

# Anticipating the Impact of the COVID-19 Pandemic on Health Inequality in South Africa: Early Evidence on Direct and Indirect Influences.



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# Anticipating the Impact of the COVID-19 Pandemic on Health Inequality in South Africa: Early Evidence on Direct and Indirect Influences

## Abstract

We examine the impact of COVID-19 on health and health inequality through both direct and indirect channels, including reviews of previous findings and of new quantitative analyses. This paper documents the early evidence that was available at the end of October 2020. We employ three large data sets that reflect social and health changes during the COVID-19 pandemic—a first and second wave of data from the National Income Dynamics Study-Coronavirus Rapid Mobile Survey (hereafter, NIDS-CRAM) and a Maternal and Child Health (MatCH) SMS survey of mothers—and matched these data to information from the latest census and District Health Information Systems. We find little evidence of inequality in the direct health effects of COVID-19. Conversely, we discovered substantial evidence of indirect pathways of inequality. The severe restrictions on social and economic activity imposed by the government in March and April 2020 had dramatic short- and medium-term effects that disproportionately affected vulnerable groups such as women and the poor. The asymmetrical burden of these indirect effects will likely deepen health inequalities in a country that is already among the most unequal in the world. The ultimate impact of the pandemic on health inequality could not yet be assessed at the time of our study, but this paper serves as an early warning regarding vulnerabilities and risks that should be tracked closely over coming months. Particularly concerning is the decreased use of public-health services despite sustained drops in HIV testing in South Africa, where nearly 8,000,000 people—and one in every five adults—are living with HIV.

**Key words:** inequality/social justice, health, developing economies.

**JEL:** D630, I1, O1

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## I. Introduction

The COVID-19 pandemic has had a devastating and deeply disruptive impact across the globe. Survey evidence in the UK, US, and Germany suggests that the pandemic has exacerbated existing inequalities (Adams-Prassl et al., 2020; Black Demographics, 2020; Yaya et al., 2020), and history teaches that disease outbreaks tend to expose existing social and economic fault lines, often weighing most heavily on those who can least afford to bear the burden: the marginalized, the vulnerable, and the poor. It is therefore pertinent to examine the extent to which the COVID-19 pandemic has affected these groups disproportionately.

Twenty-five years after the fall of apartheid, South Africa continues to struggle with entrenched chronic poverty and disparate access to resources, one manifestation of which is its polarized health system, and there is reason to believe that the COVID-19 pandemic will amplify existing inequalities. We have examined the distribution of the impact of the pandemic on health, examining both direct and indirect channels. The former include COVID-19 infection risk (including both exposure to the disease and compliance cost for protective measures), access to diagnosis and care, and mortality, and the latter include reduced healthcare use, worsening hunger, increased mental health problems, school and Early Childhood Development closures, and loss of income or employment. We considered heterogeneity along several important dimensions, including poverty, gender, and geography. Given the extensive evidence base required to answer this ambitious and expansive research question, we conduct new analysis but also draw on existing evidence where available.

The paper is organized as follows: in the next section we present a literature review and evidence of how past pandemics have affected health inequalities in developing countries, then we provide an overview of the existing health inequalities in South Africa's health system and outline the data and methods. We proceed to describe the evidence on how the pandemic has directly and indirectly affected health inequalities. The paper concludes by reflecting on the tension between the overwhelming magnitude and urgency of the social crisis and government constraints in terms of its fiscal space and capacity to deliver.

## II. The Indirect and Direct Health Impacts of Past Pandemics in Developing Countries

Although the effects of a pandemic are, by their nature, widely felt, people differ in their ability to protect themselves from exposure to the virus and from its consequences. Research has shown that the effects of pandemics tend to be unevenly distributed. For example, in 1931, Edgar

Sydenstricker found economic inequalities in the incidence of the 1918 the Spanish flu in America, reporting a higher incidence among blue collar workers (Sydenstricker, 1931). Recent studies (Murray et al., 2006; Mamelund, 2006; Grantz et al., 2016; Bengtsson, Dribe & Eriksson, 2018) have confirmed Sydenstricker's early findings showing that there were significant inequalities in prevalence and mortality rates between high-income and low-income countries, neighborhoods, and socioeconomic groups, and between urban and rural areas.

During the Ebola outbreak in West Africa, gender inequalities were significant, and women were disproportionately affected, principally because women were the main care providers for Ebola patients and played a significant role in burying the dead (Diggins & Mills, 2015). For example, in Liberia, 75% of Ebola cases were women, suggesting that women were more likely to come into contact with Ebola because they cared for infected people in health centers and at home (Ravi & Gauldin, 2014). Reports from health workers in Sierra Leone and Guinea, and by the United Nations Children's Fund (UNICEF), found similar gender disparities across care providers and Ebola patients (Ravi & Gauldin, 2014).

In addition to coming into direct contact with Ebola through care work, women were affected by the measures taken to contain the epidemic. In Sierra Leone and Liberia, for instance, during the outbreak the number of women who visited a health center dropped by 30%, and the number of births attended by a health professional dropped from 52% to 38% (Black, 2015; Kitching, Walsh & Morgan, 2015). The United Nations Population Fund estimated that more than 100,000 of the 800,000 women who were expected to give birth in Liberia, Guinea, and Sierra Leone in 2015 were more likely to face complications as a result of the sustained drain on health services (Hessou, 2014). An estimated 3,589 people in Sierra Leone were killed by the Ebola virus itself, but the additional number of newborns and mothers who died during childbirth was somewhere between 3,593 and 4,936.

Unfortunately, maternal and reproductive healthcare services for women are often one of the most fragile and underfunded areas of healthcare in low- and middle-income countries and, therefore, are affected early and severely (Slawson, 2019). Early data suggest that, in low-income countries, the reduction in maternal care during COVID-19 could claim the lives of up to 113,000 women (Gates, 2020).

Just as in past pandemics, large differences exist in COVID-19 responses between developed and developing economies. For example, resource gaps manifest as differences in testing rates and the number of intensive care beds, ventilators, or doctors per person. Resources also enable high-income countries to provide more adequate protection in terms of loans and grants to furloughed workers, retrenched workers and firms that need help. Although many developing economies have increased the scale of social protection measures in response to the pandemic, the response is often not enough, and many individuals fall through the cracks. For example, in South Africa, despite the introduction of new grants to supplement existing social support, one in three of those who lost jobs

received no social protection at all (Visagie & Turok, 2020).

In developing economies, workers often face tough choices between risking COVID-19 infection and losing their economic livelihood. In Caribbean and Latin American countries, a study has shown that the direct and indirect impact of the pandemic—including job losses, closing down of business, and declines in food security and health—have disproportionately affected poor households, suggesting that the pandemic may worsen inequality (Bottan, Hoffmann & Vera-Cossio, 2020).

The COVID-19 pandemic may likewise widen the gender gap. When school closures and quarantines were enforced during the 2014-2016 Ebola outbreak in West Africa, women and girls experienced an increase in sexual violence, coercion, and exploitation (John, Casey & McGovern, 2020). Currently, anecdotal evidence supports a similar trend in Malawi, where closure of schools in response to COVID-19 has affected girls significantly more than boys (Davies, 2020): teen pregnancy and teen marriages have risen, putting girls at a risk of not returning once schools reopen (Davies, 2020). This may have longer-term effects on women's earning prospects. Moreover, measures designed to lessen the effects of the pandemic can isolate women who live with controlling or violent partners from the people who can help them, and non-profit organizations working in this area have reported that stay-at-home policies enforced by many governments during the pandemic have exacerbated risks and increased gender-based violence. Specific numbers, however, have been difficult to obtain.

To reduce transmission of the virus, the World Health Organization has recommended the use of face masks and physical distancing, but the costs of complying with such measures vary dramatically across the socioeconomic spectrum (Burger et al., 2020; World Health Organization, 2020). For example, given that face masks are not distributed to all at no cost, poor households may not be able to afford them. Households without easily accessible running water may also find it more difficult to keep facemasks clean. Furthermore, in high-density informal settlements in which multi-generational households share small living spaces, physical distancing and shelter-in-place may not be realistic. Such variations may affect compliance and, consequently, infections.

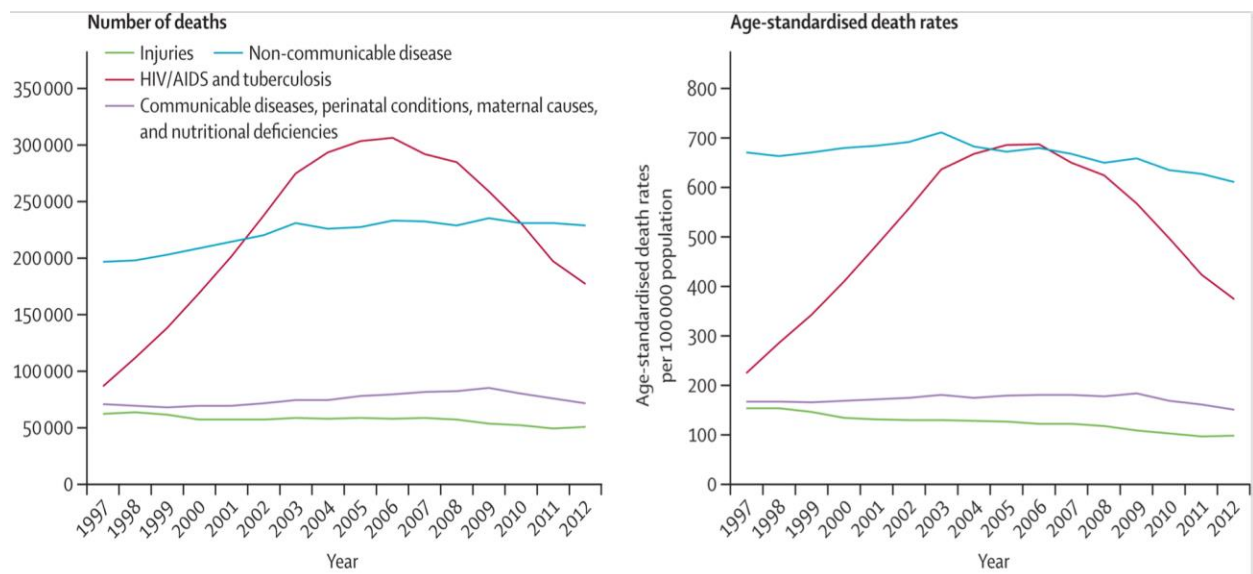
### **III. Existing Health Inequalities in South Africa**

South Africa is one of the most racially and economically unequal countries in the world, mainly because of its history of apartheid (Francis & Webster, 2019). The health system mirrors existing inequalities, which are marked by deep divides and polarization following fractures in the social landscape (Burger & Ngwenya, 2020).

Public primary care services are free and hospital fees are means-tested; consequently, health consultation costs are not prohibitive, and catastrophic health expenditure is low (Koch, 2017; Burger & Ngwenya, 2020). The quality of care in public facilities is variable, and long waiting times, rude health workers, and drug shortages in public facilities contribute to the high share of private health consultations observed among the poorest quintiles—despite the hefty fees of private providers (Burger & Christian, 2018). There are vast disparities between the public and private sector in terms of the ratio of nurses, doctors and specialists per population served (Barron & Padarath, 2017; McIntyre et al., 2007). While affordability is not a significant constraint to access, travel times can be prohibitive for residents of remote and rural areas (Burger & Christian, 2018).

South Africa has a quadruple burden of diseases that significantly contribute to mortality and morbidity, as Figure 1 shows, including four major causes of death: HIV/AIDS and tuberculosis (TB), mother and child mortalities, non-communicable diseases, and injuries and trauma (Pillay-Van Wyk et al., 2016). Following the effective and rapid (although belated) roll-out of anti-retroviral therapy in 2004, the HIV/AIDS and TB deaths declined significantly (World Health Organization and Joint United Nations Programme on HIV and AIDS, 2020; Malakoane et al., 2020).

**Figure 1: Trends in Four Major Causes of Death in South Africa, 1997-2012**



Source: Pillay-Van Wyk et al. (2016)

Twenty-five years after apartheid ended, poverty remains one of the most important predictors of health outcomes in South Africa, with poor households being more exposed to disease and trauma and often having worse access to medical care and diagnosis (Burger & Ngwenya, 2020). For instance, analysis of the 2011 Census shows that men between 40 and 59 from the poorest quintiles are six times more likely to die than are those of the same age in the richest quintiles (Haal, Smith & Van Doorslaer, 2018). A combination of greater exposure and weakened protective

mechanisms causes the poor to suffer disproportionately from the so-called “illnesses of poverty”: HIV, TB, and diarrhea, among others (Wabiri & Taffa, 2013; Janssens & Rieder, 2008; Chola et al., 2015). Similar mechanisms may also cause the burden of COVID-19 to be shouldered mainly by the poor and the marginalized.

## IV. South Africa’s COVID-19 Response

South Africa declared a state of national disaster to contain the spread of COVID-19 on 15 March 2020. This was followed, on 27 March 2020, by one of the most severe lockdowns anywhere in the world (Gustafsson, 2020). Under Alert Level 5, individuals were not allowed outside their own yards, and the military was enlisted to enforce these rules (Dlamini-Zuma, 2020). Exceptions were made only for essential services such as grocery shopping, medical needs, and work for those designated as essential workers. A ban was imposed on travel from high-risk countries as well as on the sale of alcohol and cigarettes. A concerted effort was made to promote COVID-19 prevention through handwashing hygiene and safer, no-hands greetings including elbow bumping.

In parallel, the government introduced a number of measures to cushion the impact on the income of business owners, furloughed workers, and those who lost jobs as a result of the lockdown. A government package of relief measures, amounting to over R500 billion (approximately 10% of GDP), was announced on 21 April 2020 by President Ramaphosa. Initial efforts were targeted at formal businesses and their employees and included wage protection via the Unemployment Insurance Fund, credit guarantees, and job protection.

After significant social pressure, however, a broader set of measures was introduced that was aimed largely at the poor and the vulnerable, though allowances were made for individuals who had fallen through the cracks of the existing social assistance and security system (i.e., those who were unemployed, who received no income, or who received neither a social grant nor payout from the Unemployment Insurance Fund; Köhler & Bhorat, 2020). The COVID-19 Social Relief of Distress grant was a temporary payment of R350 per month to eligible beneficiaries.<sup>1</sup> The Child Support Grant was increased by R300 per grant for May but R500 per caregiver (irrespective of the number of eligible children) from June to November. All other grants, apart from the Child Support Grant, including old-

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<sup>1</sup> The end date for this grant was extended to the end of January 2021.

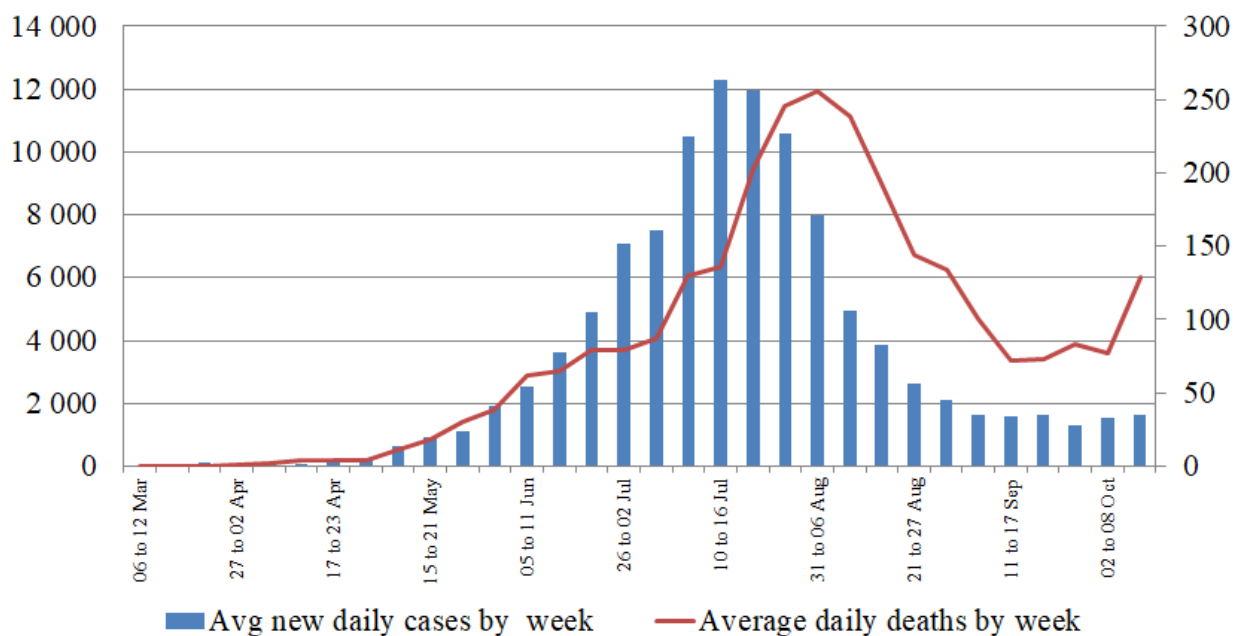


age pensions and disability grants, were increased by R250 per month from May to November (Köhler & Bhorat, 2020). The accelerated rollout of this social-assistance package was recognized as a groundbreaking achievement: it brought 5,000,000 new social assistance beneficiaries into the system (for a total of 23,000,000), representing two in five South Africans (Bridgman, Van der Berg & Patel, 2020). To avoid the risk that in-person applications for these special grants would create crowded Department of Social Development offices and street queuing that could aid the spread of COVID-19, the South African Social Security Agency enabled eligible South Africans to apply for these grants via their mobile phones, using an SMS platform (WhatsApp) and Unstructured Supplementary Service Data (USSD). They also allowed applications through a call center.

At the same time, the government used the lockdown period to prepare the health system for its COVID-19 response. Orders were placed for personal protective equipment and ventilators. On 1 April 2020, sixty-seven mobile test units were set up, and 10,000 community workers were deployed to perform community screenings. Field hospitals were planned to supplement public hospital capacity, and negotiations were held between private and public hospitals to allow public patients to use spare Critical Care and Intensive Care Unit beds in private hospitals, if the need arose.

The country moved to Alert Level 4 on 1 May 2020, allowing a limited number of priority workers to return to work and permitting individuals to do physical exercise between 6 am and 9 am. Restrictions were lowered to Level 3 more than two months later. Level 3 allowed some non-essential economic activity, and individuals regained considerable freedom, choice, and responsibility for making decisions to navigate COVID-19 risks. Schools were also opened gradually, allowing Grade 7 and 12 learners to return on 1 June 2020.

**Figure 2: Daily New Cases and Deaths by Week, 6 March-15 October 2020**



Notes: Based on calculations by Boshoff Steenekamp. Source: South African National Department of Health, 2020.

Figure 2 shows the trajectory of the pandemic from March until mid-October 2020, tracking both daily cases and weekly deaths. Cases during this first wave peaked mid-July, while the number of weekly deaths reached a maximum approximately two weeks later, in the first week of August. As the country approached this peak, there were concerns that hospital capacity—and specifically critical care beds—would not be sufficient, which prompted the reinstatement of the alcohol ban on 13 July 2020 and the re-closure of schools from 27 July to 24 August. The country never experienced a shortage of hospital beds.

On August 18, 2020 the country entered Level 2 of the lockdown, removing all restrictions on the sale of alcohol and cigarettes. Other regulations were also relaxed, including those pertaining to interprovincial travel, and family and social visits were allowed with caution (Kiewit & Kings, 2020). As of 21 September 2020, South Africa moved to Level 1 with most normal activities resuming, including international leisure travel (South African Government, 2020).

## V. Data

We used three large data sets to consider how care and treatment were affected by the pandemic. Two of these—NIDS-CRAM and a MatCH survey of MomConnect mothers—are unique large-sample data sets designed specifically to answer these questions. The NIDS-CRAM is particularly valuable because it constitutes a COVID-19 follow-up panel of individuals for a subset of the five-wave NIDS household panel.

The NIDS-CRAM research team was a partnership among thirty social scientists from different institutions, along with civil society stakeholders and a broad platform of government partners whose aim was to conduct rapid research to facilitate a targeted, well-designed, and evidence-based response to the pandemic. The complexity of South African society and expected differential impacts of groups accentuated the need for data to guide government and civil society responses and made representative sampling even more vital.

The NIDS-CRAM survey was conceptualized, planned, conducted, cleaned, and released in 114 days. During this period, the team obtained approval and support from the Office of the President, the National Department of Health, the Treasury, and the National Planning Commission; procured funding; recruited a research team; designed a sampling strategy; selected a survey mode; compiled instruments; contracted a provider to undertake telephone interviews; obtained ethics approval; conducted the surveys; cleaned and analyzed the data; and disseminated the findings.

Similarly, the entire process of the coronavirus Rapid Mobile survey of Maternal and Child

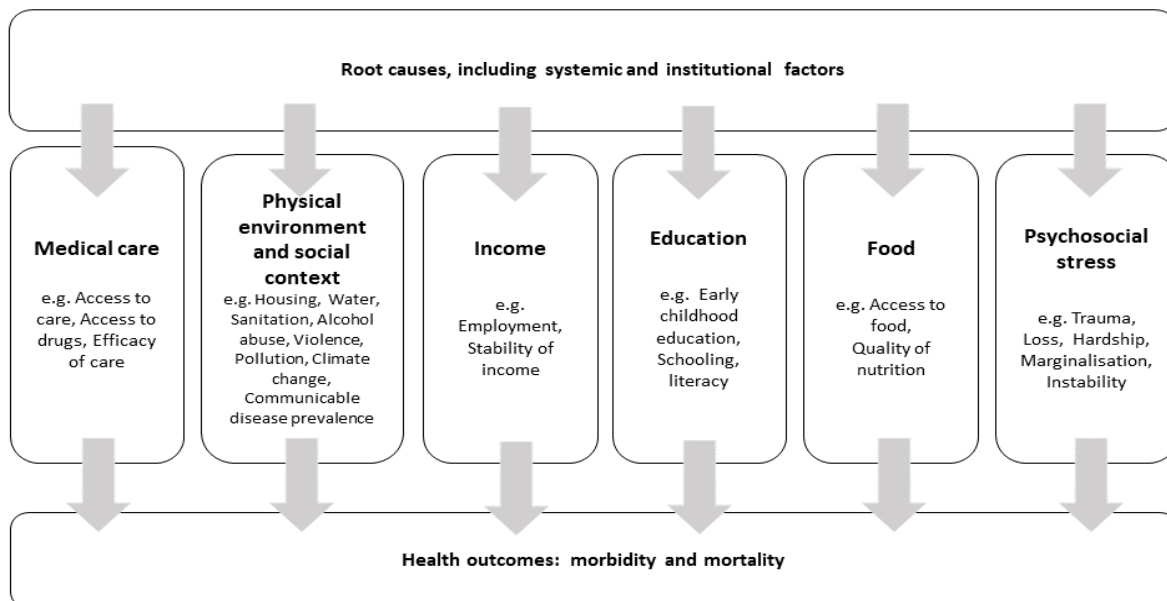
Health (MatCH), from conception to delivery of the findings, was completed in fifty-seven days and also included approval for access by the National Department of Health, design of the instrument, ethics permission, sample selection, launch of the SMS survey, and analysis of the data. Lastly, the District Health Information System data is an open-source facility level data repository with the goal of improving health services delivery (Begum et al., 2020). These data were used to examine changes in use of maternal and child health services.

The appendix provides more information on the District Health Information System, NIDS, NIDS-CRAM and the MatCH SMS surveys used for the analyses in this paper.

### **Examining Direct and Indirect Influences of the Pandemic on Health**

In this study, we examined the potential impact of COVID-19 on health inequality. To track the indirect influences of the pandemic on health, we considered how COVID-19 and responses to the pandemic affected a range of social and economic determinants of health outcomes. To guide this work, we attempted to compile an analytical framework to analyze the indirect influence of the pandemic on health but could not determine any single framework that provided a comprehensive map of the most important determinants of health outcomes in a highly unequal, middle-income country like South Africa. We therefore drew upon a wide range of work, integrating World Health Organization research on the social determinants of health (Commission on the Social Determinants of Health, 2008; Solar & Irwin, 2010; World Health Organization, 2016), revisiting the pioneering ideas of Michael Marmot (2015, 2016, 2020), and incorporating various other contributions, including Soares (2014), Artiga and Hinton (2018), and Dover and Belon (2019). Combining these ideas, we designed a conceptual framework that suitably reflected the most prominent economic and social proximate causes of mortality and poor health in a South African context. As Figure 2 shows, our framework comprised six components: medical care, physical environment and neighborhood, income, education, food, and psychosocial stress.

**Figure 3: Framework of Proximate Social and Economic Causes of Health Outcomes**



Because the paper focuses on assessing the medium-term effects of the pandemic on health inequalities, we opted to foreground proximate causes, while acknowledging that these causes are rooted in deeper, systemic drivers, which would include power imbalances, discrimination, corruption and bad governance.

To capture the direct impact of the pandemic on health inequality we describe the socioeconomic distribution of COVID-19 infection and mortality risk.

### **Direct Influences on Health - Access to COVID-19 Diagnosis and Care**

A study conducted in the United States by Lieberman-Cribbin et al. (2020) found that, in New York City, COVID-19 testing was not proportionate to need and that socioeconomic and racial disparities in healthcare access affected public-health responses. In South Africa, early evidence from the first surge in cases in Cape Town suggested that informal settlements and poor neighborhoods were disproportionately affected and were over-represented in COVID-19 hotspots (Smit, 2020). Concerns were also raised that statistics may have underrepresented the burden on the vulnerable because of severe testing bottlenecks in the public health system. Although seven out of eight people in South Africa are uninsured and thus largely reliant on the public healthcare system, an approximately equal share of COVID-19 tests had been used in the private and public system by the end of 2020. Additionally, in the early initial phases of the pandemic, public-sector laboratories had much longer processing times of up to twelve days (National Institute for Communicable Diseases, 2020a; Lancet Laboratories, 2020) compared to a three-day turnaround for private sector laboratories. These long processing times for public sector testing presented a major challenge for containing the disease,

especially among the most vulnerable. Encouragingly, differences in availability of tests and test processing times between the private and the public sector have evened out over time: in December 2020 the public sector had an average mean laboratory turnaround time of 2.4 days compared to less than one day for the private sector (National Institute for Communicable Diseases, 2020b).

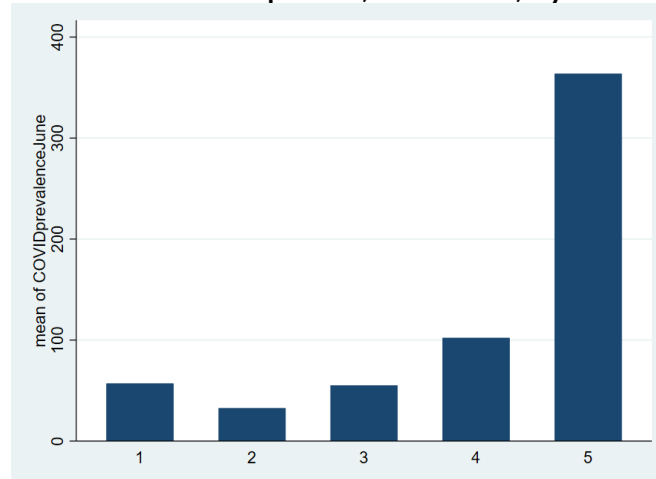
Initially, there was serious concern that the public hospital sector would run out of critical care hospital beds. Discussions were held with the private sector about contracting for potential spare capacity. Convention centers and a closed Volkswagen car manufacturing plant were re-purposed as field hospitals. In the Khayelitsha Township in Cape Town, the district hospital was expanded with an external wing across the street, which was built in less than a month. The sixty-bed wing opened at the start of June and, a month later, only two beds were vacant (Meldrum, 2020). The government also pre-emptively re-instated the sales ban on alcohol on 12 July 2020. South Africa has a high number of alcohol-related injuries resulting in deaths, estimated to amount to 12,000 per year in 2015 (Probst, et al, 2018). More relevant here is that a large share of emergency room and ICU cases are alcohol-related injuries, including acts of violence, motor vehicle accidents and pedestrians injured by motor vehicles (Rehm et al., 2003, 2017).

## **COVID-19 Infections**

The social sciences literature shows the staggering implications of socioeconomic circumstances for human vulnerability to infections (Brown & Ravallion, 2020). Many of the risk factors associated with the severity of COVID-19 are correlated with socioeconomic status. A study conducted in America by Rubin-Miller, Alban, and Artiga (2020), for example, found that Black, Hispanic, and Asian patients had significantly higher rates of infection than their white counterparts. The infection rate for Hispanic patients was over three times higher than the rate for white patients (143 compared to 46 per 10,000), and the rate among Black patients was more than twice as high (107 per 10,000) (Rubin-Miller, Alban & Artiga, 2020).

Experts had expected to see the poor and vulnerable overrepresented in South Africa's infections. Statements in this vein were often made in the media, but these perspectives were seemingly based on early evidence in the Cape Town metropolitan area. Once national statistics became available, the picture appeared to reverse, because it situated the within-metro inequalities in the broader context of the country: COVID-19 cases were concentrated in metropolitan areas, most of whose residents fell into the most affluent quintile. Although the sample is broadly nationally representative, the district-level analysis shown in Figure 3 suffers from aggregation bias, masking social inequalities within districts. These data align with earlier evidence from the National Institute for Communicable Diseases that showed equal rates of testing and of positive tests across the public-private divide. Only a minority of South Africans are covered by private health insurance, and the vast majority is largely reliant on the public sector.

**Figure 4: COVID-19 Prevalence per 100,000 in June, by District SES Quintile**



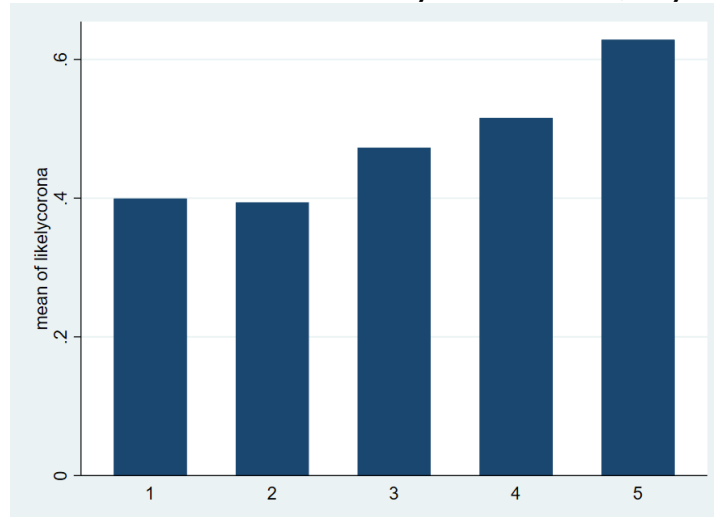
Notes: The construction of the districts' poverty quintiles is described in Gaede and Eagar (2014); Source: Mediahack COVID-19 dashboard, Census, 2011.<sup>2</sup>

In line with district-level patterns observed for COVID-19 prevalence, Figure 4 shows that subjective risk perception is much higher among the affluent. In July and August 2020 more than six in ten in this group thought they were likely to be infected, while only four in ten of those in the poorest quintile thought this. Those in the poorest quintile were significantly less likely than the affluent to report that they practiced physical distancing (14% vs. 23%), but significantly more likely to report that they wore masks (65% vs. 63%). The prevalence of misinformation was very low. The most frequently cited protective strategies (without any basis in evidence) were drinking hot lemon water and eating garlic, and less than 1% and 2% of respondents reported those strategies, respectively. There was also little evidence of denialism. When we asked those who thought they were unlikely to contract the coronavirus why they believed this, respondents overwhelmingly pointed to preventive measures. Less than 1% of respondents said they did not believe COVID-19 is real or thought that it would affect them, and 87% of respondents said they could avoid getting the virus, which attested to their belief in the efficacy of non-pharmaceutical interventions.

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<sup>2</sup> Socioeconomic quintiles were derived from the South African Index of Multiple Deprivation (Noble et al., 2013) and adapted for the District Health Barometer (Gaede & Eagar, 2014). Data to assess clinical risk as a result of COVID-19 were obtained from the district and sub-district datasets manually compiled by MediaHack based on statistics published by the nine provincial governments. All laboratory confirmed cases of COVID-19 are legally required to be reported to the National Institute for Communicable Diseases. Incidence risk was then calculated as the number of cases per population by time period for each district.

**Figure 5: Perceived COVID-19 Infection Risk by Asset Quintile, July and August 2020**



Source: NIDS-CRAM Wave 2 (2020), NIDS, 2017

It was, however, concerning that respondents in the 60-plus cohort, who have been shown to be more susceptible to severe COVID-related illness if infected, reported significantly lower mask-wearing and adherence to physical distancing. We expected to see much higher levels of adherence in this group. While 75% of those under 60 said they wore masks in July and August, only 66% of those 60-plus reported doing so. Similarly, 19% of those under 60 but only 17% of 60-plus respondents said that they practiced physical distancing in July and August.

We examined the influence of the cost of complying with preventive measures and the impact of access to complementary resources. The motivating concern was that, in crowded spaces, staying at home and physical distancing would not be feasible because of their high cost. Similarly, frequent handwashing may not be possible in neighborhoods where residents do not have easy access to clean running water.

Initially, we had expected compliance cost to play an important role in adherence to preventive measures in South Africa because of the stark economic and social inequalities and high levels of poverty. However, our analysis of the NIDS-CRAM Wave 1 and 2 surveys showed that, as a rule, compliance with COVID-19 preventive measures was not significantly affected by compliance cost. Very large differences in the cost of compliance certainly remained, but the expected benefit of avoiding the coronavirus threat apparently trumped these costs. The coronavirus anxieties and fears that respondents reported provide further support for this interpretation.

Residents in informal settlements were not significantly less likely than other respondents to practice physical distancing or stay at home, and respondents with piped water inside the house or yard were not significantly more likely to engage in frequent handwashing. Nonetheless, respondents in informal settlements were significantly more likely to report that people in their community failed to comply with stay-at-home guidelines and with drinking and socializing restrictions during lockdown:

44% of informal settlement residents (compared to 32% for residents of other neighborhood types) reported that most of the people in their neighborhood did not stay at home during the lockdown. Similarly, 51% of respondents living in informal settlements (compared to 37% for other residents) reported that most people in their area did not comply with lockdown prohibitions on drinking and socializing.

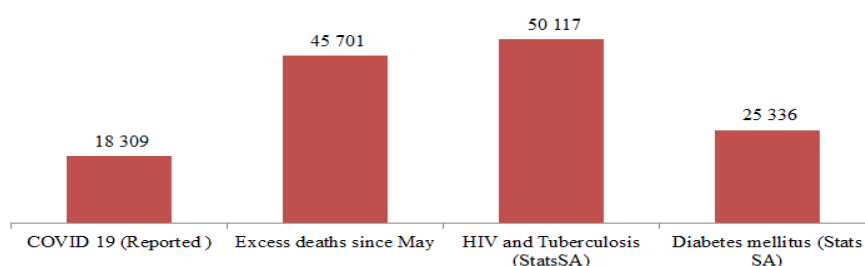
## COVID-19 Mortality

There were initially widespread fears that South Africa would have many deaths from COVID-19 as a result of the lack of feasible preventive measures (physical distancing and handwashing in crowded informal settlements with inconvenient access to water, e.g.) and because of the impact on South Africa’s 8,000,000 immuno-compromised HIV patients. Despite these initial concerns, South Africa had lower than expected official mortality rates.

This is also broadly true of African countries as a group: in early phases there were apocalyptic fears about the expected impact of the coronavirus on African countries because of a combination of weak health systems and high disease burdens, but these fears did not materialize. Experts continue to research explanations for lower than expected death rates. One explanation is that the population is already, on average, young, a characteristic of developing countries. Some consider it plausible that better adherence to mask-wearing may have contributed to the lower death rate by lowering the viral load of average exposures (Marsh & Aloba, 2020).

Another explanation may be that official death counts simply missed many COVID-19 deaths. Figure 4 below compares total COVID-19 deaths and excess deaths<sup>3</sup> through mid-October 2020 to expected annual deaths from two major diseases in the previous three years. The figure shows that, if excess deaths are interpreted as COVID-19 deaths not captured by the system, then COVID-19 mortality had already surpassed expected annual expected diabetes deaths by mid-October of 2020 and was close to matching deaths from HIV/TB.

**Figure 6: COVID-19 Mortality vs. Annual Deaths from Diabetes and HIV/TB**



<sup>3</sup> Excess deaths means the surplus of deaths with respect to average death rates over several previous years.



Notes: Based on calculations by Boshoff Steenekamp. COVID-19 deaths and excess deaths represent totals to 14 October 2020. HIV, TB, and diabetes deaths are for earlier full years. Sources: COVID-19 Online Resource & News Panel, n.d.; South African Medical Research Council, 2021 (excess deaths since May 2020); and Statistics South Africa (2017) (diabetes, HIV, tuberculosis).

In early discussions about the possible impact of COVID-19, we raised the concern that the poor would be vastly overrepresented among South Africa's coronavirus deaths because of both weakened immune systems and overcrowded housing that allowed rapid spread of the virus. As far as we know, this has been neither confirmed nor refuted. We do not know whether socioeconomic status has a systematic and statistically significant correlation with the likelihood of becoming severely ill or dying when infected (Western Cape Department of Health, 2020).<sup>4</sup>

## **Indirect Influences on Health: Medical Care, Physical Environment and Neighborhood, Income, Education, Food, and Psychosocial Stress**

As indicated, this overview is based on evidence garnered largely from CRAM-NIDS and MatCH data that was available at the end of October 2020. Given the preliminary nature of our study, in some cases we have more information about indirect influences than in others. Below, we identify instances in which evidence is tentative or weak.

### **Medical Care: Declining Healthcare Use**

Pandemics and disease outbreaks have been shown to disrupt the provision of and demand for other essential healthcare services, which could lead to adverse health outcomes, especially for high stakes clinical services such as acute response, vaccinations, and prenatal care. The Ebola pandemic led to warnings about the cumulative, long-term health effects of missed or delayed vaccinations, chronic care visits, and contraception consultations, effects that exceed the negative impact of the pandemic itself (Sochas, Channon & Nam, 2017; Robertson et al., 2020; World Health Organization, 2020; World Health Organization and Joint United Nations Programme on HIV and AIDS, 2020). Forward-looking modelling in the early phases of the COVID-19 pandemic suggested that decreases in healthcare use in low-and-middle-income countries could cause as much as a 45% increase in under-five child deaths and a 39% increase in maternal deaths (Robertson et al., 2020).

In South Africa, routine data from primary public health facilities showed large drops during

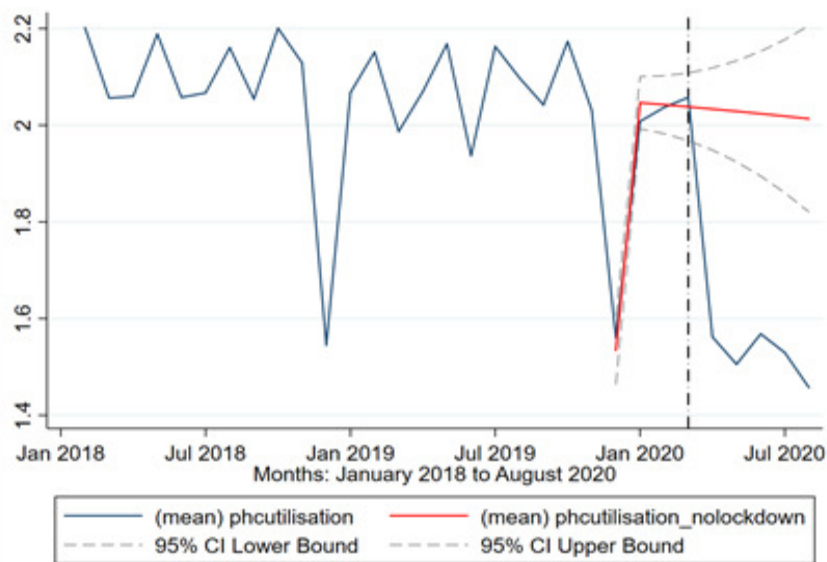
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<sup>4</sup> Western Cape Department of Health (2020) conducted a cohort study in the Western Province in South Africa that used linked data from adults attending public health facilities in the Western Cape. It provided preliminary evidence that individuals with HIV and tuberculosis were more likely to die from COVID-19. Because HIV and tuberculosis are diseases of poverty, this would imply a link between COVID-19 mortality and poverty.

the “hard” lockdown months of April and May 2020. The size of the decreases varied across health services and appeared to be somewhat smaller for high-stakes health visits such as prenatal care. Figure 6 compares the observed primary healthcare use rate with a regression-based projection under a no-COVID/no-lockdown scenario.

The impact of the lockdown is dramatic. There was little evidence of recovery by August 2020 during which South Africa was first at Alert Level 3 and then at Alert Level 2 from August 18 onward. As Figure 2 shows, daily COVID-19 cases had already begun to decline rapidly at that point. We examined whether poorer districts were more likely to show a larger drop in use in primary healthcare facilities, but we found that the most affluent quintile of districts was most deeply affected. Fearing that these reductions might partly reflect failure to submit data, we calculated a data-completeness score to capture each district’s monthly compliance with the submission of complete data. The data-completeness score showed no significant relationship with observed drops in the use of health services.

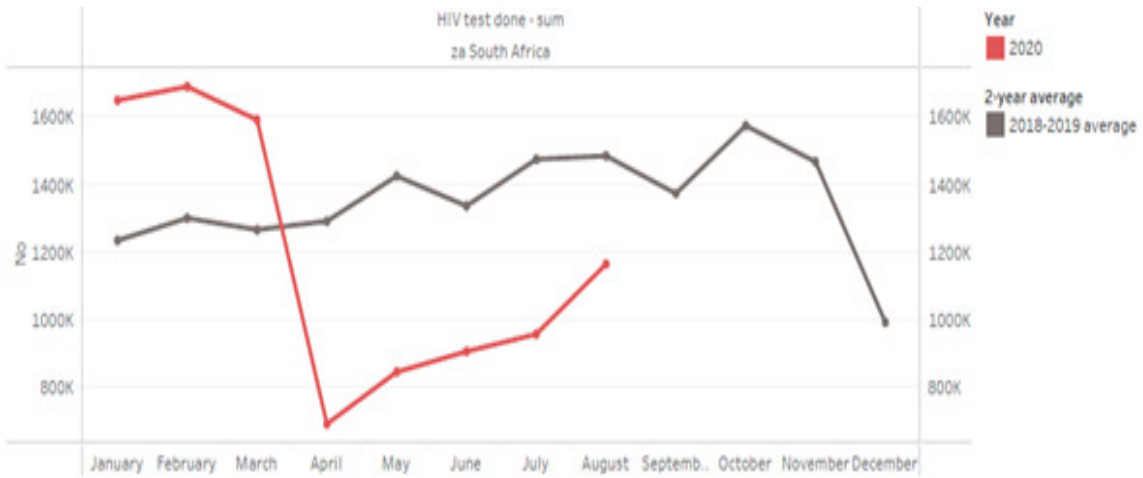
**Figure 7: Observed Primary Healthcare (PHC) Use vs. Projected Use**



Source: Regression analysis of District Health Information System (DHIS) routine data (2018-2020) under a no-COVID/no-lockdown scenario. The dashed line represents April 2020, the first full calendar month of lockdown.

HIV testing was one of the most severely affected areas of health services. Figure 7 compares national HIV testing levels per month for previous years with data from 2020 (in red), showing the drop in HIV testing. Regression analysis of District Health Information System data showed that HIV testing fell by 48.8% during April-May 2020. HIV testing remained below predicted levels (based on pre-pandemic patterns) in June and July.

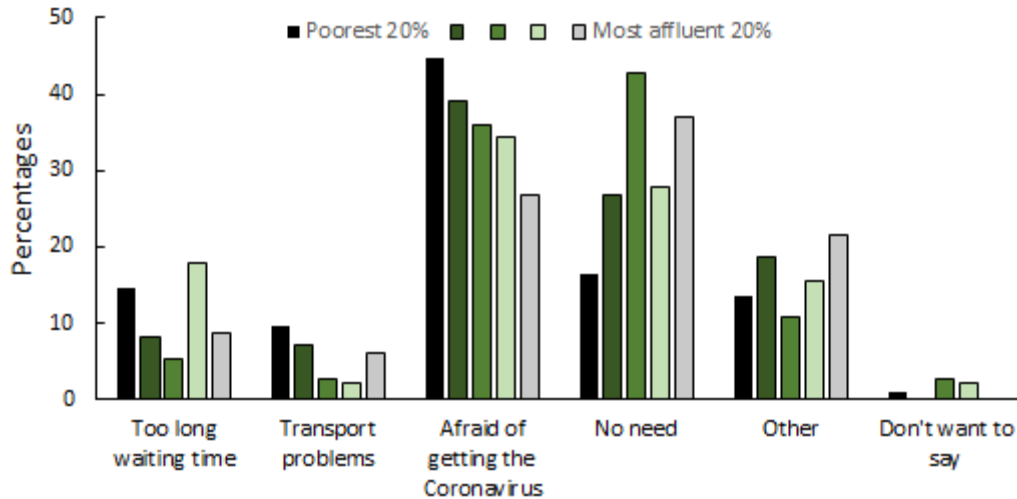
**Figure 8: Total Number of HIV Tests Done by Month**



Source: Routine District Health Information System data, January 2018-August 2020.

Our MatCH SMS survey examined the unmet health needs of pregnant women and mothers with babies younger than 1 year of age. The SMS survey was launched on 24 June 2020, and participants were given until 30 June to respond. One in eight of the women who responded reported that she had not been to a health facility since April, which represents a gap in care of approximately two months. Potential negative outcomes would vary substantially according to whether other risk factors were present, but the government recommends that pregnant women visit the clinic every six weeks. Figure 8 shows the reasons women gave for not visiting the clinic. Fears about coronavirus topped the list and were more frequently cited by women living in poorer communities.

**Figure 9: Reasons for Not Seeking Care During Lockdown, by Poverty Quintile**



Source: MatCH survey, 2020

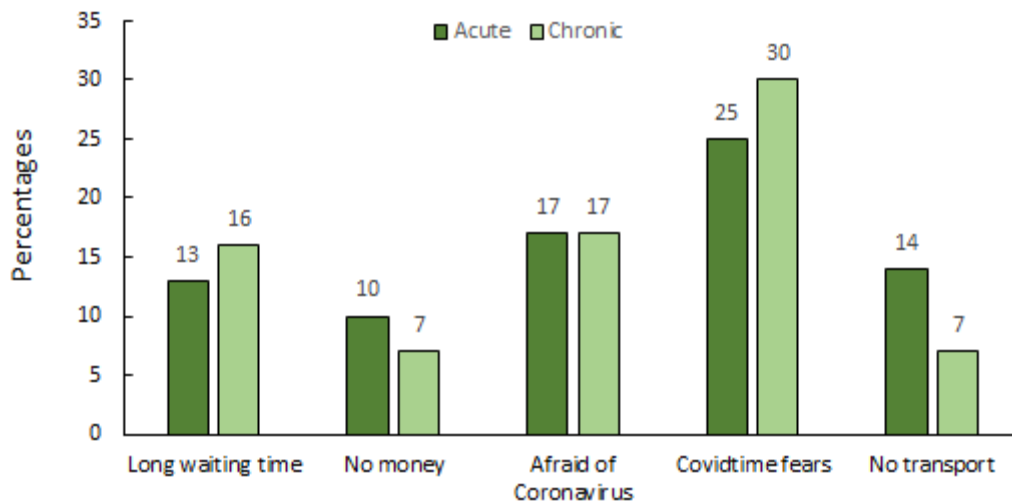
Our MatCH survey showed that one in four women skipped their babies' vaccinations during the lockdown, leaving them exposed to life-threatening illnesses. One in ten women living with HIV reported running out of antiretroviral medications. The most frequently cited reason for not renewing their prescriptions was fear of contracting the coronavirus. A follow-up survey launched two weeks later asked women to share their most prominent worry in a return SMS (no restrictions). COVID-19 fears featured prominently. For instance, one pregnant woman said she was worried "because anytime soon I am going to hospital labor so maybe I can get COVID-19." A new mother was concerned that her baby would get infected with the virus when she took her to the clinic "since it has been said staff members are the most infected in the health institutions."

In parallel, CRAM-NIDS survey respondents were asked about their chronic and acute health needs as well as about visits to health facilities. One in five of those with acute healthcare needs did not go. For chronic care, a far smaller share of respondents had not sought care: less than one in twenty. One in four of the respondents surveyed in May and June 2020 reported being unable to obtain medication, condoms, or contraceptives over the previous four weeks.

Figure 9 shows that one in four respondents with acute healthcare needs who did not seek care reported avoiding going to a health facility as a result of COVID fears, including fear of contracting the virus but also more broadly of moving around and of police or military brutality.<sup>5</sup> Seventeen percent said they did not seek care because they feared contracting the coronavirus. Respondents were allowed to provide more than one answer.

<sup>5</sup> "Hard" lockdown rules were enforced locally by police and deployed military personnel, and the media reported numerous claims of brutality and abuse of power. Hayson (2020) reported that that 230,000 people were arrested and eleven were killed during the first five weeks of the hard lockdown.

**Figure 10: Reasons for Not Seeking Care, Respondents with Confirmed Acute/Chronic Health Needs**



Source: NIDS-CRAM survey Wave 1, 2020.

These reported treatment interruptions, lapses in contraception, delays to vaccinations and testing and general declines in healthcare use are deeply concerning and can be expected to contribute both to deterioration in health and unwanted pregnancies over the medium term and to an increase in mortality over the longer term. Many such consequences will be personally and socially costly and will be irreversible. For instance, a spike in late diagnosis of HIV and failure to adhere to treatment can affect the long-term trajectory of the disease, which remains a major contributor to South Africa’s mortality burden (almost 8,000,000 South Africans—and one out of every five adults—live with HIV).

## Physical Environment and Social Context

Two high-impact pandemic responses—the alcohol and tobacco ban and the “hard” lockdown in April and May 2020—transformed the physical environment and social context of South Africans. We examined how the alcohol and tobacco ban affected alcohol abuse, tobacco consumption, and unnatural deaths and then considered how the “hard” lockdown affected the prevalence of communicable disease, traffic accidents, and carbon emissions.

The alcohol and tobacco ban was originally imposed on 27 March 2020, lifted on 1 June 2020, and then, controversially, re-imposed on 13 July 2020. The ban was lifted for the last time on 18 August 2020. Internet surveys by the Research Unit on the Economics of Excisable Products at the University of Cape Town, South Africa (see also Van Walbeek, Filby & Van der Zee, 2021) questioned reports that the tobacco ban had been effective in encouraging smokers to quit smoking. According to their internet-based survey, 16% of respondents reported that they quit smoking, and 90% of those

who had not quit smoking said they found ways to obtain cigarettes. The NIDS-CRAM data showed that 8% of smokers quit during the sales ban period, while 85% continued smoking and a relatively high share of 7% declined to answer the question. Of those who quit during lockdown about half said they started smoking again after the sales ban was lifted.

Based on previous work that linked alcohol with unnatural deaths, we would have expected the alcohol ban to reduce unnatural deaths and, specifically, homicides, road accidents, and pedestrian deaths. Unnatural deaths represent a higher share of deaths in South Africa than in other developing countries and largely include homicides and road fatalities (including car accidents and pedestrian deaths). This category includes other unintentional-injury deaths, many of which have also been linked to alcohol. Weekly analyses of deaths by the South African Medical Research Council<sup>6</sup> have shown that severe constraints on economic and social activities, including the ban on alcohol during lockdown Level 5 (27 March to 1 May 2020), significantly reduced unnatural deaths (Bradshaw et al., 2020). The South African Medical Research Council's analyses also showed that deaths as a result of unnatural causes in the first quarter were projected to be 800 a week, peaking above 1,000 at Easter. In fact, actual deaths tracked expectations until the lockdown, at which point they fell to 400 unnatural deaths a week thereafter (Farber, 2020a). During the year in its entirety, however, the number of unnatural deaths remained close to the predicted number (based on previous years) but did not follow the sharp increase at the end of November that was evident in previous years. The lack of an end-of-November upturn could plausibly be attributed to delays and reduction of holiday travel (Bradshaw et al., 2020).

On its own, the reduction in weekly unnatural deaths during the Alert Level 5 lockdown hardly constitutes strong evidence, nor does it enable us to attribute the reduction in unnatural deaths to any of the cluster of policies that were enforced during this period. Barron et al. (2020) endeavored to use the same data to estimate the mortality impact of the unexpected second alcohol ban of five weeks. They concluded that the policy led to a reduction of twenty-one deaths per day or 740 deaths over the entire period (a 14% decrease in unnatural deaths). They used significant weekend and end-of-month increases in traffic and violence-related deaths to identify the causal impact of the alcohol ban. They also investigated the impact of curfews imposed during the same period but found no evidence of a significant impact on mortality.

Barron et al. (2020) could not distinguish the impact of the alcohol ban on homicides from the impact on road deaths. We have some weak evidence regarding how the pandemic affected road deaths,<sup>7</sup> but comparatively little on homicides. Reported crime dropped<sup>8</sup> during the “hard” lockdown,

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<sup>6</sup> In partnership with the University of Cape Town's Centre of Actuarial Research, the South African Medical Research Council's burden of disease research unit set up a rapid mortality reporting system.

<sup>7</sup> The media reported that car accidents on Cape Town highways were at an eight-year low during the hard lockdown (Mlamla, 2020). During the 2020 Easter holidays, twenty-eight people were killed on the roads, while 162 had been killed on the roads during that period in the previous year (Ndlazi, 2020).

but clear causal evidence is lacking because the decline could also have resulted from constraints on movement.

Gender-based violence, which has been identified as a national priority because of its prevalence and because progress in combating the problem has been slow, has been an additional concern. Non-profit organizations and call centers reported a dramatic rise in gender-based violence during the “hard” lockdown, which often left victims few options other than continuing to live with perpetrators<sup>9</sup> (Van Dyk, 2020; Farber, 2020b). Notably, this reported surge was not reflected in police statistics. Given that only one in twenty-five rapes is reported to the police in South Africa, police statistics are not a reliable source of information for this highly stigmatized crime (Machisa et al., 2011; Jewkes & Abrahams, 2002).

The decrease in economic activity and restrictions on freedom of movement during the lockdown affected emissions of carbon and other greenhouse gases. Le Quéré et al. (2020) showed that globally daily carbon emissions had decreased by 17% by early April 2020 with respect to 2019 averages. The Le Quéré group also found that almost half of the reduction in global daily carbon emissions was from reduced traffic. Tracker, a South African vehicle telematics company, estimated that use of cars declined from twenty-two days per month pre-lockdown to eleven days per month during the lockdown, while kilometers travelled decreased from a monthly average of 1,647 km to 501 km over the same period (Thompson, 2020). Reductions in emissions are welcome, but a substantial and long-term reduction in emissions is unlikely to emerge as an unintended consequence.

The “hard” lockdown and generally increased carefulness and adherence to non-pharmaceutical interventions (including staying at home, physical distancing, mask wearing, and better handwashing hygiene) may have led to a reduction in viral infections, gastrointestinal diseases, and other communicable conditions: influenza cases sharply declined during the Winter of 2020, for instance (Olsen, et al., 2020), and more severe communicable diseases such as tuberculosis may also have been affected. Sustaining some COVID-related improvements in hygiene and awareness could have long-lasting effects on inhibiting the spread of communicable diseases.

## **Education: Closure of Schools and Early Childhood Development Centers**

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<sup>8</sup>Analyzing crime and comparing the first week of the lockdown to the same period in 2019, Police Minister Bheki Cele reported that murders decreased from 326 to 94, rape from 699 to 101, and assaults with intention to inflict grievous bodily harm from 2,673 to 456 (figures from “South Africa: The Struggle,” 2020).

<sup>9</sup> During the first three weeks of the lockdown, the government’s call centre recorded 120,000 victims of gender-based violence and, by mid-April 2020, was receiving between 500 and 1,000 calls in the Municipality of Tshwane (Farber, 2020b).

Education has been considered an important means to reduce poverty and inequality, particularly in low- and middle-income countries (Saint-Paul & Verdier, 1993; Sen, 1990) and is inextricably linked to health, social, economic, and security status (Grossman, 1972; Fogel, 1994). Coronavirus-related school closures and declines in school attendance will have long-term consequences for children and working adults.

School closures were implemented in most parts of the world as a way to reduce the spread of COVID-19 infections. By April 2020, schools in approximately 193 countries, including South Africa, were closed. The impact of this closure, however, is not uniform across gender and economic status groups. The closures of schools affected poor households more: attendance rates of learners from poor households ranged between 14% and 19%, though it was 49% for the most affluent households (Mohohlwane, Shepherd & Taylor, 2020). More than 13,000,000 young South Africans missed close to five months of school in 2020. Recent Department of Education estimates projected that returning schooling performance to its pre-pandemic trajectory will take at least three years but may take as many as ten years (Macupe, 2021).

Early Childhood Development (ECD) programs play a substantial role in preparing children to thrive in primary and secondary school and are intended to reduce inequalities between the poor and the rich (Mbarathi, Mthembu & Diga, 2016). As of 2018, approximately 3.8 million children aged between 0 and 6 attended ECD programs in South Africa. As a result of the lockdown, this number shrank significantly, and new evidence has suggested that the ECD sector is operating at less than a quarter of pre-lockdown levels (Willis, Kotze & Kika-Mistry, 2020). Reductions in the incomes of students' families and lower-density, masking, and hygiene regulations have affected ECD programs, one of the hardest-hit sectors in education, and poor communities and women are bearing a disproportionate share of the burden of the closure of these programs (Willis, Kotze & Kika-Mistry, 2020).

In South Africa, formally registered ECD centers typically provide meals. The closure of ECD programs in March 2020 therefore contributed to increasing levels of child hunger, especially among poor households whose children depended upon these meals (Van der Berg, Zuze & Bridgman, 2020; Wills et al. 2020). Closures of ECD programs may also affect the safety and security of children's home environments (Organisation for Economic Co-Operation and Development, 2020) and could lead to increased abuse, neglect, caregiver mental illness, violence, and economic hardship (Center on the Developing Child at Harvard University, 2016).

The closure of ECD programs also shifted the burden of childcare onto adults in the household, disproportionately affecting women (Casale & Posel, 2020). This additional childcare affected women's ability to work, leading to reduced incomes which could increase hunger, especially in South Africa's large share of female-headed households.

Closures of schools and ECD centers have an impact on access to food and on household income and, therefore, affect the future health of children, but education also has a direct impact on



lifetime health, as Kaestner, Schiman, and Ward (2020) and Garcia and Heckman (2020) have reported. Such disruptions affect the vulnerable and the poor the most, serving to increase health inequalities.

## **Income: Unemployment and Loss of Income**

Arguably, the loss of livelihoods—including unemployment and the closure of businesses—was one of the biggest and most devastating economic losses associated with the pandemic. Approximately 3,000,000 jobs are estimated to have been lost during the “hard” lockdown in South Africa: one in three who had earned an income prior to February 2020 was no longer earning an income by the time of the April lockdown (Spaull et al., 2020; Ranchhod & Daniels, 2020). As many as 30% of those who lost jobs during the “hard” lockdown—about 1,000,000 people—are expected to be classified as poor post-lockdown (Jain et al., 2020). This has implications for poverty and welfare and will increase poverty and the need for government grants, which may impose an additional fiscal burden.

Job losses hit those least able to cope with the loss. Casale and Posel (2020) documented the fact that two-thirds of the 3,000,000 people who lost jobs were women, even though women represent less than half of the South African work force. Informal workers, who lack insurance and legal and social protection and who are often more dependent on daily earnings for survival, were also disproportionately affected (Rogan & Skinner, 2020). Among the informal self-employed who were working in February and March 2020, average earnings decreased by 27% in April. Women in informal self-employment experienced reductions in earnings of up to 70% over the same period. The working hours of women and men in informal employment were affected differently: during the “hard” lockdown in April, women in informal employment saw a decline of 49% in the typical number of hours worked, while the corresponding figure for men was 25% (Rogan & Skinner, 2020).

To mitigate the impact of job losses and unemployment, the South African government expanded social-protection efforts. Evidence has shown, however, that social grants have been inadequate to mitigate this poverty impact: only one in five temporarily unemployed workers received the relief designed for them and others who lost jobs were forced to rely on the existing social-grant system (Visagie & Turok, 2020). About one in three of those who lost their jobs during April 2020 received no grant payment (Jain et al., 2020). Non-South African citizens and immigrant workers are frequently cited exclusions.

Unemployment not only increases the mortality risk of the individual directly affected (Boen & Yang, 2016; Gerdtham & Johannesson, 2003), but also influences the health of the rest of the household because of the reduction in income (Nwosu & Oyenubi, 2021). Stevens et al. (2015) showed that the health of children under five and adults over 65 is most deeply affected by unemployment in the household. We should therefore anticipate that South Africa’s dramatic increase in unemployment is likely to harm health and increase mortality risk and, because its impact has been concentrated among

the vulnerable, will worsen health inequalities.

## **Food: Increased Self-Reported Hunger**

The COVID-19 pandemic has also affected global food systems, supply chains, and purchasing practices. According to the Food and Agriculture Organization of the United Nations and World Food Programme (2020), the number of acutely food-insecure people in low-to-middle-income countries could increase from an estimated 149,000,000 pre-COVID-19 to 270,000,000 before the end of 2021 if life-saving assistance is not provided urgently. Recent estimates also suggest that up to 6,000 children could die every day from preventable causes over the next six months as a result of pandemic-related disruptions to essential health and nutrition services (Food and Agriculture Organization of the United Nations and World Food Programme, 2020). This has worrying implications for the potential widening of educational inequalities and health outcomes in the longer term.

NIDS-CRAM found that almost half of respondents (47%) said that they ran out of money to buy food in April. April was arguably the hardest month because employment losses had occurred, but grants had not yet kicked in. As expected, losing a source of income during April, the first full month of the lockdown, increased the likelihood of household hunger and of running out of money to buy food (Nwosu & Oyenubi, 2021; Van der Berg, Zuze & Bridgman, 2020). The 2018 General Household Survey asked respondents whether they ever ran out of money to buy food during the course of the year and one in five (21%) said yes. These numbers cannot be compared directly, but it is apparent that hunger more than doubled during the lockdown. By June, the situation had improved somewhat but remained concerning: 37% of respondents reported that their households had run out of money to buy food during the month (Spaull et al., 2020).

Hunger struck the most vulnerable groups of society more severely. Black households and rural residents were significantly more likely to report that they experienced hunger (Nwosu & Oyenubi, 2021). In rural areas, 20% of respondents reported that someone in their household had gone hungry in the previous seven days (Spaull et al., 2020). In cities and towns, 16% and 13% of respondents, respectively, reported hunger in their household over the previous seven days (Spaull et al., 2020). Bridgman, Van der Berg, and Patel (2020) found that about 19% of the black population reported going hungry, compared to 8% of the colored population; among white households, on the other hand, the figure was negligible.

There appears to have been a strong local response to this crisis: one in five (18%) respondents reported receiving support (food or shelter) from the government (8%); from NGOs, churches, or other associations (6%); or from neighbors and the community (9%). Three-quarters of these respondents lived in households that received government grants (Wills et al., 2020).

Poor nutrition and hunger have been shown to have substantial and permanent effects,

especially in terms of their impact on the cognitive and physical development of young children. Good nutrition also influences general vitality, concentration levels, and immunity in adults and children, can decrease susceptibility to infections and illness, and is associated with increased treatment adherence and better treatment outcomes for those with chronic illnesses such as HIV and diabetes (Smith et al., 2020). Where it is absent, we should expect an increase in health inequalities.

## **Psychosocial Stress: Hardship, Uncertainty, Fear, and Worsening Mental Health**

Mental health is increasingly a health burden in South Africa. Prior to the COVID-19 pandemic, about one in ten of the adult population in South Africa was estimated to have experienced major (clinical) depression at some point in life (Herman et al., 2009; Lund et al., 2010). The COVID-19 pandemic has disrupted the personal, professional and social lives of South Africans has resulted in a significant increase in depressive symptoms from 12% in 2017 to 24% in 2020, for the subset of individuals included in both surveys.<sup>10</sup> Contrary to expectations, the pandemic reduced both the gender and the income gap in depressive symptoms.

A study by Oyenubi and Kollamparambil (2020) showed varying risk factors for depression among the poor and the rich. The higher subjective risk perception of affluent South Africans is a major contribution to increased depressive symptoms, whereas employment loss and poverty are the main factors associated with an increased likelihood of depressive symptoms among the poor. For the poor, receipt of social grants and living in extended families appear to have a protective influence.

If these observed increases in depressive symptoms endure, they will represent a significant deterioration of well-being and a substantial additional chronic care burden for the health system. Additionally, mental health problems are a risk factor for suicide and are associated with such other health problems as strokes and heart disease (Surtees et al., 2008; Nabi et al., 2008). This is, however, one dimension in which the increased burden has fallen disproportionately on the affluent and on men and, thus, such shifts have helped to reduce health inequalities.

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<sup>10</sup> Note that this comparison of depressive symptoms is based on the results of two different validated instruments. As a result of space and Computer Assisted Telephone Interviewing time constraints, NIDS-CRAM could not include the CES-D-10 instrument which was used in the NIDS panel. Instead, the team opted for the much shorter two-question PHQ-2 and adapted the instrument minimally to make it usable with Computer Assisted Telephone Interviewing. Caution is therefore advised when comparing these two instruments. Fortunately, the size of the observed increase in depressive symptoms between the NIDS 2017 and the NIDS-CRAM 2020 is very large.

## VI. Conclusion

The pandemic—and specifically the associated “hard” lockdowns in April and May and subsequent regulations and restrictions—effectively set South Africa back ten years in terms of Early Childhood Development participation, hunger, and the availability of jobs, with the burden falling disproportionately on those who could least afford to bear it.

Similar to experiences with Ebola in the Democratic Republic of the Congo, we may find that the long-term, indirect effects of hunger, unmet health needs, loss of education, and loss of employment will dwarf the direct impact of the pandemic, take longer to manifest fully, and be more enduring. Although evidence of inequality in the direct health effects of COVID-19 has been scarce, the indirect health effects are large and have hit poor households and women the hardest. The result of the unequal burden of these indirect effects can be expected to worsen health inequalities in a country that is already heart-breakingly unequal.

Our analyses of two waves of NIDS-CRAM and MatCH data allowed us to reach a finely detailed understanding of the impact of the COVID-19 pandemic and the social distribution of its adverse consequences, but there were shortcomings even in this ambitious approach. We did not have sufficient data to offer an evidence-based perspective on the way increased gender-based violence has influenced health inequalities, for example, nor to make suggestions regarding the design of targeted, evidence-based interventions.

The NIDS-CRAM survey showed that, by June 2020, hunger had decreased from its highest point in April, but was still substantially higher than pre-pandemic levels. Availability of and participation in Early Childhood Development programs also decreased. Some jobs returned by June, but most did not. Statistics South Africa’s *Quarterly Labour Force Survey* showed that only about a quarter of the 2.2 million jobs lost in the second quarter of 2020 had been recovered in the third quarter (Statistics South Africa, 2020). As expected, many of the devastating social and economic effects of the pandemic may be permanent and may need to be addressed through a series of carefully designed government and social interventions to complement existing social-assistance measures such as COVID-19 grants.

The full impact of the pandemic on health inequality could not yet be assessed at the time of our study, but our warnings regarding vulnerabilities and risks should be tracked closely over coming months. Routine data have shown that, by August 2020, healthcare use in general remained far below its pre-pandemic levels, with little evidence of recovery. Though the health inequalities we have described may be slow to manifest themselves, the decrease in the use of healthcare services happened very quickly. Of particular concern is the reduced use of public-health services at the same time that HIV testing in South Africa has fallen off—despite the fact that nearly 8,000,000 people (and one in every five adults) are living with HIV in South Africa. That may provide motivation for prioritizing the issue of healthcare access and participation on the research agenda.

Responses to the COVID-19 pandemic have been made against the backdrop of the severe fiscal constraints caused by South Africa's rising debt and the high projected costs of maintaining its dysfunctional and cash-hungry electrical utility. In the shadow of this mounting debt, government spending may be more difficult to justify. Because evidence shows that well-designed grants, education, and primary care can boost health and enhance productivity, however, such spending could be seen as a justifiable investment in that fiscal context. That said, an overreliance on government funding and service delivery would not be prudent. The weak functioning of some provincial bureaucracies and restrictions on expansion of the government workforce diminish the capacity of the government to fund recovery and limit its ability to deliver interventions at the rapid pace required.

We realize, at the same time, that development researchers have for too long accepted delays in data generation and analysis and in the formulation and implementation of responses. In the face of the humanitarian and healthcare crises of COVID-19, including severe income loss, employment insecurity, hunger, anxiety, ill-health, and increased mortality risk, numerous groups around the world have rapidly implemented innovative surveys and worked to protect vulnerable individuals and communities. In other words, delays in documenting and responding to development problems can be shortened. If interventions are implemented rapidly enough, as has been the case with COVID-19 grants in South Africa, ongoing panel surveys can monitor their impact within a useful time frame. Similarly, because data will be crucial, large household surveys and censuses should be prioritized so that changes in unemployment, hunger, and mental health can be tracked and can guide social assistance efforts and expansion of social grants. As one example, the South African population census planned for 2020 will be conducted online and telephonically in 2021, according to the website of Statistics South Africa.

The COVID-19 crisis has proven to be an opportunity for ordinary citizens and the private sector to combat hunger and provide for affected households, and the shared experience of anxiety, loss, and struggle appears to be engendering solidarity among subsections of citizens. Such displays of local commitment and investment are encouraging and much needed because South Africa undoubtedly faces a decade of increased hardship and difficult choices.

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## Appendix

### **NIDS Panel and CRAM-NIDS Wave 1 and 2, 2020**

Our analysis relied on data from the National Income Dynamics Study (hereafter, NIDS) and the NIDS-Coronavirus Rapid Mobile Survey (CRAM). CRAM was a follow-up survey based on a carefully selected subsample of 7,074 individuals from the NIDS panel. The CRAM survey focused on how the lockdown and the threat of COVID-19 affected migration, jobs, income, nutrition, and health. NIDS was instituted as a nationally representative panel study following the lives of 28,000 South Africans every two years since 2008. NIDS was managed by the South African Labour Development Research Unit at the University of Cape Town.

The NIDS-CRAM survey data were obtained through batch sampling of adults aged 15 and older in South Africa in Wave 5 (2017) of the NIDS survey and by dividing the sample into ninety-nine strata according to household per capita income decile, age, race, and urban/rural place of residence. A first batch of 2,500 respondents was randomly drawn from the ninety-nine strata and approached to participate in NIDS-CRAM. Next, higher numbers of participants from strata with lower response rates were sampled, and lower numbers from strata with higher response rates, until equal representation was reached from all strata. In total, 17,568 individuals were asked to participate, and 7,074 (40%) completed the questionnaire. The data collection for Wave 1 occurred between 7 May and 27 June 2020. The sample weight of each individual in NIDS-CRAM was a function of the corresponding 2017 NIDS sample weight and the sampling rate of each stratum in NIDS-CRAM.

The NIDS-CRAM Wave 2 questionnaire was adapted to account for changing circumstances and context and was administered to the same sample between 13 July and 13 August. Interviews were conducted with 5,676 of the original 7,074 respondents (an attrition rate of 19%), including twenty-two (or 0.3%) Wave 1 respondents who had died, seven who had moved overseas, and seventeen who were classified as uncontactable. Attrition was notably higher among urban residents, the employed, those with missing information on household income in the first wave, and the most affluent. Panel weights corrected for this attrition and for non-response in Wave 1 by adjusting Wave 1 weights by the inverse of the probability of a Wave 1 respondent being re-interviewed in Wave 2. The analysis here is based on a balanced sample—only including respondents who were interviewed in both waves of the survey, unless otherwise indicated.

The original NIDS sample, which was nationally representative in its first Wave in 2008, experienced four rounds of attrition, and consequently 2017 Wave 5 sample was no longer fully representative of South Africa. Additionally, the inevitable reliance on telephonic interviews during the lockdown affected both responses and interviewees' willingness to participate—challenges that affected other surveys as well.

In our analysis, we did not examine variation by province because NIDS and NIDS-CRAM data were stratified by district council. As a result of concerns about the reliability of geographical information in Wave 1, we used Wave 2 geographical information for all individuals who had not moved since Wave 1.

CRAM provided information regarding age and chronic disease (based on self-identification in CRAM Wave 1), and three-year-old biometric data were available from NIDS Wave 5: the survey captured both BMI and blood pressure. Though they were three years old, these biometrics were nonetheless useful, though we acknowledge that our reliance on historic measurements meant that we had no way to capture respondents who had recently become obese, overweight, or hypertensive.

**Appendix Table 1 provides a basic descriptive analysis on the NIDS-CRAM Wave 1 sample.**

### **MatCH survey, 2020**

The MatCH Short Message Service (SMS) survey (Coronavirus Rapid Mobile survey of Maternal and Child health) leveraged the MomConnect mhealth platform, which provides excellent coverage of pregnant women and new mothers. According to Lefevre et al. (2018), in 2017, more than half of the women who received public-sector prenatal services were registered on the MomConnect platform. We drew a self-weighting sample of 15 000 pregnant women and new mothers from the MomConnect database and stratified the sample on the basis of province, gestational age or age in months of babies, respondents' type of phone.

The National Department of Health gave permission for the survey of patients and analysis of monthly District Health Information System data for consequences of the pandemic, and ethics approval came from the University of Stellenbosch's Research Ethics Committee for Social, Behavioural, and Education Research (Project 14926 on 15 June 2020).

The 15,000 women received an invitation to join the SMS survey on the afternoon of 24 June 2020. They could respond by SMS to indicate a willingness to participate in the survey, a desire not to participate, or send a request for more information. Those who participated in the survey received R10 in airtime. Assuming a response rate of 20%, we aimed to achieve a survey sample of 3,000, ultimately realizing a sample of 3,140 (an effective response rate of 21%). Descriptive statistics for the MatCH SMS survey are included in Appendix Table 2.

The survey covered nutrition, depressive symptoms, access to prenatal care, vaccinations, and anti-retroviral therapy. We examined impediments to healthcare access by asking respondents who had not received care or medications the reason for non-attendance.

We created poverty quintiles for all respondents by constructing poverty quintiles for the feeding areas of all primary care public health facilities. Because of the focus on access to primary

care and because MomConnect registrations took place at local primary care facilities, we extracted only information on public sector primary care facilities—clinics, community health centers, and community day centers—from the government database of facilities. Each small census area was then linked to the closest public primary care facility using geographic information system codes to create a catchment area for each facility.

Poverty quintiles were estimated by deriving a measure of living standards and wealth measure via a Principal Component Analysis that used employment status, education, earnings category, household size, and cell phone and car ownership. Component 1 scores, which were used to calculate wealth scores for each small census area and then aggregated over the entire catchment area, weighted by the population size, appear in Appendix Table 2. We calculated poverty quintiles for the facility's feeder communities and matched our sample of respondents in MatCH to these poverty quintiles via the MomConnect facility identifier, which showed the facility where each mother was registered.



**Appendix Table 1: NIDS-CRAM Wave 1 Descriptive Statistics**

<b>Variable</b>	<b>Count</b>	<b>%</b>
Total	7,074	
Mean age (Standard Deviation)	38.81 (15.43)	
<b>Gender</b>		
Man	2,754	38.9
Woman	4,314	60.9
Other	6	0.1
<b>Population</b>		
African/Black	6,048	85.5
Colored	612	8.7
Asian/Indian	79	1.1
white	325	4.6
Other/Refuse/Don't know	10	0.1
<b>Education</b>		
Grade R/No Schooling	398	5.6
Primary Education	982	13.9
Secondary Education	3,877	54.8
Tertiary Education	1,817	25.7
<b>Experienced the following symptoms: sore throat, fever or cough</b>		
Yes	615	8.7
No	6,396	90.4
Don't know/Refused to answer	63	0.9
<b>Experienced shortness of breath 4 weeks prior to the survey</b>		
Yes	209	2.9
No	6,857	96.9
Don't know/Refused to answer	8	0.11
<b>Injuries 4 weeks prior to the survey</b>		
Yes	205	2.9

No	6,862	97.0
Don't know/Refused to answer	7	0.1
<hr/>		
Requires care for a chronic condition		
Yes	1,613	22.8
No	5,447	77.0
Don't know/Refused to answer	14	0.2
<hr/>		
Visited a health facility		
Yes	1,687	23.9
No	532	7.5
Refused to answer	5	0.1
<hr/>		
Type of health facility visited		
Private doctor/Clinic	160	2.3
Private hospital	42	0.6
Public clinic	1,224	17.3
Public hospital	197	2.8
Pharmacy	45	0.6
Traditional healer	3	0.04
Other	10	0.1
Gets advice over the phone/Internet	1	0.01
Don't know/Refused to answer	5	0.1
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**Appendix Table 2: MatCH Descriptive Statistics**

Variable	Count	%
Total	3 140	
Mean Age (Standard Deviation)	27 (5.5)	
Stage of pregnancy/age of baby		
Second trimester	298	9.5
Third trimester	612	19.5
0-6 months	1,068	34.0
6-12 months	1,162	37.0
MomConnect platform for interaction		
WhatsApp	1,435	45.7
SMS	1,705	54.3
Province		
Eastern Cape	240	7.6
Free State	151	4.8
Gauteng	812	25.9
KwaZulu-Natal	587	18.7
Limpopo	499	15.9
Mpumalanga	375	11.9
North West	223	7.1
Northern Cape	39	1.2
Western Cape	214	6.8

Is anyone in your household receiving a Child Support Grant or an Old Age Pension?		
Yes	907	66.0
No	388	28.2
Don't want to answer/Don't know	79	6.0