



## WAVE 3

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

# Differences in depressive symptoms between formal and informal workers during the COVID-19 crisis: Evidence from Wave 2 and Wave 3 of NIDS-CRAM

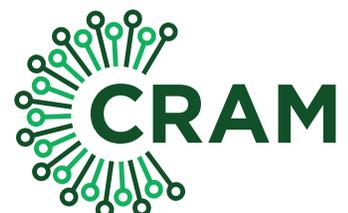
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# Differences in depressive symptoms between formal and informal workers during the COVID-19 crisis: Evidence from Wave 2 and Wave 3 of NIDS-CRAM

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## Abstract

The stringent lockdown of the economy in response to the Covid-19 global pandemic triggered a larger negative shock on labour market outcomes of informal when compared to formal workers in developing countries. This potentially generated a disproportionate burden of stress and anxiety which cause depressive symptoms, among informal workers. These unintended consequences of COVID-19 reinforced the vulnerability and stressful working conditions that characterised informal work pre-COVID 19. Therefore, this study examines differences in depressive symptoms between informal and formal workers in South Africa during the COVID-19 lockdown period. Our analysis focuses on the June to October 2020 period, which was characterised by the easing of lockdown regulations from level 3 to level 1. Using the NIDS-CRAM wave 2 and 3 survey data, we estimate a standard logit and a fixed effects (FE) logit model to account for worker's unobserved heterogeneity. Results show that the likelihood of experiencing depressive symptoms increased across all workers between June and October. We find no statistically significant differences between informal and formal workers' mental health over this period. Additional results show that workers living in urban areas and households suffering from hunger had a higher risk of experiencing depressive symptoms. Based on these results, we recommend for government strategies that curb the rise in depressive symptoms among workers.

# Executive summary

The COVID-19 global pandemic and its containment measures (lockdown) have worsened the burden of depression (mental disorder), which is the single leading cause of total years lived with disability globally. The preventative social distancing measures disproportionately triggered fear and loneliness, substance abuse, domestic violence, job loss and hunger among vulnerable groups in society. When viewed from the lens of labour markets in developing countries, this suggests that informal workers were 'exposed' to a higher risk of depression than formal workers. Typical informal work is characterised by precarious working conditions and absence of legal and social protections accorded to formal workers, which can generate stressful conditions that cause mental disorders. Moreover, informal workers were disproportionately affected by additional stressors from the stringent lockdown of the economy during the first quarter of 2020; job loss and erosion of income. This situation could, nonetheless, have been shifting over time as more individuals returned to work with the easing of lockdown restrictions. Regardless, all health protocols and social distancing measures have largely remained in place leaving the psychological effect unabated.

Using data from Waves 2 and 3 of NIDS-CRAM, this paper explores the extent to which depressive symptoms are persistent or differ among formal and informal workers in South Africa as the lockdown regulations eased from level 3 to level 1. Specific focus is given to informal work and understanding the link between informal work and depressive symptoms. Informal workers are identified as regular and casual workers without a written employment contract and own account workers/employers who are not registered for tax. We identify individuals who screened positive for depressive symptoms as those whose total depression score (this is bounded between 0 and 6) is at least 3. Transition matrices and maximum likelihood (logit and fixed effects logit model) estimation methods are employed for analyses. Results show that the odds of workers experiencing depressive symptoms were higher in wave 3 (October) compared to wave 2 (June). We also find that the higher risk of experiencing depressive symptoms among informal workers becomes statistically insignificant after accounting for unobserved (fixed) individual heterogeneity. In addition, there is no convincing evidence indicating that women in informal work had different experiences of depressive symptoms relative to men. Other results show that workers living in urban areas and households suffering from hunger have a higher risk of experiencing depressive symptoms while age, earnings, race and education effects are generally insignificant.

Our results suggest that while the risk of depressive symptoms among workers increased between June and October 2020, the increases were of the same order for informal and formal workers. These results call for interventions that curb the general rise in depressive symptoms among workers. The government can consider allocating resources to mental health and psychosocial support as an integral component of the national recovery plans. Collection of statistics for mental disorders also needs prioritisation so that adequate resources for investing in life-saving mental health programmes are availed during the pandemic and beyond. Interventions could include strengthening digital and telephonic counselling services and tele-therapy in mental health, monitoring changes and disruptions to counselling services and promoting the provision of basic mental health support programmes in the workplace and local communities.

# 1. Introduction

Depression is one of the mental disorders that significantly contribute to the global burden of disease – GBD. This state of well-being impedes an individual from coping with the normal stresses of life, realising own abilities, working productively, social inclusion and contributing to community (WHO, 2013). Resultantly, individuals who suffer from depression face a higher risk of poverty, disability and death as compared to those without. This condition accounts for 4.3% of the GBD and 11% of total years lived with disability globally (WHO, 2013 p.8).

The burden of depression could have worsened since the WHO declared COVID-19 a global pandemic (Galea et al., 2020). The preventative social distancing measures disproportionately triggered fear and loneliness, substance abuse, domestic violence, job loss and hunger among vulnerable groups in society (Galea et al., 2020, Oyenubi and Kollamparambil, 2020). When viewed from the lens of labour markets in developing countries, this suggests that informal workers were 'exposed' to a higher risk of depression than formal workers (Ludermir and Lewis, 2003). Typical informal work is characterised by precarious working conditions, and absence of legal and social protections accorded to formal workers (Ludermir and Lewis, 2003; ILO, 2020). It employs 86 percent of workers on the African continent and about a third of the South African workforce (ILO, 2018; Rogan and Skinner, 2020). In response to the global pandemic, the South African government imposed 5-tiered COVID-19 containment measures (lockdowns). Level 5 (March - April 2020) was the most restrictive while level 1 (September- December) was the least restrictive<sup>1</sup>. The government has been opening up more sectors of the economy as the lockdowns eased. This has allowed more South Africans to work and participate in the economy. However, studies on the effect of COVID-19 containment measures in South Africa show that informal workers incurred larger job-losses and a decline in hours of work and wages than formal workers (Rogan and Skinner, 2020; Benhura and Magejo, 2020). The findings harmonise with Kesar et al. (2020) and Balde et al. (2020) who uncovered a larger negative shock of COVID-19 on informal workers in India, Burkina Faso, Mali and Senegal. These outcomes reinforce the vulnerability that characterised informal workers pre-COVID 19. For instance, informal workers in South Africa already faced a wage penalty compared to formal workers (Bargain and Kwenda, 2014). These cumulative economic disadvantages and lack of legislative and social protection could have spurred disproportionate burdens of health risks, such as depressive symptoms on informal workers.

Despite the easing of lockdown restrictions, the South African economy (at large) and the formal labour market (in particular) are still struggling to catch up with pre-COVID levels, the situation is arguably worse for informal work. Health wise, all protocols and social distancing measures have remained in place since lockdown level 5. Hence, the psychological effect remains unabated. This begs the query whether depressive symptoms differ between formal and informal workers in South Africa as the economy progressed from more to less stringent COVID-19 regulations. The results are essential for policy and interventions aimed at economic recovery and improving workers' welfare amidst the global pandemic.

Using data from the South African National Income Dynamics Study Coronavirus Rapid Mobile Survey (NIDS-CRAM), this paper explores the extent to which depressive symptoms are persistent or differ among formal and informal workers in South Africa as the lockdown regulations eased from level 3 to level 1. Specific focus is given to transitions in informal work and depressive symptoms, from June to October 2020, and whether informality matters for depressive symptoms after controlling for individual fixed effects. The analysis exploits data from Wave 2 (collected in July and August) and Wave 3 (collected in November and December) of the NIDS-CRAM survey conducted by the Southern Africa Labour and Development Research Unit (SALDRU) based at UCT's School of Economics. It is restricted to individuals who were employed in both waves. This allows us to identify the effect of changes in work type on depression in isolation from that of job loss. We identify informal workers as regular/casual workers without a written employment contract and own account workers/employers not registered for tax, while workers' mental health status is identified based on depression scores derived from health questions in the survey. The study utilises transition matrices, and maximum

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<sup>1</sup> Currently the government is enforcing amended level 3 regulations to curb the spread of a second wave of the pandemic.

likelihood (Logit and Fixed Effects Logit model) estimation methods for analyses.

The rest of the paper is structured as follows. Section 2 contextualises the study, section 3 discusses the methodology while section 4 discusses the data used for analysis. The results and conclusion for the study are discussed in section 5 and section 6, respectively.

## 2. Background and Context

Informal work can generate stressful conditions which can result in depressive disorders due to precarious working conditions and lack of legal and social protections (Ludermir and Lewis, 2003; ILO, 2020). Moreover, additional stressors from stringent lockdown of the economy disproportionately affected informal workers during the first quarter of 2020 through job loss and erosion of income (ILO, 2020). Regardless, South Africa lacks statistics on depressive disorders in the workplace, yet depression can have devastating effects on employees and employers, especially when it weakens cognitive ability (Stander et al., 2016). Hence, the South African Depression and Anxiety group and the Health and Economic Research Organisation supported by Lundbeck investigated the prevalence of depression within the workplace (Stander et al., 2016). The study administered an IDEA<sup>2</sup> survey instrument to 1060 employees and managers in South Africa. Results showed that 24% of respondents had been previously diagnosed with depression by a health care professional. Moreover, there seemed to be a lack of awareness of depression and its effects in the workplace (Stander et al., 2016). The study notes that affected employees may take many sick leave days, become less productive, and firm profitability may decline.

The prevalence of depression in South Africa goes beyond the labour market, although statistics on mental disorders are limited in supply. Tomlison et al. (2009) investigated the epidemiology of major depression in South Africa. The study used data from the South African Stress and Health survey conducted between 2002 and 2004, containing information on 4351 adult South Africans of all racial groups. Relying on the WHO Composite International Diagnostic Interview to establish a diagnosis of depression, results of the study showed that the prevalence of depression was 9.7% for lifetime and 4.9% prior to the interview. Ardington and Case (2010) also showed that mean depression scores for South Africans are high. The study used the first wave of NIDS data (collected in 2008) and CES-D 10 scores (continuum of symptoms of depression and anxiety) of respondents to capture mental health. Findings stratified by gender and age showed that mean depression scores for South Africans were roughly twice as large as those from Indonesia and United States of America.

Despite evidence that attests to the presence of depression in South Africa, and the labour market in general, currently there is no study that has compared depressive symptoms of formal and informal workers in South Africa both pre- and post-COVID 19. Pre-COVID 19 evidence from another developing country, however, affirms a relationship between informality and mental disorders. Particularly, Ludermir and Lewis (2003) investigated the association between informal work and common mental disorders in Northeast Brazil. The study applied the self-reporting questionnaire (SRQ-20) to estimate the prevalence of common mental disorders of which depression is a subset. Results showed that informal compared to formal workers had a higher prevalence of common mental disorders. There are two competing explanations for this result. First, informal work can generate stressful conditions that cause mental disorders. Second, there is a possibility of self-selection into informal work; people with mental disorders may struggle to find/keep formal work so they opt for informal work. The relevance of these viewpoints remains an empirical issue, but our analysis is inclined to stressful conditions.

More broadly, some studies have provided evidence on the effects of COVID-19 and social distancing measures on mental health of the population. Galea et al. (2020) associate COVID-19 and global pandemics in general, with a surge in mental disorders as they bring additional stressors on vulnerable individuals. For South Africa, Oyenubi and Kollamparambil (2020) demonstrated that

depressive symptoms increased significantly in 2020 compared to 2017. Individuals who lost (gained) employment during lockdown level 5 were associated with increased (decreased) depressive symptoms. This suggests that depressive symptoms could have increased more for informal than formal workers. The higher risk of financial loss among informal workers could have generated stress and anxiety which triggered depressive symptoms. Alternatively, financial loss potentially exposed some households to hunger and hence, vulnerability to stress and depressive symptoms. Mungai and Bayat (2019) also showed that adults with a lower socioeconomic standing were vulnerable to and struggled to transition out of depressive symptoms. Given South Africa's long-standing history of socio-economic inequalities, this result suggests that depressive symptoms in the country vary by gender, education level and racial group. As such, the South African government has to prioritise health and socioeconomic challenges faced by previously marginalised groups in society.

## Potential effects of COVID-19 regulations on informal workers and depressive symptoms

The South African government imposed level 5 lockdown in March-April 2020. This was characterised by stringent precautionary directives from the government; all sectors of the economy were closed except for essential services (Department of Cooperative Governance and Traditional Affairs - COGTA, 2020a). Workers in non-essential services were ordered to stay at home and work from there where applicable. This meant a loss of livelihood for informal workers who provided non-essential services, especially those relying on day-to-day earnings. The risk of income loss was lower for formal workers as they are protected by contractual agreements. Thus, level 5 regulations had a potentially larger adverse effect on income and health of informal compared to formal workers.

South Africa moved to lockdown level 4 from 1-31 May 2020. The government issued strict health protocols and social distancing rules. Employers had to promote conditions for employees to work from home or minimise physical contact. Economic activity was also allowed to resume in many sectors such as: agriculture, hunting forestry and fishing; wholesale and retail trade, spaza shops and informal traders; informal recyclers; and private households (COGTA, 2020b). This permitted many informal workers to work, however the psychological scarring effect of level 5 regulations on the workers' well-being cannot be ignored.

The government introduced moderate restrictions during lockdown level 3 which spanned June - August 2020. Strict health protocols were still intact; wearing facemasks in public, hand sanitisation and temperature checks in public, and social distancing measures. Most workers could work away from home and workplaces were directed to follow protocols of being COVID-19 ready. Work restrictions however remained for those employed in public spaces (COGTA, 2020c). Level 2 lockdown also had moderate restrictions; it lasted from 18 August - 20 September. The regulations allowed economic activity in most industries, including public places, under strict adherence to health protocols and safety precautions (COGTA, 2020d). While many workers could have resumed work, the labour market outcomes still needed time to recover as the economy was still struggling. Thus, the effect of lockdown restrictions on mental health could still be evident.

The country moved to the least restrictive lockdown level 1 from 21 September – 28 December. Working from home was still permitted, and any work could be performed outside the home. Individuals and workplaces were ordered to strictly adhere to health protocols and social distancing measures. All businesses could operate under sector protocols, except for a few such as nightclubs. Most restrictions for this level were on social gatherings and events, where participants were limited, to allow social distancing (COGTA, 2020e). That health regulations remained strict across the lockdown levels implies that the negative psychological effect of COVID-19 on informal workers could still be evident despite the temporal easing of regulations. This solicits the present study to present the first set of evidence on the extent to which depressive symptoms differ across formal and informal workers in South Africa during COVID-19 as lockdown regulations eased from level 3 to level 1.

### 3. Methodology

To identify the link between depressive symptoms and informal work between June (lockdown level 3) and October (lockdown level 1), we begin by presenting descriptive statistics followed by an estimation of the following logit model for depressive symptoms:

$$w_{it} = x'_{it}\beta + \gamma IF_{it} + u_{it}. \quad (1)$$

Where  $w_{it}=1$  if worker  $i$  exhibits depressive symptoms at time  $t$  and  $0$  otherwise,  $x_{it}$  is a vector of individual characteristics (age, gender, marital status, race and education, occupation, wage quintiles, household food security status and location) and  $IF_{it}$  is a binary variable equal to 1 if person  $i$  is an informal worker at time  $t$  and  $0$  otherwise. Assuming that  $u_{it}$  follows a standard logistic distribution, it follows that:

$$P(w_{it} = 1|x'_{it}, IF_{it}) = \frac{\exp(x'_{it}\beta + \gamma IF_{it})}{1 + \exp(x'_{it}\beta + \gamma IF_{it})}. \quad (2)$$

The parameters of the model are estimated by the method of maximum likelihood. In our specification, the key variable of interest is  $IF$  associated with parameter  $\gamma$  that captures the relationship between depressive symptoms and informal employment. In our results, we present and interpret the odds ratio which is the ratio of  $\left(\frac{p}{1-p}\right)$  - measures the probability that  $w=1$  relative to the probability that  $w=0$  - when exposed to a particular state (e.g. informal work) to that in the absence of that state (e.g. formal work). Estimates from the logit regression are potentially biased due to omitted variable bias arising from worker's unobserved heterogeneity (e.g. personality) which may influence both work type and mental health. Further, there is a potential problem of simultaneity between type of work and mental health. Due to data constraints (i.e. lack of convincing instrumental variables), we are unable to fully address these two sources of bias. Nevertheless, we exploit the panel structure of our dataset to account for individual (fixed) unobserved heterogeneity. To this end, we estimate the following fixed effects (FE) binary logit model:

$$w_{it} = \alpha_i + x'_{it}\beta + \gamma IF_{it} + u_{it}. \quad (3)$$

Where  $w_{it}$ ,  $x_{it}$  and  $IF_{it}$  are as previously defined and  $\alpha_i$  is an individual fixed effect. The log-likelihood function is given by:

$$\begin{aligned} \text{Log } L(\beta, \gamma, \alpha_1, \dots, \alpha_n) &= \sum_{it} w_{it} \log F(\alpha_i + x'_{it}\beta + \gamma IF_{it}) \\ &+ \sum_{it} (1 - w_{it}) \log [1 - F(\alpha_i + x'_{it}\beta + \gamma IF_{it})]. \end{aligned} \quad (4)$$

The model is estimated by considering a set of statistics  $k_i$  that are sufficient for  $\alpha_i$ . This implies that conditional upon  $k_i$ , an individual's likelihood contribution no-longer depends on  $\alpha_i$ , but it still depends on other parameters  $\beta$  and  $\gamma$ . If the joint density function of  $w_{i1} \dots w_{iT}$  is represented by  $f(w_{i1} \dots w_{iT} | \alpha_i, \beta, \gamma)$  and if a sufficient statistic  $k_i$  exists, this means that:  $f(w_{i1} \dots w_{iT} | \beta, \gamma, \alpha_i) = f(w_{i1} \dots w_{iT} | \beta, \gamma)$ , see Verbeek (2000). Consistent estimates are obtained by maximising the conditional likelihood function based on  $f(w_{i1} \dots w_{iT} | k_i, \beta, \gamma)$ .

For the fixed effects logit model a sufficient statistics for  $\alpha_i$  is  $\bar{w}_i$  (Verbeek, 2000). The underlying idea is that the number of depressive symptom *spells* provide a sufficient statistic for the individual effect  $\alpha_i$ . Holding this fixed,  $\alpha_i$  drops from the likelihood function. The conditional distribution of

$w_{i1} \dots w_{iT}$  is degenerate if  $k_i=0$  or  $k_i=1$  and such individuals are discarded in the estimation. Thus, only individuals that change status are relevant in estimating the parameters of the model. With  $T=2$ , the fixed effects binary logit model can be easily illustrated. Using a simplified model that only considers the key variable i.e. informal employment<sup>3</sup>, conditional on  $k_i=1/2$ , there are two possible outcomes:  $(w_{i1} = 0 \text{ and } w_{i2} = 1)$  and  $(w_{i1} = 1 \text{ and } w_{i2} = 0)$ . The conditional probability of the first outcome is (c.f. Verbeek, 2000):

$$P\{(0,1)|k_i = 1/2, \alpha_i, \gamma\} = \frac{1}{\frac{P\{\alpha_i, \gamma\}}{P\{\alpha_i, \gamma\} + P\{\alpha_i, \gamma\}}} \quad (5)$$

Using  $P\{\alpha_i, \gamma\} = P\{w_{i1} = 0|\alpha_i, \gamma\}P\{w_{i1} = 1|\alpha_i, \gamma\}$  with:

$$P\{w_{i2} = 1|\alpha_i, \gamma\} = \frac{\exp\{\alpha_i + \gamma IF\}}{1 + \exp\{\alpha_i + \gamma IF\}}$$

it follows that the conditional probability that does not depend on  $\alpha_i$  is given by:

$$P\{(0,1)|k_i = 1/2, \alpha_i, \gamma\} = \frac{\exp\{(IF_{i2} - IF_{i1})\gamma\}}{1 + \exp\{(IF_{i2} - IF_{i1})\gamma\}} \quad (6)$$

and

$$P\{(1,0)|k_i = 1/2, \alpha_i, \gamma\} = \frac{1}{1 + \exp\{(IF_{i2} - IF_{i1})\gamma\}}$$

Clearly, the model is only identified through the within dimension of the data; individuals who do not change status are excluded from the estimation as they provide no information about the model parameters (Verbeek, 2000). In the analysis, we explore the magnitude of transitions in mental health and informal employment. We report and interpret the corresponding odds ratio. All estimates are unweighted; hence, our results reflect experiences of individuals in the sample.

## 4. Data and descriptive statistics

### 4.1. Data

This study used data from the NIDS-CRAM wave 2 and 3 surveys. The survey is designed with a panel structure; individuals surveyed in wave 1 were re-surveyed in wave 2 and 3. The survey collects information on a wide range of individual and household characteristics (e.g. demographics, labour market status, education, health and location) which are useful for this study. We note that wave 1 did not collect information on emotions and depression, hence for the purposes of this study we utilise information from wave 2 and 3. We construct a balanced panel using the unique person identifier available in the dataset. Observations with missing information on our key variables were excluded from the sample. The sample is also restricted to individuals who were employed in wave 2 and 3 whose status can be classified into informal/formal employment. Thus, the sample consists of workers who transition between work type and those who do not. The data delimitation process leaves 1,434 individuals with 2,868 observations aged 18-65 years.

Informal workers are identified as regular and casual workers without a written employment contract and own account workers/employers who are not registered for income/value-added tax. Mental health status is determined based on individual responses to the following two questions from the NIDS-CRAM survey.

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<sup>3</sup> The illustration is based on the following simplified model:

*Over the last 2 weeks, have you had little interest in doing things? 1. Not at all, 2. Several days, 3. More than half the days, 4. Nearly every day.*

*Over the last 2 weeks, have you been feeling down, depressed or hopeless? 1. Not at all, 2. Several days, 3. More than half the days, 4. Nearly every day.*

We compute a depression score which is a sum of an individual's responses to the questions above. Following Oyenubi and Kollamparambil, (2020), individuals who screened positive for depressive symptoms are those with a depression score of 3 and above.

## **4.2. Descriptive statistics**

*Sample composition:* Table 1 presents descriptive statistics of the final sample. There are no considerable differences in the average age of informal and formal workers. The share of women is higher in informal relative to formal work (56 vs 50%), while that of married individuals is relatively higher among formal workers. The proportion of Africans is higher in informal compared to formal work, while coloureds and whites are mainly in formal employment. Formal work is characterised by higher levels of education compared to informal employment. The percentage with no matric is 58% in the informal sector while it is 37% in the formal sector. The corresponding figures for post-matric education are 18% in informal work and 36% in formal work. A considerable share of informal workers lived in households that suffered from hunger (20%) compared to those in formal work (11%). Consistent with the precarious nature of informal jobs, we find that informal workers have a higher proportion in lower wage quintiles than formal workers. The former are mostly employed in elementary and other occupations while the latter are in managerial and technical/clerical jobs. Most workers are located in urban areas, and KwaZulu Natal and Gauteng provinces.

**Table 1: Descriptive statistics by informal/formal work**

	Informal		Formal	
	Mean	S.E.	Mean	S.E.
Age (years)	38.56	(0.42)	38.93	(0.31)
Female	0.56	(0.02)	0.50	(0.01)
Married	0.46	(0.02)	0.55	(0.01)
African	0.92	(0.01)	0.80	(0.01)
Coloured	0.05	(0.01)	0.14	(0.01)
Asian/Indian	0.01	(0.00)	0.01	(0.00)
White	0.02	(0.00)	0.06	(0.01)
No matric	0.58	(0.02)	0.38	(0.01)
Matric	0.24	(0.01)	0.26	(0.01)
Post matric	0.18	(0.01)	0.36	(0.01)
Hunger	0.20	(0.01)	0.11	(0.01)
Quantile wage	2.51	(0.05)	3.25	(0.04)
Manager	0.06	(0.01)	0.21	(0.01)
Technicians	0.08	(0.01)	0.22	(0.01)
Service & skilled agric workers	0.14	(0.01)	0.19	(0.01)
Crafts and operators	0.15	(0.01)	0.14	(0.01)
Elementary occupations	0.29	(0.01)	0.20	(0.01)
Other Occupations	0.29	(0.01)	0.04	(0.00)
Urban	0.65	(0.01)	0.77	(0.01)
Western Cape	0.05	(0.01)	0.12	(0.01)
Eastern Cape	0.07	(0.01)	0.09	(0.01)
Northern Cape	0.05	(0.01)	0.09	(0.01)
Free State	0.07	(0.01)	0.07	(0.01)
KwaZulu Natal	0.29	(0.01)	0.20	(0.01)
North West	0.06	(0.01)	0.06	(0.01)
Gauteng	0.16	(0.01)	0.20	(0.01)
Mpumalanga	0.13	(0.01)	0.10	(0.01)
Limpopo	0.12	(0.01)	0.08	(0.01)
Wave 2	0.50	(0.02)	0.50	(0.01)
Wave 3	0.50	(0.02)	0.50	(0.01)
# Obs	1,082		1,786	

**Notes:** Statistics are unweighted.

*Depressive symptoms:* Table 2 presents descriptive statistics on the prevalence of depressive symptoms by type of work for the overall sample and by gender and education level. Overall, there was a 6-percentage point difference in the prevalence of depressive symptoms between informal and formal workers in June. However, this difference is statistically insignificant as indicated by the overlap in the 95% confidence intervals. We also find no statistically significant differences in the prevalence of depressive symptoms between informal and formal workers across gender and education levels for this period. Thus, informal and formal workers had similar depressive symptom experiences in June 2020. This result extends to October where differences between informal and formal workers are statistically similar.

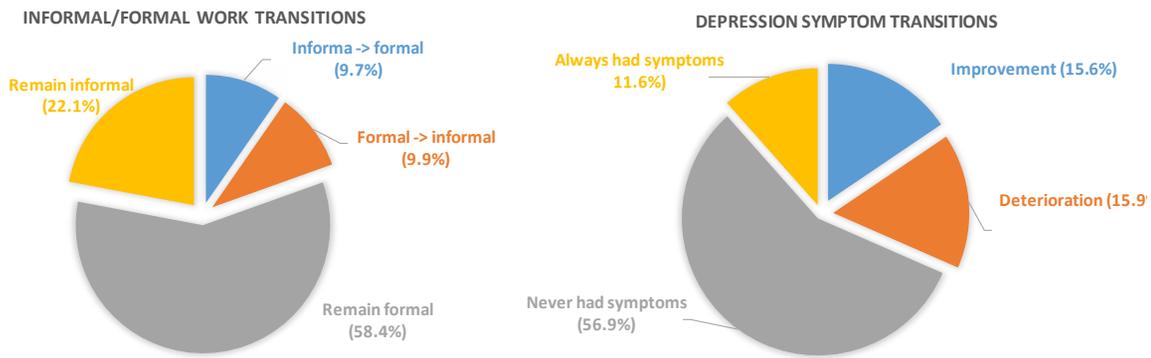
**Table 2: Prevalence of depressive symptoms**

	Informal workers			Formal workers		
	Prop.	S.E.	95% CI	Prop.	S.E.	95% CI
Share with depressive symptoms:						
<b>Wave 2</b>						
Overall	0.26	(0.02)	{0.22, 0.45}	0.20	(0.01)	{0.17, 0.35}
Female	0.27	(0.03)	{0.22, 0.45}	0.17	(0.02)	{0.14, 0.29}
Male	0.25	(0.03)	{0.19, 0.40}	0.22	(0.02)	{0.18, 0.38}
No matric	0.23	(0.02)	{0.19, 0.39}	0.19	(0.02)	{0.15, 0.31}
Matric	0.30	(0.04)	{0.22, 0.48}	0.16	(0.02)	{0.11, 0.24}
Post matric	0.27	(0.04)	{0.18, 0.39}	0.23	(0.02)	{0.18, 0.38}
<b>Wave 3</b>						
Overall	0.31	(0.02)	{0.27, 0.55}	0.26	(0.01)	{0.23, 0.47}
Female	0.31	(0.03)	{0.26, 0.54}	0.26	(0.02)	{0.22, 0.45}
Male	0.31	(0.03)	{0.25, 0.52}	0.26	(0.02)	{0.22, 0.45}
No matric	0.31	(0.03)	{0.26, 0.54}	0.27	(0.02)	{0.23, 0.47}
Matric	0.26	(0.04)	{0.18, 0.40}	0.27	(0.03)	{0.22, 0.45}
Post matric	0.38	(0.05)	{0.28, 0.60}	0.24	(0.02)	{0.19, 0.39}

Over time, there were increases in the prevalence of depressive symptoms among informal and formal workers. However, the changes over time are not statistically significant. The result holds when the analysis is disaggregated by gender and education. Thus, based on these unconditional differences, the prevalence of depressive symptoms was of the same order of magnitude in June and October among informal and formal workers regardless of gender and education level.

*Transitions in mental health:* Exploiting the panel structure of the data, we examine transitions in mental health in conjunction with transitions in type of work. Between June and October, workers could (i) transition from informal into formal work, (ii) transition from formal to informal work or (iii) remain in the same type of work; either informal or formal employment. Similarly, workers' mental health status could (i) improve (from experiencing depressive symptoms to no depressive symptoms), (ii) deteriorate (from no depressive symptoms to experiencing depressive symptoms) or (iii) remain in the initial state. Figure 1 shows the transitions that occurred in type of work and mental health between June and October 2020.

**Figure 1: Informal/formal work and mental health transitions**



A considerable percentage of workers remained in the same type of work over time: 58% remained in formal work while 22% remained in informal work. About 10% transitioned from formal to informal work and vice versa. For mental health, 57% of workers did not exhibit depressive symptoms while 12% had depressive symptoms in both wave 2 and 3. Statistics indicate that 16% of workers started to experience depressive symptoms (deterioration) in wave 3 while a similar share no longer exhibited depressive symptoms (improvement). In *Table 3*, we link changes in type of work to mental health.

**Table 3: Proportion of worker transitions in mental health and type of work**

	Transitions in type of work:			
	Informal to formal work (I)	Formal to informal work (II)	Remained in formal work (III)	Remained in informal work (IV)
No depressive symptoms in Oct.	0.14	0.14	0.14	0.15
	(0.03)	(0.03)	(0.01)	(0.02)
Had depressive symptoms in Oct.	0.16	0.19	0.16	0.18
	(0.03)	(0.04)	(0.01)	(0.02)
No depressive symptoms in June & Oct.	0.61	0.57	0.62	0.54
	(0.04)	(0.05)	(0.02)	(0.03)
Had depressive symptoms in June & Oct.	0.09	0.10	0.07	0.13
	(0.02)	(0.03)	(0.01)	(0.02)

**Notes:** Standard errors in brackets.

Among workers who transitioned from informal into formal work, 61% never experienced depressive symptoms in both June and October, while 9% exhibited depressive symptoms in both periods. The share of workers moving into formal work that report improvement and deterioration in mental health is 14 and 16%, respectively. For workers who transitioned into informal work, 57% never experienced depressive symptoms while 10% experienced depressive symptoms in June and October. Movement into informal work is associated with a marginally higher share of workers (19%) who experienced depressive symptoms rather than an improvement (14%). Notably, the observed differences in mental health transitions across groups (I) and (II) are statistically insignificant. A comparison across non-movers (columns III and IV) also shows insignificant differences in the share of workers experiencing depressive symptoms.

## 5. Regression Results

*Table 4* and *5* report results for the logit and the fixed effects (FE) logit regressions, respectively. The latter accounts for time invariant unobserved worker characteristics that may influence choice of work and depressive symptoms. Three specifications were used; in column I no additional covariates are included, column II controls for individual, work and household characteristics and in column 3 we include interactions of informal work, time period and gender.

The full model specification results in *Table 4* indicate that the odds of experiencing depressive symptoms were 1.4 times higher in October compared to June 2020. This upward trend is consistent across model specifications and when accounting for unobserved characteristics (*Table 5*). Turning to the position of informal relative to formal workers, results in *Table 4* show that informal workers had a higher risk of experiencing depressive symptoms. However, this effect becomes statistically insignificant when accounting for individual fixed effects (*Table 5*). As discussed in the methodology, our identification relies on workers who experience a switch in mental health status and sector of employment. Consequently, results could be sensitive to this identification strategy. Our results are therefore suggestive that depressive symptom experiences of informal and formal workers were statistically similar during the period under study. An interaction of informal work and October dummy variables show that the relative odds of informal workers experiencing depressive symptoms were of the same order as that of formal workers in October. This result is robust across model specifications. Accordingly, temporal changes in depressive symptoms registered among formal and informal workers were statistically similar.

**Table 4: Logit regression results**

	I					II					III				
	Odds ratio	S.E.	p-value	95% CI		Odds ratio	S.E.	p-value	95% CI		Odds ratio	S.E.	p-value	95% CI	
Informal work	1.34	(0.12)	0.00	{1.11, 1.60}		1.55	(0.19)	3.56	{1.22, 1.97}		1.39	(0.28)	0.11	{0.93, 2.07}	
Oct-20	1.37	(0.11)	0.00	{1.17, 1.61}		1.33	(0.13)	0.00	{1.11, 1.60}		1.43	(0.18)	0.00	{1.12, 1.82}	
Informal x October 2020											0.84	(0.16)	0.37	{0.57, 1.23}	
Female						0.88	(0.10)	0.25	{0.70, 1.10}		0.76	(0.10)	0.04	{0.58, 0.99}	
Informal x female											1.48	(0.32)	0.07	{0.97, 2.26}	
Age						0.97	(0.04)	0.53	{0.89, 1.06}		0.97	(0.04)	0.54	{0.89, 1.06}	
Age2						1.00	(0.00)	0.48	{1.00, 1.00}		1.00	(0.00)	0.49	{1.00, 1.00}	
Married						0.91	(0.10)	0.41	{0.74, 1.13}		0.91	(0.10)	0.37	{0.73, 1.12}	
African						0.39	(0.09)	0.00	{0.25, 0.63}		0.39	(0.09)	0.00	{0.24, 0.63}	
Coloured						0.83	(0.23)	0.49	{0.48, 1.43}		0.83	(0.23)	0.50	{0.48, 1.44}	
Indian/Asian						0.67	(0.40)	0.50	{0.21, 2.13}		0.69	(0.40)	0.52	{0.22, 2.16}	
No matric						0.79	(0.11)	0.10	{0.60, 1.04}		0.79	(0.11)	0.10	{0.60, 1.05}	
Matric						0.88	(0.12)	0.35	{0.67, 1.15}		0.87	(0.12)	0.33	{0.66, 1.15}	
Hunger						2.41	(0.34)	0.00	{1.83, 3.17}		2.41	(0.34)	0.00	{1.83, 3.18}	
Wage quintile 1						1.26	(0.22)	0.19	{0.89, 1.79}		1.27	(0.23)	0.18	{0.90, 1.80}	
2						1.29	(0.24)	0.16	{0.90, 1.86}		1.31	(0.24)	0.15	{0.91, 1.88}	
3						1.20	(0.21)	0.29	{0.85, 1.71}		1.22	(0.22)	0.26	{0.86, 1.74}	
4						1.49	(0.25)	0.02	{1.07, 2.07}		1.50	(0.25)	0.02	{1.08, 2.09}	
Manager						0.85	(0.15)	0.36	{0.60, 1.20}		0.86	(0.16)	0.41	{0.61, 1.23}	
Technicians/clerks						0.72	(0.12)	0.04	{0.53, 0.99}		0.73	(0.12)	0.06	{0.54, 1.01}	
Service & skilled agric. workers						1.06	(0.16)	0.68	{0.79, 1.44}		1.07	(0.16)	0.64	{0.80, 1.45}	
Craft & machine operators						0.78	(0.14)	0.17	{0.55, 1.11}		0.80	(0.14)	0.22	{0.56, 1.14}	
Urban						0.96	(0.13)	0.74	{0.73, 1.25}		0.94	(0.13)	0.66	{0.72, 1.24}	
Province						yes					yes				
Constant						yes					yes				

**Notes:** Dependent variable = 1 if worker has depression symptoms and 0 otherwise. Reference groups: formal, wave 2, male, white, post-matric, household not suffering from hunger, wage quintile 5, elementary & other occupations.

**Table 5: Fixed effects logit results**

	I					II					III				
	Odds Ratio	S.E.	p-value	95% CI		Odds Ratio	S.E.	p-value	95% CI		Odds Ratio	S.E.	p-value	95% CI	
Informal work	1.12	(0.25)	0.62	{0.72, 1.73}		1.24	(0.37)	0.48	{0.69, 2.22}		1.01	(0.51)	0.98	{0.37, 2.74}	
Wave 3	1.52	(0.15)	0.00	{1.25, 1.83}		1.56	(0.25)	0.01	{1.14, 2.12}		1.77	(0.35)	0.00	{1.21, 2.59}	
Informal x Wave 3											0.72	(0.22)	0.28	{0.40, 1.30}	
Informal x female											1.81	(1.12)	0.34	{0.54, 6.12}	
Age						0.47	(0.36)	0.33	{0.10, 2.15}		0.47	(0.37)	0.34	{0.10, 2.18}	
Age2						1.01	(0.01)	0.46	{0.99, 1.03}		1.01	(0.01)	0.51	{0.99, 1.02}	
Married						0.76	(0.23)	0.35	{0.42, 1.36}		0.77	(0.23)	0.38	{0.43, 1.39}	
No matric						0.96	(0.51)	0.94	{0.34, 2.71}		1.01	(0.54)	0.99	{0.35, 2.87}	
Matric						1.01	(0.50)	0.98	{0.38, 2.67}		1.02	(0.51)	0.96	{0.39, 2.71}	
Hunger						2.09	(0.75)	0.04	{1.04, 4.23}		2.07	(0.75)	0.05	{1.01, 4.22}	
Wage quintile	1					0.85	(0.34)	0.68	{0.39, 1.85}		0.79	(0.32)	0.55	{0.36, 1.74}	
	2					0.85	(0.36)	0.70	{0.36, 1.97}		0.79	(0.34)	0.58	{0.33, 1.85}	
	3					0.87	(0.38)	0.75	{0.37, 2.06}		0.84	(0.37)	0.69	{0.35, 2.00}	
	4					1.07	(0.41)	0.86	{0.50, 2.28}		1.07	(0.42)	0.87	{0.50, 2.29}	
Manager						0.50	(0.28)	0.21	{0.17, 1.49}		0.53	(0.30)	0.26	{0.18, 1.60}	
Technicians/clerks						0.84	(0.31)	0.64	{0.41, 1.71}		0.86	(0.31)	0.68	{0.42, 1.76}	
Service & skilled agric. workers						1.32	(0.60)	0.54	{0.54, 3.22}		1.31	(0.60)	0.55	{0.54, 3.20}	
Craft & machine operators						2.69	(1.38)	0.05	{0.98, 7.34}		2.59	(1.33)	0.06	{0.95, 7.09}	
Urban						2.23	(0.82)	0.03	{1.08, 4.61}		2.14	(0.79)	0.04	{1.04, 4.40}	

**Notes:** Dependent variable = 1 if worker has depression symptoms and 0 otherwise. Reference groups: formal, wave 2, male, white, post-matric; household not suffering from hunger, wage quintile 5, elementary & other occupations.

Logit estimates (*Table 4*) show that the odds of women experiencing depressive symptoms was lower compared to that of males. Interacting informal work and the female dummy we find that women in informal work had higher odds (1.5) of experiencing depressive symptoms relative to their male counterparts. However, this effect becomes statistically insignificant when accounting for unobserved individual heterogeneity (*Table 5*).

We find no significant age, marital status, education, wage (quintile) effects on the risk of experiencing depressive symptoms under the period of study (*Table 5*). The risk of experiencing depressive symptoms was 2 times higher among workers living in households that suffered from hunger compared to those that did not. This result is robust across all model specifications. The odds of having depressive symptoms are generally not significantly different across occupations except for workers in craft and machine-operating occupations with an odds ratio of 2.5 after counting for unobserved heterogeneity. While logit estimates show no significant differences in the likelihood of having depressive symptoms between workers in urban and rural areas, FE logit estimates show that the risk of depressive symptoms among workers in urban areas was 2 times higher than that of workers in rural areas.

## 6. Conclusion and Policy Recommendations

Understanding the link between informal work and mental health during the COVID-19 pandemic is important given the vulnerabilities faced by informal relative to formal workers. In this study, we examine if informal workers faced a higher risk of experiencing depressive symptoms compared to their counterparts in formal work. We explored changes in depressive symptoms and whether there were differences by gender using logit and FE logit models and the NIDS-CRAM wave 2 and 3 datasets.

We find that the odds of workers experiencing depressive symptoms were higher in wave 3 (October) compared to wave 2 (June). We also find that the higher risk of experiencing depressive symptoms among informal workers becomes statistically insignificant after accounting for unobserved individual heterogeneity. In addition, there is no convincing evidence indicating that women in the informal sector had different experiences of depressive symptoms relative to men. Our findings suggest that while the risk of depressive symptoms among workers increased between June and October 2020, the increases were of the same order for informal and formal workers. Additional results show that workers living in urban areas and households suffering from hunger had a higher risk of experiencing depressive symptoms while age, earnings, race and education effects were generally insignificant.

Our results call for interventions that curb the general rise in depressive symptoms among workers. The government can consider allocating resources to mental health and psychosocial support as an integral component of the country's recovery plans. Collection of statistics for mental disorders also needs prioritisation so that the government can avail adequate budget for investing in life-saving mental health programmes during the pandemic and beyond. For instance, deploying digital and telephonic counselling services and tele-therapy to bridge gaps in mental health, encouraging employers to provide basic mental health related support at the work place, and monitoring changes and disruptions in counselling services for efficient and effective responses. Provisions of easily accessible and affordable mental health programmes will be highly beneficial to informal workers who generally face a lack of basic mental health support at the work place.

This study is not without limitations. We identify groups of workers who faced a high risk of having depressive symptoms. However, the mechanisms underpinning observed patterns cannot be explored in detail due to data constraints. As previously indicated our analysis is limited by the potential simultaneity problem between type of work and mental health – an issue we cannot resolve using the current dataset. We also acknowledge that our FE logit regressions relies on workers who transition across mental health and work type states. Given the limited number of transitions in the data, our results are therefore suggestive of the experiences of informal/formal workers. Future studies could benefit from addressing these issues.

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