



WAVE 1

National Income
Dynamics Study (NIDS) –
Coronavirus Rapid Mobile
Survey (CRAM)

Examining the unintended health consequences of the COVID-19 pandemic in South Africa

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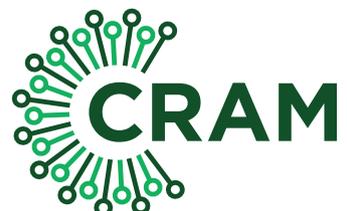
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N.i.D.S.
NATIONAL INCOME DYNAMICS STUDY



CORONAVIRUS RAPID MOBILE SURVEY 2020

Examining the unintended health consequences of the COVID-19 pandemic in South Africa

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Abstract

Our study examined the unintended health consequences of the COVID-19 pandemic in South Africa. We considered access to acute and chronic care amongst the general population with our NIDS-CRAM (Coronavirus Rapid Rapid Mobile Survey) telephone interviews, and access to vaccinations, ARTs and antenatal care by pregnant women and women with infants in the public sector with our MATCH (Maternal and Child Health) SMS survey. We find that within the range of care and treatment types that we examined, the impact has been varied, with the highest-stakes type of care seemingly least affected. Chronic care and care of infants have been least affected. We find that 22% of those who needed acute health care, did not seek care. Also, 16% of pregnant women and mothers of infants in our public sector sample have not been to the clinic for two months. We find it particularly concerning that 11% of the public sector mothers in our sample who need ARTs have run out of ARTs. Overwhelmingly, fear of contracting the Coronavirus is the most frequently cited reason for not seeking care or not accessing treatment.

¹ Cari van Schalkwyk - Stellenbosch University & DST-NRF Centre of Excellence in Epidemiological Modelling and Analysis (SACEMA). We want to thank Kai Barron, Peter Barron, Najma Shaik, Graeme Hoddinott, Mark Tomlinson, Jonatan Daven, Noxolo Madela, Anita Bron, Sophie Pascoe, Lawrence Long and Amnesty Lefevre for their useful feedback on our instrument design. We want to thank Cobus Burger, Pamela Halse, Alex O'Riordan and Glen Takalani for their superb research assistance. Thank-you in particular to Cobus Burger who helped us calculate poverty quintiles for the MATCH sample and to thank Reza Daniels, Tim Brophy and Kim Ingle from the South African Labour and Development Research Unit for their relentless commitment to data quality and their attention to detail. All remaining mistakes, however, remain entirely our responsibility.

Executive Summary

This policy paper examines the unintended health consequences of the COVID-19 pandemic in South Africa. We consider how the virus and the government's response to the virus have affected access to healthcare and treatment using evidence from our unique MATCH and NIDS-CRAM data sets that were developed to consider the adverse social and health effects of the pandemic. Specifically, we consider access to acute and chronic care amongst the general population with our NIDS-CRAM data set, and access to ARTs, vaccinations and care by public sector mothers - specifically, pregnant women and women with infants who use the public sector -- with our MATCH data set. We find that there were significant unintended consequences of COVID-19, but these consequences varied based on the type of care and the patient group.

The analysis of our MATCH survey of public sector mothers found that:

- 16% of the mothers and pregnant women reported having last visited a hospital and a clinic in April or earlier. They were surveyed from 24 to 30 June, and thus this represents an approximate two-month gap in care, which is considered to be a risk for this group of women - but would admittedly vary substantially based on the individual's health. Pregnant women are advised to visit the clinic every six weeks
- 1-in-4 of women whose babies needed key vaccinations over the past two months have not been to the clinic in 2 months, evidence of missed or delayed vaccinations.
- 11% of mothers living with HIV ran out of ARTs
- 5% of mothers whose children needed care or vaccinations did not seek care

The analysis of our NIDS-CRAM survey of the South African population found that:

- 23% of the survey sample reported that they could not access medication, contraceptives or condoms over the past 4 weeks
- 22% of those who needed acute care, did not seek care
- 4% of those who needed chronic care, did not seek care

Overall, we found that a very large share of unmet health care needs is attributed to Coronavirus fears, so it is clear that the pandemic has had considerable unintended public health consequences. There is also evidence of some protective effect of affluence, which may partly operate via access to insurance. We also found that Coronavirus fears are more of an impediment amongst the poorest and most vulnerable groups.

We consider these estimates to be conservative because we focus on high-stakes types of health demand. Given the potential consequences of ART interruptions for pregnant and breastfeeding mothers, we would expect this patient group to be less likely to run out of ART than other patients. While both surveys benefited from large and well-represented sampling frames, and careful stratification, nonresponse bias remains a risk, especially with telephone and SMS surveys where nonresponse is known to be higher.

Policy-recommendations include

- Contracting private sector GPs to help support the additional demands on primary care
- Deploying community health workers more effectively as service linkers
- Expand Centralised Chronic Medicines Dispensing and Distribution (CCMDD) to cover a wider range of medications
- Strengthen local coordination structures
- Understanding the cost of using fear to motivate behaviour change
- Helpline for at-risk patients who run out of medication

Introduction

South Africa reported its first case of COVID-19 on 5 March 2020. As of 3 July, South Africa has conducted a total of 1 745 153 tests, and identified 177 124 positive cases, reported 9 063 new cases, 86 298 total recoveries and 2 952 deaths (amounting to a case mortality ratio of 2%) (SA Government, 2020).

The COVID-19 pandemic has had a direct negative impact on access to non-COVID-19 related healthcare. In May, the Gauteng Provincial Health Department noted that close to 11,000 HIV patients have failed to collect their medicines since the start of the lockdown period. At the same time, Francois Venter from WITS said that headcounts at Johannesburg clinics have decreased by between 30% to 70% since the COVID-19 pandemic (Cullinan, 2020). Private practitioners have also been hit by lower demand for healthcare, causing reductions in revenue ranging between 45% to 60% according to the South African Private Practitioner's Forum (Mashego, 2020).

Statistics South Africa's (2020) coronavirus internet survey has provided some preliminary insights about impediments to healthcare access. They find that 9% of respondents had problems with access to their chronic medication, with 55% of the respondents fear contracting the virus, 26% worry about arrests or fines and the remainder cite problems with transport. Stats SA also finds that a high share of respondents say they would be reluctant to seek medical care for non-COVID-19 related illnesses during these times, with the share ranging between 35% and 39% for those living in the CBD and suburbs, and 48% and 73% for those living in townships or informal settlements. Apart from immediate concerns with contracting the COVID-19 virus, healthcare access may also decrease as time away from work and/ or shorter working hours may lower incomes and, with that, workers' ability to pay for transport to access healthcare. It is important to note that these estimates are likely to underestimate the problem because the StatsSA survey is severely biased towards the top of the income distribution with 81% of respondents having tertiary education and only 1% of respondents living in informal housing.

These findings align with projections from other research. Robertson et al (2020) modelled the impact of reductions in health access under different scenarios in low-and-middle-income countries during the COVID-19 pandemic. They found that it could lead to a 9-45% increase in monthly under-five child deaths and 8-39% increase in monthly maternal deaths. WHO and UNAIDS (2020) models estimate that unless there are effective interventions, the COVID-19 response in sub-Saharan Africa could lead to a six-month disruption of antiretroviral therapy, which could cause up to 500 000 additional deaths from AIDS-related illnesses.

Analysis of past epidemics has shown that the indirect health costs can be of a similar magnitude to the direct health costs of the epidemic itself. For example, Sochas, Channon and Nam (2017) provide evidence from Sierra Leone suggesting that the number of direct deaths due to Ebola between 2013 and 2016 was of a similar magnitude to the number of additional maternal, neonatal and stillbirths during the period due to the decrease in access to healthcare.

The unintended consequences can operate via demand-side and supply-side factors. Fear of the virus and infection in terms of postponement of both chronic and acute care has been a frequent theme with regards to indirect health effects of COVID-19, not only in South Africa but also globally. The indirect costs of care-seeking may have increased during the early phases of the COVID-19 pandemic and associated lockdown. During the early phases of lockdown, people would have had to travel past police and defence force stops and there may have been a fear and hassle factor related to this. Also, the relative cost of travel may have increased due to decreased incomes, as explored in other policy papers using the data from Wave 1 of NIDS-CRAM, during the lockdown.

There are also concerns about supply-side effects. Discouragement of certain types of health-seeking and postponement of elective and preventative care in South Africa due to increased possibility of infection in hospitals and healthcare facilities. Supply-side effects can also operate via displacement of healthcare. For example, COVID-19 testing may displace TB testing as COVID-19 uses Gene Expert technology typically used for TB testing. Tuberculosis testing in South Africa

began to decline in the early stages before the lockdown, and these testing volumes declined more rapidly during the level 5 lockdown restrictions (National Institute for Communicable Diseases, 2020). The National Institute of Communicable Diseases concluded that the reduction in testing was most likely due to decreased movement of people and fewer accessing health care (National Institute for Communicable Diseases, 2020). A shift of resources has also been observed since the beginning of the fight against COVID-19 as some existing hospitals' wards for acute or other care have been converted for COVID-19 care. For example, some of Tygerberg Hospital's TB wards were converted to COVID-19 wards (Steyn, 2020).

It is possible that COVID-19 may generate longer-term resourcing effects, with a movement away from South Africa's typical critical burden of disease areas towards COVID-19 infection control and greater hospitalisation capacity. Although the emergency budget has made provision for additional COVID-related health expenditure, it is not yet clear how resourcing decisions at provincial levels will be affected over the next two to three years.

The above demand- and supply-side factors mostly highlight the likely drivers of individuals interactions (or lack thereof) with the *health system*. It does not, however, consider how COVID-19 may impact health status indirectly through channels that do not run through the health system but that are more specific to the individuals' experience of the pandemic and associated lockdown approaches. Pandemics and unprecedented natural disasters can have longer term effects on the mental health status of individuals. In a vulnerable sample of low-income mothers in New Orleans, it was found that both mental and physical health deteriorated up to one year after the Hurricane Katrina disaster, with some effects (using longitudinal data) persisting even up to 12 years after the event (Raker et al., 2020).

It is, however, important to recognise that pandemics like these could also generate long-lasting positive health consequences through, for example, greater awareness of infection control and handwashing. School closures may have generated short-term reductions in paediatric infections. There was also less movement and travel overall during this period which means reduced exposure to all viral infections. The US realized a decline in the number of reported gonorrhoea cases from the male Homosexual community in San Francisco after the outbreak of the HIV pandemic (Aguero & Beleche, 2017). While in Mexico, during the 2009 outbreak of influenza (H1N1), the country saw a decline in the second main cause of child death (Aguero & Beleche, 2017). Some potential positive effects that many emanate from the COVID-19 pandemic include a reduction in various viral infections, gastrointestinal diseases, due to increased handwashing. Business Insider South Africa also reported that during the early phases of lockdown, part of the most searched terms on Google was "COVID-19 news", indicating that people wanted to stay informed about the virus.

It is important to acknowledge that certain groups are likely to be more vulnerable than others in terms of immediate indirect health impacts -- in particular, we are concerned about women and children. Evidence from past pandemics indicates that more resources are diverted from routine health services, especially for women and children. During the Ebola pandemic in West Africa, there was a sharp decline in the utilisation of antenatal and postnatal care. Women had limited access to already limited sexual and reproductive health services, which resulted in a spike in the deaths of mothers and children from health issues not related to Ebola (Ribacke, et al., 2016). A situation like this could also lead to an increased number of unsafe abortions performed. The World Health Organization reported in April that 24 countries have delayed measles immunization for children since the outbreak of COVID-19. This leaves more than 117 million children at risk of not receiving this life-saving vaccine if COVID-19 continues to spread (World Health Organization, 2020).

Research questions and data

In order for policymakers to make informed decisions on how to address the many challenges that COVID-19 is presenting (both direct and indirect, health-related and economic) it is of critical importance that they have current and accurate information. Unlike with Ebola in Sierra Leone,

where the indirect effect was measured only months afterwards, our aim is to measure access to health-care regularly during the coming months, thereby providing policymakers with rapid up-to-date information that will help inform their decisions and ability to respond rapidly.

Neither the modelling exercises, nor the ex-post analysis of the Ebola epidemic provides a clear picture of how COVID-19 has and will affect access to healthcare and, more fundamentally, health outcomes in South Africa. The research cited above demonstrates that even while we are fighting the immediate and salient threat of the COVID-19 pandemic, it is imperative that we also pay careful attention to the indirect threat it poses through impeding access to healthcare for pregnant women, young mothers and those with chronic conditions such as HIV. The anecdotal evidence, biased surveys and patches of administrative data are sufficient to demonstrate that there is a problem, and perhaps even an emerging calamity, yet we have no reliable, nationally representative, rapid data to guide decision making and policy responses.

We have access to three data sets to consider how care and treatment have been affected by the pandemic. Two of these -- NIDS-CRAM Wave 1 and a MATCH survey of Momconnect mothers -- are unique data sets designed specifically to answer these questions. We also use the Census data to create poverty quintiles for mothers in our MATCH survey. To do so, we use the GIS code of the facility where mothers were registered and match it to the Census GIS codes for small areas. In the section below we provide more information on NIDS and CRAM. We describe the matching to the Census but do not provide more information about it because it is a well-known data source, and not central to this analysis.

CRAM-NIDS Wave 1, 2020

CRAM is a national survey of 7074 adults drawn from the NIDS wave 5 sample. In turn, NIDS is a national panel study following the lives of the same 28 000 South Africans and those they live with every two years since 2008. NIDS was founded and is managed by the South African Labour Development Research Unit. It should be borne in mind that the NIDS wave 5 sample has endured four rounds of attrition since the first draw in 2008, and have consequently become increasingly less representative of South Africa over time. Despite such caveats, this sampling frame was the best feasible strategy given the restrictive parameters for research during the lockdown.

NIDS-CRAM survey's first wave interviewed a subsample of adults from households in the National Income Dynamics Study (NIDS) Wave 5 between 7 May and 27 June 2020. The same group of individuals is phoned each month and is asked a range of questions about their income and employment, their household welfare, receipt of grants, and about their knowledge and behaviour related to COVID-19. This paper reports on the first wave, but there are at least three further waves planned. The surveys are conducted as Computer Assisted Telephonic Interviews (CATI), in the respondent's preferred language. Each participant received a R20 airtime voucher per wave to thank them for participating. It needs to be acknowledged that the reliance on telephonic interviews will affect both how people respond to questions and their willingness to participate in the survey. However, given the parameters for surveys during the lockdown, these challenges will also be experienced by other surveys. The aim of this survey is to provide inputs on key outcomes such as unemployment, household income, child hunger, access to government grants and hunger.

The NIDS-CRAM survey sample was obtained through a batch sampling process of participants in the fifth wave of the 2017 NIDS survey. In 2017, this survey was broadly representative of adults aged 15 and older in South Africa. The batch sampling process involved dividing the 2017 NIDS sample into 99 strata according to household per capita income decile, age, race and urban/rural place of residence. At first, a batch of 2500 respondents was randomly drawn from each of the 99 strata and was approached to participate in NIDS-CRAM. Then, higher numbers of participants from strata with lower response rates were sampled, and lower numbers from strata with higher response rates, until the final size was reached with equal representation from all strata. In total, 17 568 individuals were asked to participate, of whom 7074 (40%) completed the questionnaire. The sample weight of each individual in NIDS-CRAM is a function of the corresponding 2017 NIDS sample weight and the sampling rate of each stratum in NIDS-CRAM.

Relating to our research questions here, the NIDS-CRAM survey included questions related to access to chronic medication, chronic care and acute care. We also examine impediments to access through follow up questions asking the respondents why they were not able to access care, with potential answers including fears about arrest or fines; fears about contracting COVID-19; problems with available transport; problems with paying for transport; stock-outs at the facility.

We do not examine data using provincial breakdowns because the sample stratification was by the district council. We also do not consider rural-urban divides in our analysis because of concerns about the reliability of these indicators in wave 1 of the survey. An important caveat to interpreting the income quintile results is that the income variable was imperfectly measured, implying that we can only calculate income quintiles for two-thirds of the sample. All other analysis in this section uses the full NIDS-CRAM sample.

MATCH survey wave 1, 2020

The MATCH panel SMS survey (Coronavirus Rapid Mobile survey of Maternal and Child health) leverages the Momconnect mhealth platform, which has excellent coverage of pregnant women and new mothers. According to Lefevre et al (2018) in 2017, more than half of the women attending public sector antenatal care services were registered on the Momconnect platform. We drew a self-weighting sample of 15 000 pregnant women and new mothers from the database of Momconnect users who are either currently expecting or have had a child over the past year. The sample was stratified based on province, gestational age or age in month of their baby and their type of phone.

The 15 000 women all received an invitation to join the SMS survey on the afternoon of 24 June. They could respond by SMS with "JOIN" to participate in the survey, by SMSing "STOP" to not participate or to reply with "MORE" if they needed more information. Those who participated in the survey received R10 in airtime. Assuming a response rate of 20%, from the targeted sample of 15 000 women, we aimed to achieve a survey sample of 3000 and realised a sample of 3140 and thus had an effective response rate of 21%.

The survey covers nutrition, depressive symptoms, access to antenatal care, vaccinations and ART. We examine impediments to access through asking the respondents who did not access care or collect their medicine, why they did not. Potential answers include fears about contracting COVID-19; problems with available transport; long waiting times, or stock-outs at the facility.

We received permission from the National Department of Health to survey their patients and have ethics approval for this work from the University of Stellenbosch's Research Ethics Committee for Social, Behavioural and Education Research [project 14926 on 15 June 2020] as part of the rapid Coronavirus research stream.

We created poverty quintiles for all respondents via constructing poverty quintiles for all primary care public health facilities. Because of the focus on access to primary care and because the Momconnect moms' registrations are at their local primary care facility, we extracted only public sector primary care facilities -- clinics, community health centres and community day centres -- from the government database of facilities. Each small area place in Census was then linked to their closest public primary care facility, using the GIS codes in both the Census and the national facility database to create a catchment area for each facility.

We created poverty quintiles by deriving a measure of living standards and wealth measure via Principal Component Analysis (PCA), using employment status, education level, earnings category, household size and cell phone and car ownership. The component 1 scores are shown in Appendix Table 1. The PCA was used to calculate wealth scores and these were aggregated over the entire catchment area, weighted by the population size of each small area place in the Census 2011. We matched our sample of respondents to these poverty quintiles via the Momconnect facility identifier, which captures the facility where the mother was registered.

Results

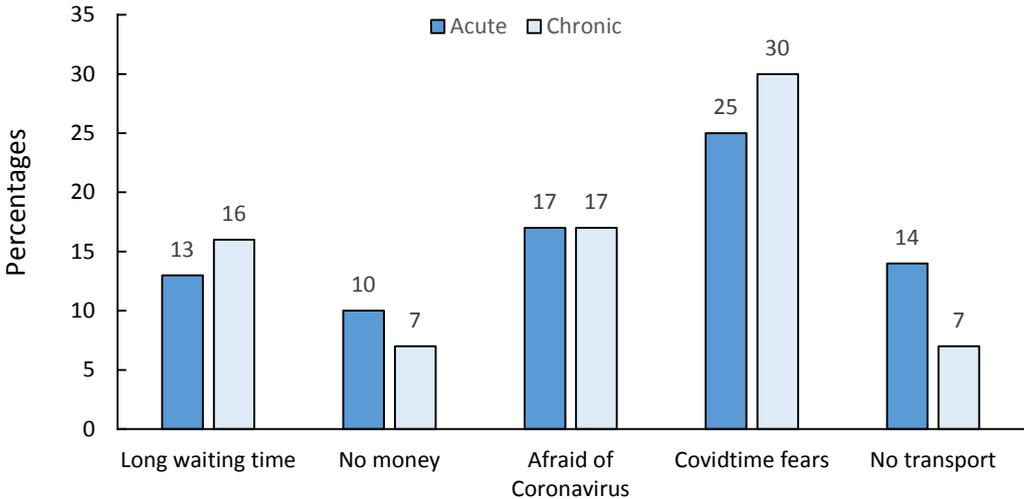
Acute and chronic care

We find concerning evidence of unmet health needs. According to the NIDS-CRAM data set 9% of the respondents required acute health care over the four weeks prior to the study, reporting symptoms that in their opinion required attention. Respondents were broadly asked to report injuries or illness, but also specifically about fever, sore throat, coughing or shortness of breath. We distil health needs for these questions by excluding those who said that they did see a health worker because they did not require care for their symptoms, illness or injuries.

Of those that needed care, 22% did not visit a healthcare facility. Respondents could provide more than one reason why they did not seek care. It is worrying that the most frequently cited reason was fear. 25% of respondents who did not seek care for acute health needs mentioned fear as a reason -- either just being afraid, or being afraid of being fined or being afraid of contracting the Coronavirus. The latter category dominates this group, cited by 17% of those who did not seek care. Other frequently cited reasons included transport problems (14%), long queues (13%) and a lack of money (10%). All of these impediments could have been exacerbated by the Coronavirus, but if we conservatively categorise only the respondents who cited Corona-time fears as the Coronavirus-associated impact on health-seeking - but optimistically assume all of them would have sought care ordinarily--, we can derive an estimate of a 33% rise in unmet acute health care needs due to unintended consequences of the pandemic.

The survey also asked about access to chronic care during these times: 18% of respondents reported needing to see a healthcare worker regarding a chronic condition such as diabetes, TB, hypertension or HIV within the previous four weeks. Again, we excluded those who said that they did not consult a health worker, because they did not need care. The majority of these chronically ill individuals did receive healthcare (96%). Amongst the 79 individuals that reported needing healthcare but not receiving it, the most prevalent reasons were COVID-19 related fears (30%), including fears of contracting the virus (17%). Other reasons included long queues (16%), not having money (7%) and transport problems (7%). Figure 1 below illustrates the reasons for unmet healthcare for both chronic and acute care.

Figure 1. Reasons for unmet health needs for acute and chronic care



Source: NIDS-CRAM wave 1 (2020), data has been weighted

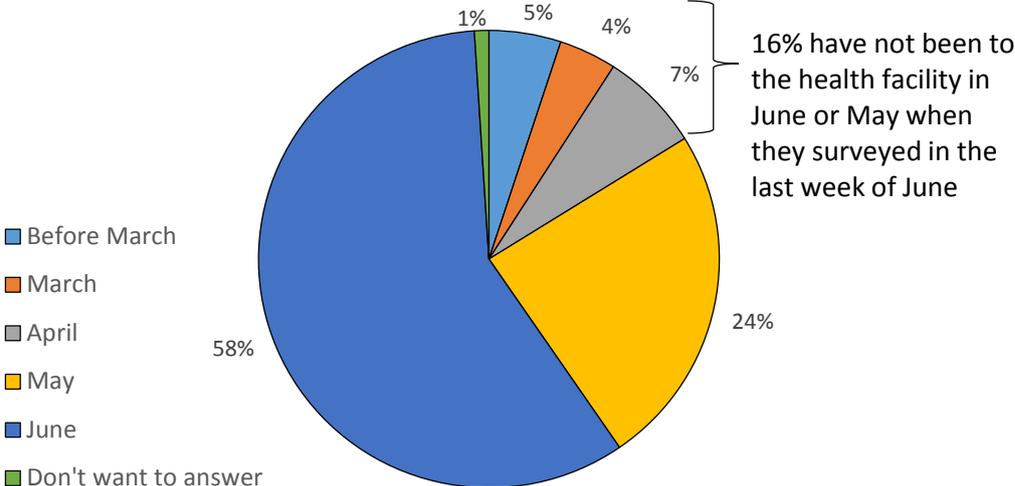
Turning to the MATCH survey, we find that 22% of MATCH households reported that a child in their household was either sick or in need of a vaccination. Of this group, 35 of 684 women (5%) who reported that there were children needing care did not visit a healthcare facility or worker. 19 of the

35 women (54%) reported that they did not go because they were afraid of getting the Coronavirus. A further four women (11%) each reported that the child did not need care or that long waiting times discouraged them. Although only suggestive because the samples are relatively small and not directly comparable, the lower levels of unmet acute health care needs amongst children (cf. the adult population in CRAM) are aligned with expected parental behaviour, especially given that the babies in this sample are all younger than a year, and thus still particularly vulnerable.

Healthcare visits by pregnant women and mothers with infants

Among 3140 women who participated in the survey, the majority (58%) reported attending a healthcare facility in June and 24% in May. The respondents completed the SMS survey between 24 and 30 June, so it is concerning that Figure 2 below shows that 16% of the women last visited a facility in April or earlier -- approximately two months ago at that time. Pregnant women in their second and third trimester are required to visit the clinic every six weeks. Additionally, we have 300 moms in our sample who had babies who were 8 to 16 weeks old babies at the time of the SMS survey. 25% of these moms have not been to the clinic in 2 months, providing evidence of missed or delayed vaccinations (at 6, 10 or 14 weeks).

Figure 2. Month of last healthcare visit



Source: MATCH wave 1 (2020)

Figure 3 below shows that for the 513 women (16%) whose last visit to a facility was in April or earlier, 37% (185) said they didn't go because they were afraid of the virus while 30% (150) said they didn't need to go.

If we conservatively assume that COVID-19 increase in non-attendance is represented by the group of women who cite Coronavirus fears as the reason for not going, then the COVID-19 pandemic has resulted in a 56% decrease in healthcare visits for our sample of mothers. This calculation assumes that the women who said that they did not visit the clinic recently due to Coronavirus fears would have visited the clinic in the absence of the pandemic. It may be an overestimate because it is not clear whether all of the women who cite Coronavirus fears would have visited the clinic under more normal circumstances. But, on the other hand, some of the other cited constraints such as transport problems may also have been affected by the lockdown and the reduced levels of economic activity during these months.

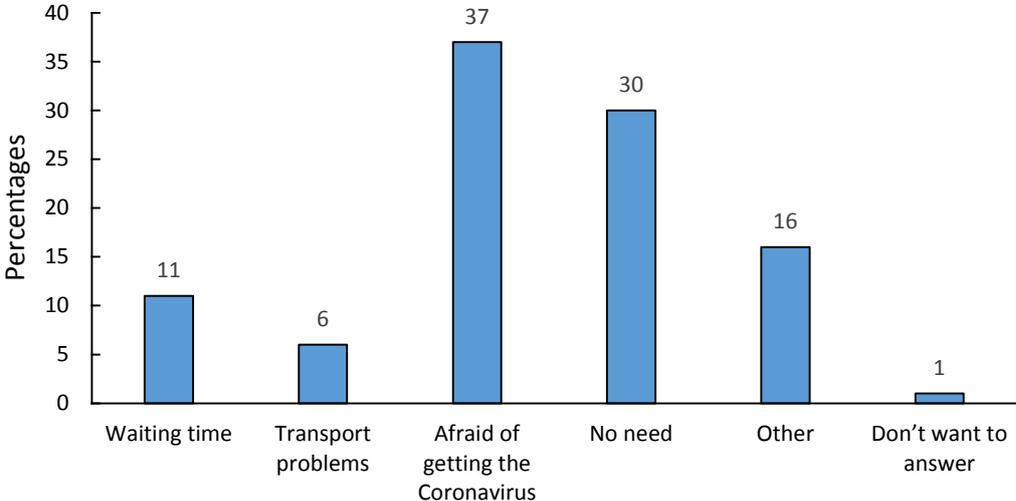
Table 1 below shows that this effect is concentrated amongst the mothers who have given birth and in particular those with older babies. We find that pregnant women were less likely to report that they have not been to the facility for two months: only 5% (or 44 of the 910 pregnant women) have

not been to the health facility since April. Of these 44 pregnant women, 21% said they didn't need to go. Although the sample size is small, it is concerning that a fifth of pregnant women thought it unnecessary to receive care for a two month period.

A much higher share of the mothers who had already given birth reported not having been to a health facility since April: 153 of the 1068 women with 6 months or younger have not visited a health facility over the past two months. 48% were afraid of catching the Coronavirus and 31% felt that there was no need for them to go.

Amongst mothers with babies aged 6 to 12 months, there was an even higher likelihood of not having been to the health facility since April: 27% (316 of 846 mothers) reported that they have not been to the health facility over the past two months. Of the 316 mothers who have not been to the health facility recently, 39% (121) said they were afraid of contracting the Coronavirus and 32% (99) said that there was no need to go.

Figure 3. Why have you not visited the health facility over the past two months?

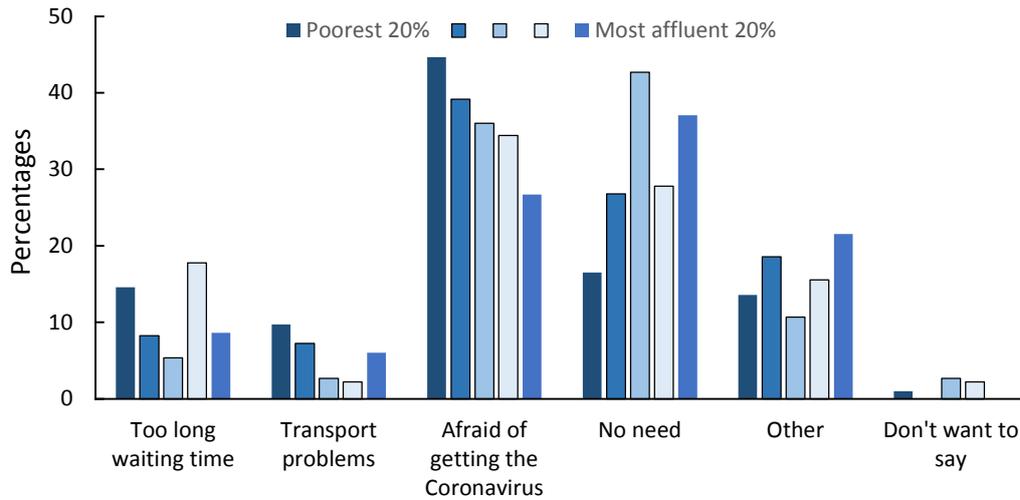


Source: MATCH wave 1 (2020)

Table 1. Reasons for not going to clinic or hospital for two months, by trimester and baby age in months

	Second trimester		Third trimester		Babies 0 - 6 months		Babies 6-12 months	
Waiting time	4	24	2	7	19	13	28	9
Transport problems	2	12	4	15	11	7	14	5
Afraid of getting the Coronavirus	4	24	12	44	48	32	121	39
No need	4	24	5	19	41	28	99	32
Other	3	18	4	15	25	17	49	16
Don't want to answer	0	0	0	0	4	2.7	1	0.3
Total	17	100	27	100	148	100	312	100

Figure 4. Reasons for not visiting the health facility recently and poverty quintiles



Source: MATCH wave 1 (2020)

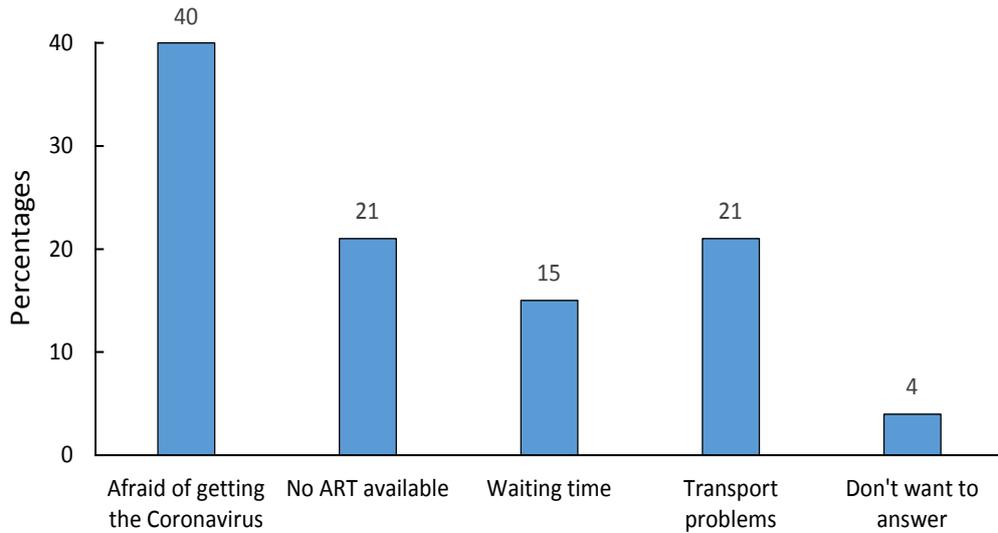
This sample of women all attended public sector healthcare and is therefore not representative of South Africa in terms of income. As described earlier, we have linked information on income from Stats SA census data and can investigate income disparities within our sample. When we explore healthcare attendance by income group, the wealthier 60% of mothers were slightly more likely to attend in the last two months than the poorer 40% (86% vs 83%). However, of those who did not access care, 45% of the poorest 40% of respondents reported fear of contracting the virus as the reason while such fears were less frequently cited (33%) amongst the remaining 60% of women.

Access to medicine, contraception and condoms

Of the 3140 individuals sampled in the MATCH survey, 3,047 answered the question about ART use. Of those, 1385 (46%) said that they did not require ART. Of the 1610 women who require ART 11% (175) said they run out. This fraction is very concerning as interruption in ART risks the health of the mother, as well as increasing the risk of transmission to the baby, whether vertical or through breastfeeding. For the same reason, we would expect ART adherence to be considerably higher for this group than for others and therefore consider this to be an underestimate of ART interruptions amongst the full population.

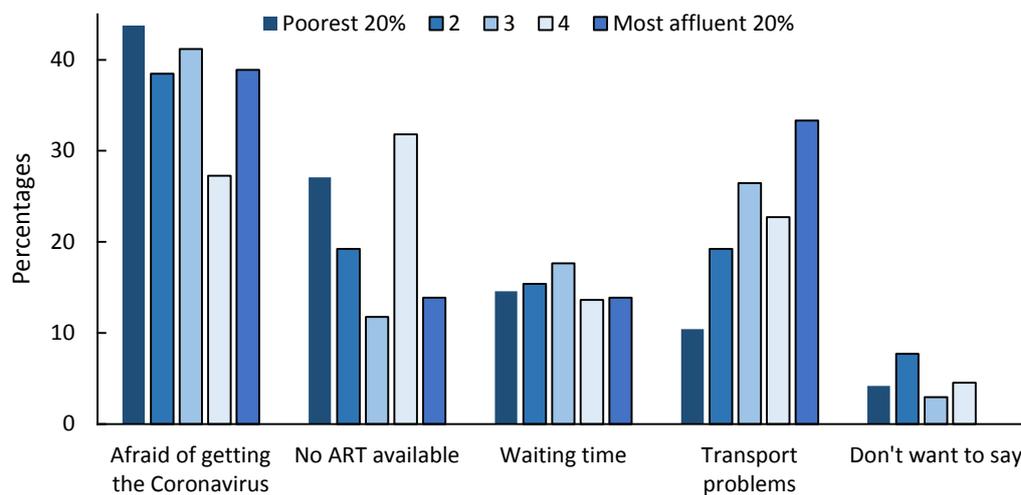
An unacceptably large fraction (21%) said that ART was not available at the facility, while the remaining women had issues with transport and long waiting times (illustrated in Figure 5 below). Of the 175 mothers who ran out of ART, 67 (40%) said that they didn't go to the facility due to fear of contracting COVID-19. If we classify this as the COVID-related rise in ART interruptions it would mean that ART interruptions increased by 62% due to the unintended consequences of the pandemic.

Figure 5. Reasons for running out of ART



Source: MATCH wave 1 (2020)

Figure 6. Reasons for running out of ART, by wealth quintile



Source: MATCH wave 1 (2020)

Of the 7074 participants in NIDS-CRAM, 1524 (18%) reported having a chronic condition such as HIV, TB, lung condition, heart condition or diabetes. According to Table 2 below, almost a quarter (23%) of respondents reported not having access to the medication, condoms and contraceptives that they needed. The table summarises access for the total sample and for those with chronic conditions. It also provides the differences by medical aid, income quintile and gender. A concerning high fraction of participants with a chronic condition (39% of 1524) reported inability to access medication, condoms or contraception. It is evident that across almost all described categories, those with chronic conditions are more likely to report being unable to access the necessary medication and contraceptives than the total sample. The gap is particularly large for those in the lower socioeconomic quintiles - the poorest South Africans. However, while it is the case that the lack of access is largest among poorer individuals, a substantial lack of access remains at both higher levels of income and education. In general, lack of access is similar for males and females (22% vs 24%), but males with chronic conditions are more likely than females to not receive medication or contraceptives. We also do not find strong patterns across income quintiles, but do find it concerning that amongst the higher risk group of chronic patients, lack of access is considerably higher amongst those without medical aid (43% vs 25%).

Table 2: Access to vital medicine, condoms or contraception

		Total sample		Could not access		Chronic condition		Could not access	
		N	%	N	%	N	%	N	%
Total		7074		1919	23%	1524		705	39%
Medical Aid	Yes	1111	22%	250	18%	255	24%	83	25%
	No	5942	78%	1664	15%	1269	77%	622	43%
	Missing	21	0.3%	5	4%	0	0	0	0
Income quintile	0-20%	912	13%	268	26%	190	12%	88	46%
	20-40%	1047	13%	306	24%	269	16%	122	41%
	40-60%	967	12%	268	24%	257	14%	137	49%
	60-80%	884	12%	238	24%	196	14%	89	35%
	80-100%	595	12%	137	17%	107	11%	37	26%
	Missing	2669	38%	702	23%	505	32%	232	36%
Education	Primary	982	12%	328	32%	324	19%	171	53%
	Secondary	3877	54%	1032	23%	784	50%	352	36%
	Tertiary	1817	30%	436	19%	302	24%	125	29%
	Missing	398	4%	123	28%	114	7%	57	55%
Gender	Male	2754	47%	665	22%	398	34%	189	42%
	Female	4314	53%	1253	24%	1125	66%	515	36%
	Missing	6	0.1%	1	8%	1	0.1%	1	100%

Source: NIDS-CRAM wave 1 (2020).

Note: The count of available observations that appear in the N column for total “Sample” and “Chronic condition” do not take account of 34 missing values for the variable of interest or 7 observations without assigned weights in this early version of the data. The N column for “Could not access” do however incorporate both these omissions. Percentages are all weighted.

Discussion

We have found evidence of substantial unintended distortions to acute care, with a derived pandemic impact of 33%. Too often, acute health needs, which were not addressed because of health system factors associated with the pandemic, may only be picked up once it is too late, in ex-post excess mortality analyses. For example, Vollmer et al, (2020) found in their study of two large London hospitals during the period 12 March to 31 May that non-COVID emergency admissions fell by 48% across all acute disease areas, including acute coronary syndromes, stroke and cancer-related emergencies. It is not clear from this study what the reasons for non-attendance of emergency care

were but it is speculated that the excess non-COVID deaths found in communities served by these hospitals most likely indicate that people simply stayed home despite requiring emergency care, which resulted in more deaths (Vollmer et al., 2020).

By contrast, there is little evidence that care for chronic conditions has been severely affected at this stage: 96% of respondents in CRAM-NIDS who said they needed to see a healthcare worker for a chronic condition (e.g. HIV, TB or diabetes) said they were able to do so. This may be because many provincial departments of health like the Western Cape and Gauteng have put in place multiple initiatives to ensure continuity of care during the lockdown period, especially for chronic patients. These initiatives include approaches from home delivery of patients, to safer patient triaging within primary healthcare facilities to avoid in-facility COVID-19 infections (Brey et al, 2020).

Our survey of public sector mothers provides early and tentative evidence of a concerning 56% unintended COVID-19 impact on recent health visits by pregnant women and women with infants. Our SMS survey shows that 37% of our sample of pregnant women and mothers with infants who last visited a clinic or a hospital in April or earlier, said they did not go because of fear of contracting COVID-19. 30% said they did not need to go, and this is concerning because a two-month gap is a long time for pregnant women and for mothers with infants. A sufficient number of timely antenatal care visits of adequate quality is required to minimise both the potential negative health outcomes for mothers, at the most severe mortality, as well as optimise positive health outcomes for their babies -- including birth weight and the probability of poor birth outcomes (Gajate-Garrido, 2013). It concerning in light of the evidence re missed visits presented here, that such authors find that missing these critical visits -- especially in the last trimester of pregnancy when blood pressure levels may be increasing and pre-eclampsia developing -- can lead to longer term health impacts for both the mother and baby.

Women and individuals from different socio-economic groups were, in certain cases, affected differently in their care-seeking. For pregnant women and younger mothers, drawing on results of the MATCH survey, there were no significant differences in care-seeking by socio-economic status. However, the results show that fear of the coronavirus as a deterrent in their own pregnancy care or in their young baby's care affected poorer women worse. Amongst the poorest 40% of mothers, 45% of mothers said they did not recently go to the clinic because of fear of the coronavirus, compared to 33% for the rest of the women in our sample.

Evidence that the fear of the virus is constraining access to essential health services -- and in particular maternal and child health -- is a grave concern because they still account for a significant burden of disease in South Africa. Even though South Africa did not achieve maternal and neonatal mortality millennium development goals, it made considerable progress in reducing these outcomes in the last decade (Damian, et al, 2019). It is thus paramount that these gains are not reversed.

Fear of contracting the COVID-19 virus was the most commonly cited reason for not seeking care for acute illnesses, maternal and child health services, and chronic care, including antiretrovirals. Access to antiretroviral therapy, a particular type of chronic medication, was heavily impacted. One in ten women said they ran out of ART during May and June. The most frequently cited reason was fear of the coronavirus (40%). Assuming that all of these women would have gone to the clinic and hospital under normal circumstances and conservatively limiting the unintended public health impact of COVID-19 on this category of treatment to those who said they did not collect their ART because of Coronavirus fears, this would represent an estimated 62% increase in ART interruptions due to the pandemic. While supply-side problems did feature in the form of medication not having been available (21%), it is not clear whether this was due to drug stock-outs or to other problems at the healthcare facility.

While we find large increases in problems with access to care and treatment, it should be acknowledged that these large increases are off a relatively low base so the reduction in utilisation would represent a small overall share of utilisation. Our findings here are lower than what would have been expected based on very large reported drops in TB tests and ART visits observed in some routine data, such as the testing report by the NICD (2020). There could be several plausible

explanations for this apparent discrepancy. We have selected to look at services and subsamples that were of greater concern, but demand factors such as Coronavirus fears would be expected to play a lesser role, where care matters most. Additionally, this is self-reported data and given social desirability bias, respondents may tend to underreport interruptions in their treatment and their access to care, especially in the context of being an expectant mother or having a young baby, where there are such strong social norms about the duty of care. It should also be noted that there is a theoretical possibility that some share of the declines in routine data may be due to reduced health needs due to the lock-down, which would lower the incidence of communicable diseases. However, given gestation periods for such diseases, one would expect the impact to be largest in May and June, and the routine data reported large drops in testing and treatment access in April. The last important caveat to state is that SMS and CATI surveys have lower response rates. While we have been in the fortunate position to have access to large and fairly representative master samples, and we are able to stratify our samples on variables that we expect to be correlated with our key outcomes, some selection based on unobserved heterogeneity will remain in the self-selection of participants into the survey sample and this could bias our findings. Given the rates of nonresponse, this concern needs to be noted and should be borne in mind when making sense of the findings reported here.

These findings are a reminder that we should not ignore demand-side concerns when thinking about the drivers of indirect health impacts of the coronavirus. In three scenarios used to recently predict the indirect health impacts of COVID-19 on maternal and child health in low- and middle-income countries (LMICs), demand-side problems and concerns featured in only one of three scenarios used to model possible impacts (Robertson et al., 2020). In this one of three scenarios, demand-side concerns only featured as a relatively small driver of impacts (Robertson et al. 2020). It would be all too easy for health departments to channel most of their energy towards immediate supply-side concerns that are more fully under their control and arguably also easier to address -- to focus on ensuring that public healthcare facilities are kept open, ensuring continuity of testing for critical diseases and conditions, continued access to chronic care and continuity in medication supply-chains. However, these findings warn that demand-side issues may be equally, if not more, important than potential supply-side problems and disruptions and it could worsen, as the virus spreads, and COVID-19 infections and mortality rise.

It is important to note that the unintended health consequences of COVID-19 may worsen over time. As South Africa approaches its predicted peak and lockdown regulations eased, numbers of COVID-19 positive health workers have risen sharply. The response to a COVID-19 positive case in particular at primary healthcare facilities is characterised by closure of the facility from anything between 1–3 days, with no exact date of when the facility will reopen. There is no clear messaging on ideally how long should a facility close to disinfect after a positive COVID-19 case.

Policy-recommendations and conclusions

Contracting private sector GPs for public primary care

Since 2012, real per capita public sector health spending has declined. Close to two-thirds of current provincial health budgets are spent on staff salaries. Despite reforms to reorientate the health system towards health promotion, prevention and primary health care, the bulk of expenditure is still flowing towards hospitals and curative care. The COVID-19 pandemic has increased demands for hospital-level resources, and in particular, critical care beds, which may adversely affect plans for much-needed primary care expansion and investment. In this context, where the trajectory of the COVID-19 infections, as well as the unintended consequences of the disease, will be determined by local action and clear communication about risks and prevention, it will be counterproductive. We, therefore, recommend that the government considers contracting underemployed health professionals in the private sector to help address the broader public response to this crisis. According to Van Den Heever (2020), private sector professionals have seen a 60% decline in patient traffic due to decisions to delay accessing health care because of Coronavirus fears -- as

evidenced by the survey findings.

Community health workers as service linkers

Many community health workers have been trained on supporting maternal, neonatal and child health and they can help to take government health services into the home, as well extending knowledge on COVID-19 and the enhanced risk for individuals with hypertension and diabetes. Short intensive training programmes should be developed to support community health workers for such an added role. Additional investments should be made to improve the coordination and supervision of community health worker teams to ensure interventions can be efficiently implemented. A public campaign that outlines the services that will be offered by outreach teams to ensure that community service expectations are aligned with community health worker capability.

Expand CCMD to cover a wider range of medications

The Central Chronic Medicine Dispensing and Distribution programme helps to deliver chronic meds (and specifically ARTs) to collection points which include community pharmacies. Given the perceived risks of collecting medication the current operations of the programme should be reconsidered. Pharmacists should be allowed to fill scripts and substitute with alternatives should medication be out of stock. This would be conditional to pharmacists have access to state tender pricing and provide an opportunity to pilot initiatives envisaged under the NHI

Strengthen local coordination structures

The emergency response to COVID-19 has concentrated capacity with national and provincial command councils but at the expense of existing multi-sectoral coordination structures. Particularly at the subdistrict level, such structures can play an important role in ensuring continuity of care as well as supporting the development of localised communication campaigns to address perceived risks and Coronavirus fears. A useful first step could be leveraging the use of district health information systems to identify priority areas of support.

Understanding the cost of using fear to motivate behaviour change

While the unmet health care needs reported here may be lower than feared, an overwhelming share of those who did not seek care attributed it to the risk of contracting the Coronavirus. This may illustrate the unintended consequences of fear-mongering by the press, and also some public messages. It would be important to counter such fears through empowering and hopeful communication, focussing on how the virus can be avoided.

Helpline for at-risk patients who run out of medication

Chronic patients, and in particular diabetes and hypertension patients, are known to have a much higher case fatality rate than others. It could be useful to consider special measures for this at-risk group of patients, including a helpline when they run out of medication. In Cape Town, the Western Cape Department of Health used uber taxis to deliver long-run supplies of medicines to patients via community healthcare workers prior to the start of the lockdown and similar measures could be used for providing continued supplies of medicine to diabetes and hypertension patients.

Appendix

Appendix Table 1: First component scores, PCA for Census poverty index

Employed	0.2484
Unemployed	-0.0767
Discouraged worker	-0.111
Not economically active	-0.1257
No schooling	-0.1275
Some primary schooling	-0.1616
Secondary schooling	-0.0819
Completed secondary schooling	0.1848
Higher degree	0.266
Cell phone ownership	0.1977
Car ownership	0.2792
No income	-0.0046
R1-R4800	-0.1092
R4801-R9600	-0.149
R9601-R19600	-0.1231
R19601-R38200	-0.0832
R38201-R76400	0.0483
R764001-R153800	0.205
R153800-R307600	0.2611
R307600-R614400	0.2648
R614000-R1228800	0.2294
R1228800-R2457600	0.1781
R2457601 or more	0.1764
Unspecified	0.0412
One household member	0.0974
Two household members	0.2199
Three household members	0.16
Four household members	0.134
Five household members	-0.0615
Six household members	-0.1704

Seven household members	-0.1998
Eight household members	-0.1949
Nine household members	-0.1794
Ten household members	-0.1817

Appendix Table 2: MATCH Descriptive Statistics

Variable	Quintiles/Binary Quintiles	Count	%
Total		3140	
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		1068	34.0
6-12 months		1162	37.0
MomConnect interaction			
Whatsapp		1435	45.7
SMS		1705	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
When did you last go to the clinic or hospital?			
Before March		151	4.8
March		135	4.3
April		227	7.2
May		757	24.1
June		1831	58.3
Don't want to answer		39	1.2

Why didn't you go to the clinic recently?		
Waiting Time	53	10.3
Transport problems	31	6.0
Afraid of getting the coronavirus	185	36.1
No need	149	29.0
Other	81	15.8
Don't want to answer/Don't know	14	2.8
During April, May and June, was there a child in your home who was sick or needed a vaccination?		
Yes	686	21.8
No	2379	75.8
Don't want to answer/Don't know	75	2.4
Did the child see a nurse/doctor?		
Yes	648	94.5
No	35	5.1
Don't want to answer/Don't know	3	0.4
If you take ART, during May and June, have you run out of medication?		
Yes	175	5.6
No	1435	45.7
Don't need ART	1385	44.1
Don't want to answer/Don't know	145	4.6
Distribution of individuals who ran out ART		
Ran out of ART	175	10.9
Did not run out of ART	1435	89.1
Why did you run out of ART?		
Afraid of getting the Coronavirus	67	38.3
No ART available/Facility closed	35	20.0
Waiting time	25	14.3
Transport problems	36	20.6
Don't want to answer/Don't know	12	6.9
Has any adult in the household gone to bed hungry in the past 7 days?		
Yes	475	15.1
No	2515	80.1
Don't want to answer	32	1.0
Left question out	118	3.8

Has any child in the household gone to bed hungry in the past 7 days?			
Yes	296	9.4	
No	2525	80.4	
No child in the household	160	5.1	
Don't want to answer/Don't know	159	5.1	
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	
In the last 7 days have you felt hopeless, down or depressed?			
No	805	88.8	
Yes, for a few days	91	10.0	
Yes, for most days	6	0.7	
Don't know	5	0.6	
Mental Health			
Okay	2830	90.1	
Not okay	111	3.5	
Don't want to answer	199	6.3	
Reason why the mom ran out of ART medication			
	Quintile		
Afraid of getting the Coronavirus	0-20%	21	32.3
	20-40%	10	15.4
	40-60%	14	21.5
	60-80%	6	9.2
	80-100%	14	21.5
Reason why the mom ran out of ART medication			
ART not available/Facility closed	0-20%	13	38.2
	20-40%	5	14.7
	40-60%	4	11.8
	60-80%	7	20.6
	80-100%	5	14.7

Reason why the mom ran out of ART medication			
Waiting time	0-20%	7	28.0
	20-40%	4	16.0
	40-60%	6	24.0
	60-80%	3	12.0
	80-100%	5	20.0
Reason why the mom ran out of ART medication			
Transport problems	0-20%	5	13.9
	20-40%	5	13.9
	40-60%	9	25.0
	60-80%	5	13.9
	80-100%	12	33.3
Reason why mom ran out of ART medication			
Afraid of getting the Coronavirus	Binary Quintile		
	0-40%	31	47.7
	0-100%	34	52.3
Reason why mom ran out of ART medication			
ART not available/Facility closed	0-40%	18	52.9
	0-100%	16	47.1
Reason why mom ran out of ART medication			
Waiting time	0-40%	11	44.0
	0-100%	14	56.0
Reason why mom ran out of ART medication			
Transport problems	0-40%	10	27.8
	0-100%	26	72.2
Reason why mom has not been to a health facility recently			
Afraid of getting the Coronavirus	Quintile		
	0-20%	46	26.6
	20-40%	38	22.0
	40-60%	27	15.6
	60-80%	31	17.9
	80-100%	31	17.9

Reason why mom has not been to a health facility recently			
Waiting time	0-20%	15	28.3
	20-40%	8	15.1
	40-60%	4	7.5
	60-80%	16	30.2
	80-100%	10	18.9
Reason why mom has not been to a health facility recently			
Transport problems	0-20%	10	35.7
	20-40%	7	25.0
	40-60%	2	7.1
	60-80%	2	7.1
	80-100%	7	25.0
Reason why mom has not been to a health facility recently			
There is no need	0-20%	17	11.9
	20-40%	26	18.2
	40-60%	32	22.4
	60-80%	25	17.5
	80-100%	43	30.1
Reason why mom has not been to a health facility recently			
Afraid of getting the Coronavirus	Binary Quintile		
	0-40%	84	48.6
	0-100%	89	51.4
Reason why mom has not been to a health facility recently			
There is no need	0-40%	43	30.1
	0-100%	100	69.9
Reason why mom has not been to a health facility recently			
Waiting time	0-40%	23	43.4
	0-100%	30	56.6
Reason why mom has not been to a health facility recently			
Transport Problems	0-40%	17	60.7
	0-100%	11	39.3

Appendix Table 3: NIDS-CRAM descriptive statistics

Variable	Count	%
Total	7074	
Mean Age (Standard Deviation)	38,81 (15.43)	
Gender		
Man	2754	38.9
Woman	4314	60.9
Other	6	0.1
Population		
African/Black	6048	85.5
Coloured	612	8.7
Asian/Indian	79	1.1
White	325	4.6
Other/Refuse/Don't know	10	0.1
Income Quintile		
First Quintile	912	20.7
Second Quintile	1047	23.8
Third Quintile	967	21.9
Fourth Quintile	884	20.0
Fifth Quintile	595	13.5
Education		
Grade R/No Schooling	398	5.6
Primary Education	982	13.9
Secondary Education	3877	54.8
Tertiary Education	1817	25.7
Experienced the following symptoms, sore throat, fever or cough		
Yes	615	8.7
No	6396	90.4
Don't know/Refused to answer	63	0.9
Experienced shortness of breath 4 weeks prior to the survey		
Yes	209	2.9
No	6857	96.9
Don't know/Refused to answer	8	0.11
Injuries 4 weeks prior to the survey		
Yes	205	2.9

No	6862	97.0
Don't know/Refused to answer	7	0.1
Has health needs for a chronic condition		
Yes	1613	22.8
No	5447	77.0
Don't know/Refused to answer	14	0.2
Visits a health facility		
Yes	1687	23.9
No	532	7.5
Refused to answer	5	0.1
Type of health facility visited		
Private doctor/Clinic	160	2.3
Private hospital	42	0.6
Public clinic	1224	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
Reason for not going to the clinic (If does not visit clinic)		
Afraid of the defence force/Police	4	0.1
Afraid of getting Coronavirus	30	0.4
Could postpone visit	16	0.2
Looking after children	4	0.1
No transport available	23	0.3
no transport money	13	0.2
Not ill enough to need care	191	2.7
Queues are too long	36	0.5
Too Busy	23	0.3
Other/Refused to answer	192	2.7
Has access to medication, condoms and contraception		
Yes	1919	27.1
No	5121	72.4
Don't know/Refused to answer	34	0.5

Where Individual has access to medication, condoms or contraception(if there is access)		
Private doctor/Clinic	72	1.0
Private hospital	19	0.3
Public clinic	1322	18.7
Public hospital	179	2.5
Pharmacy	254	3.6
Other	38	0.5
Refused to answer/Don't know	35	0.5
Confirms to have one of the following: HIV,TB lung condition, heart condition or diabetes		
Yes	1524	21.5
No	5521	78.0
Don't know/Refused to answer	29	0,41
Has medical aid		
Yes	1111	15.7
No	5942	84.0
Don't know/Refused to answer	21	0.3
Health needs for chronic condition By Gender		
	Man Count	Man %
Yes, needs medication	492	17.9
No, does not need medication	2256	81.9
Refused to answer/Don't Know	6	0.2
Total	2754	100
Visits the Clinic		
	Man Count	Man %
Yes	528	69.1
No	236	30.9
Total	764	100
Reason for not visiting the clinic		
	Man Count	Man %
Afraid of defense force/Police	3	1.3
Afraid of getting Coronavirus	9	3.8
Could postpone visit	4	1.7
Looking after children	2	0.8
No transport available	12	5.1
No transport money	4	1.7
Not ill enough to need care	86	36.4
Other/Refused to answer	84	35.6

Queues too long	15	6.4
Too busy	17	7.2
Total	236	100
Has access to medication	Man Count	Man %
Yes	665	24.1
No	2074	75.3
Don't know	10	0.4
Refused to answer	5	0.2
Total	2754	100

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