.

Difference-in-differences estimations of the impact of South Africa Social Security Grant (SASSG) on self-reported health status

Table 3 shows the estimates comparing the temporal evolution of health status of the SASSG beneficiaries and non-beneficiaries while controlling for time-invariant household characteristics. Column 2 of Table 3 reports results of the self-reported health status of the respondents; we proxy health status by re-categorizing the self-assessment health status to poor and otherwise in which health status indicating *"poor"* and *"fair"* are both categorized to be poor and 0 otherwise. Similar to the findings in Table 2, two imperative conclusions emerged from our estimation (Table 3). First, the proportion of respondent with poor health status in the households went up by 26.7 percentage points in the year 2020 when compared to the previous period in the year 2017 (column 1, row 2). Second, inclusion in the SASSG significantly offsets the adverse effects induced by COVID-19. The magnitude of the coefficient θ_1 is -0.116 in column 1 (row 3), showing that benefitting from SASSG significantly declined the likelihood of having poor health by 11.6 percentage points. Moreover, adding coefficients θ_0 and θ_1 indicates that the likelihood of becoming poor increased by 26.7 percentage points for non-SASSG households and by 15.1 (= 26.7 less 11.6) percentage points for SASSG households. Overall, the findings shows that access to the South Africa Social Security Grant (SASSG) significantly reduce the likelihood of poor health status in South Africa.

Table 3: Difference-in-differences estimations of the impact of South Africa Social Security Grant (SASSG) on self-reported health status

	Poor Health
Post pandemic dummy, 2020 round	0.267***
	0.022
SASSG-Post	-0.116***
	(0.028)
Constant	0.223***
	0.007
Individual and Household characteristics	Yes
Provincial dummies	Yes
District fixed effects	Yes
Other control variables	Yes
R-squared	0.22
Number	4056

Notes: Estimations are based on South Africa NIDS 2017 and 2020 NIDS-CRAM household data. All estimations are adjusted by sampling weights to account for nonresponses in the phone survey. Values out of parentheses are associated with the coefficients described in Equation 2. Values in parentheses are standard errors.

5. Conclusion and policy implications

Literature on the impact of social protection, poverty, and income related health inequality in South Africa is relatively scarce and provides mixed evidences. To make a case for the existence of obvious impacts resulting from a dynamic process triggered by measures reducing poverty during the COVID-19 pandemic in South Africa, this study used NIDS-2017 and the NIDS-CRAM-2021 to investigate the impact of participation in the South Africa Social Security Grant (SASSG) on poverty status and income-related health inequality to empirically investigate: (1) poverty status of the South Africa's households; (2) income-related health inequality among the households; (3) factors influencing access to the social protection programmes (South Africa Social Security Grants (SASSG)), and (4) the impact of the South Africa's Social Security Grants (SASSG) participation on poverty as well as income-related inequalities under the COVID-19 pandemic. Our analysis leads to five key findings, among others. First, poverty and income inequality exist among the South Africa's households. Second, COVID-19 pandemic resulted in some households falling into poverty, and increase the income-related health inequalities as well. Third, the estimated outcomes of the pre- and COVID-19 eras gave a unique insight for policy trajectories towards poverty reduction. Fourth, the South Africa's Social Security Grants (SASSG) participation helped to reduce poverty as well as income-related inequalities. Fifth, highlights the role of other factors in driving poverty and inequalities in South Africa. Based on our findings, we conclude that, access to the social protection (SASSG) is critical for cushioning the negative impact of COVID-19 pandemic induced poverty and income-related inequalities in South Africa. Therefore, since poverty itself is a plague that requires drastic attention, we recommend that, for a more effective poverty and inequality reduction in South Africa during the COVID-19 and post COVID-19 era, a pro-growth poverty reduction strategy, where interventions specifically targets poverty reduction such as the social protection grants (SASSG), be implemented; hence, contribute to economic recovery and speedy economic growth in South Africa.

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Appendix

Prevalence of poor health by quintiles comparing pre- and COVID-19 era

Table A1: Prevalence of poor health by quintiles of per capita household income [PCHI] in percentage (%)

Quintiles	Pre-COVID-19	COVID-19 Period
1	9.31	38.56
2	9.42	29.55
3	11.22	28.89
4	10.23	23.45
5	6.51	20.34
Population	9.04	27.45

Notes: NIDS wave 5 estimates weighted by wave 5 post-stratification weights; NIDS-CRAM estimates weighted by NIDS-CRAM design weights.

Table A2: Prevalence of poor health by quintiles of per capita household income [PCHI] in percentage (%) in the context of access to South Africa Social Security Grant (SASSG)

Quintiles	SASSG Beneficiaries	SASSG Non-Beneficiaries
1	17.90	28.22
2	15.22	27.41
3	10.93	23.33
4	10.14	18.12
5	9.70	10.22
Population	8.22	25.33

Notes: NIDS wave 5 estimates weighted by wave 5 post-stratification weights; NIDS-CRAM estimates weighted by NIDS-CRAM design weights.

Table A3: Decomposition of poverty headcount index (α=0)

Variable	Group	Pre-COVID-19		COVID-19 Era	
		Proportion	Poverty Headcount (α=0)	Proportion	Poverty Headcount (α=0)
Age	15–29	43.0	0.044	40.3	0.093
	30–39	23.8	0.062	25.9	0.242
	40–49	13.5	0.102	15.5	0.225
	50–59	10.6	0.087	11.4	0.145
	60–69	4.7	0.099	4.8	0.103
	70 and above	4.4	0.022	2.1	0.045
	Total population	100.0	0.208	100.0	0.334
Marital Status	Married	41.7	0.096	43.72	0.195
	Not Married	58.3	0.087	56.28	0.124
	Total population	100.0	0.208	100.0	0.234
Gender	Male	38.4	0.130	39.2	0.299
	Female	61.6	0.233	60.8	0.123
	Total population	100.0	0.208	100.0	0.334
Education	No schooling	9.7	0.478	10.4	0.499
	Primary	20.6	0.221	21.8	0.310
	Secondary	42.1	0.136	41.9	0.189
	Tertiary	27.6	0.055	25.9	0.078
	Total population	100.0	0.208	100.0	0.334
Race	African/Black	86.49	0.456	82.49	0.583
	Coloured	8.39	0.123	7.69	0.210
	Asian/Indian	0.75	0.089	0.78	0.123
	White	4.28	0.021	4.33	0.023
	Total population	100.0	0.208	100.0	0.334
Employment	Economically inactive	39.1	0.156	42.9	0.331
	Unemployed	11.6	0.067	22.4	0.198
	Employed	49.3	0.027	34.7	0.056
	Total population	100.0	0.208	100.0	0.334

Province	Western Cape	11.0	0.166	12.25	0.183
	Eastern Cape	10.6	0.182	9.60	0.199
	Northern Cape	4.3	0.245	5.77	0.345
	Free State	5.7	0.208	5.89	0.256
	KwaZulu-Natal	24.5	0.304	27.02	0.346
	North West	7.3	0.192	5.78	0.341
	Gauteng	18.9	0.152	14.52	0.234
	Mpumalanga	8.8	0.176	8.90	0.201
	Limpopo	8.9	0.122	10.27	0.178
	Total population	100.0	0.208	100.0	0.334
Geographical Type	Traditional	30.7	0.205	31.42	0.224
	Urban	63.7	0.135	65.76	0.149
	Farm	5.6	0.198	2.81	0.203
	Total population	100.0	0.208	100.0	0.334
SASSG Status	Beneficiary	34.89	0.029	69.49	0.234
	Non-Beneficiary	69.49	0.339	34.89	0.401
	Total population	100.0	0.208	100.0	0.334

Table A4: Factors influencing access to the South Africa Social Security Grant (SASSG)

Variables	Coef.	Std. Err.	z	P>z	Margina effect	Std. Err.
Gender (1=male)	0.390	0.062	6.24	0.000	0.094***	0.015
Age (years)	0.006	0.002	2.60	0.009	0.001***	0.001
Household size	0.049	0.016	3.03	0.002	0.012***	0.004
Number of members between 18 and 60 years	-0.092	0.028	-3.26	0.001	-0.023***	0.007
Number of members above 60	0.081	0.054	1.50	0.134	0.020	0.013
Geographical Type (Reference = Urban)						
Farm	-0.144	0.177	-0.81	0.415	-0.035	0.042
Traditional	0.155	0.067	2.32	0.020	0.038**	0.017
Employment Status (Reference = Employed)						
Economically inactive	1.043	0.079	13.13	0.000	0.255***	0.019
Unemployed	0.374	0.087	4.29	0.000	0.093***	0.022
Race (Reference = White)						
African/Black	1.418	0.198	7.16	0.000	0.293***	0.032
Coloured	0.677	0.220	3.09	0.002	0.168***	0.054

Asian/Indian	0.657	0.434	1.51	0.130	0.163	0.105
Education (Reference = Tertiary)						
No schooling	-0.415	0.064	-6.48	0.000	-0.101***	0.015
Primary	0.198	0.180	1.10	0.272	0.049	0.045
Secondary	0.142	0.086	1.63	0.103	0.093	0.095
Wealth Class (Reference = Quintiles 5)						
Quintiles 1	0.702	0.101	6.95	0.000	0.173***	0.025
Quintiles 2	1.074	0.120	8.98	0.000	0.262***	0.027
Quintiles 3	-1.152	0.108	10.69	0.000	-0.280***	0.025
Quintiles 4	-0.926	0.102	9.05	0.000	-0.227***	0.024
Household experienced hunger	0.005	0.074	0.07	0.948	0.002	0.018
Province (Reference = Limpopo)						
Western Cape	0.351	0.166	2.12	0.034	0.083**	-0.037
Eastern Cape	-0.152	0.118	-1.29	0.199	-0.037	-1.300
Northern Cape	-0.172	0.157	-1.10	0.272	-0.041	-1.120
Free State	0.036	0.143	0.25	0.801	0.009	0.250
KwaZulu-Natal	-0.027	0.092	-0.29	0.774	-0.006	-0.290
North West	-0.040	0.141	-0.28	0.777	-0.010	-0.280
Gauteng	-0.107	0.112	-0.96	0.340	-0.026	-0.960
Mpumalanga	0.320	0.122	2.63	0.009	0.076	-2.710
Constant	-2.574***	0.286	-8.97	0.000		

Table A5: Determinant of households' poverty in South Africa

Variables	Coef.	Std. Err.	z	P>z	Margina effect	Std. Err.
Gender (1=male)	-0.117	0.064	-1.83	0.067	-0.027*	0.015
Age (years)	-0.018	0.003	-6.71	0.000	-0.004***	0.001
Household size	0.319	0.021	15.45	0.000	0.073***	0.005
Number of members between 18 and 60 years	0.008	0.035	0.24	0.810	0.002	0.008
Number of members above 60	-0.260	0.059	-4.39	0.000	-0.059***	0.013
Geographical Type (Reference = Urban)						
Farm	-0.144	0.177	-0.81	0.415	-0.035	0.042
Traditional	0.155	0.067	2.32	0.020	0.038**	0.017
Employment status (Reference = Employed)						
Economically inactive	0.863	0.089	9.68	0.000	0.180***	0.017
Unemployed	1.082	0.107	10.15	0.000	0.209***	0.016
Race (Reference = White)						
African/Black	-0.159	0.161	-0.98	0.325	-0.036	0.035
Coloured	-0.157	0.191	-0.82	0.411	-0.036	0.045
Asian/Indian	-1.842	0.457	-4.03	0.000	-0.423***	0.081
Education (Reference = Tertiary)						
No schooling	0.484	0.078	6.24	0.000	0.111***	0.018
Primary	-0.145	0.096	-1.51	0.130	-0.034	0.022
Secondary	-0.504	0.202	-2.50	0.012	-0.106**	0.038
Household experienced hunger	0.822	0.086	9.61	0.000	0.170***	0.016
Province (Reference = Limpopo)						
Western Cape	-0.531	0.158	-3.35	0.001	-0.127***	0.039
Eastern Cape	-0.563	0.124	-4.53	0.000	-0.135***	0.031
Northern Cape	-0.784	0.158	-4.96	0.000	-0.190***	0.039
Free State	-0.388	0.145	-2.67	0.008	-0.092***	0.036
KwaZulu-Natal	-0.114	0.103	-1.10	0.270	-0.026	0.024
North West	-0.739	0.147	-5.01	0.000	-0.179***	0.037
Gauteng	-0.317	0.116	-2.74	0.006	-0.074***	0.028
Mpumalanga	-0.170	0.128	-1.33	0.185	-0.027	0.015
Constant	0.728	0.262	2.78	0.005		

Table A6: Determinants of health status in the COVID-19 era

Variables	CI (Ck)	Elasticity (ηk)	Contribution (ηkCk)	Contribution (%)
Gender (1=male)	0.039*** (0.001)	0.180** (0.089)	0.003 (0.001)	-2.98
Age (years)	0.078*** (0.005)	0.301*** (0.001)	0.007 (0.004)	-6.89
Household size	0.310*** (0.022)	0.231 (0.342)	0.004 (0.023)	22.98
Geographical Type (Reference = Urban)				
Farm	0.110*** (0.001)	0.111 (0.112)	0.014 (0.031)	42.11
Traditional	0.212 (0.214)	0.113 (0.142)	0.007 (0.113)	52.18
Employment Status(Reference = Employed)				
Economically inactive	0.661*** (0.004)	0.456*** (0.004)	0.016 (0.127)	25.09
Unemployed	0.336*** (0.003)	0.116 (0.234)	0.336 (0.327)	27.09
Race (Reference = White)				
African/Black	-0.345*** (0.004)	0.674*** (0.124)	-0.235*** (0.004)	-8.09
Coloured	0.078*** 0.023	0.003 (0.004)	(0.008) (0.012)	32.09
Asian/Indian	0.003 0.002	0.089 (0.123)	0.083 (0.091)	32.89

Notes: CI= Concentration index; Estimates weighted by NIDS-CRAM design weights; *** p < 0.01, ** p < 0.05, * p < 0.1

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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African Economic Research Consortium

Consortium pour la Recherche Economique en Afrique

Middle East Bank Towers,

3rd Floor, Jakaya Kikwete Road

Nairobi 00200, Kenya

Tel: +254 (0) 20 273 4150

communications@aercafrica.org