

Food insecurity and common mental disorders in perinatal women living in low socio-economic settings in Cape Town, South Africa during the COVID-19 pandemic: a cohort study

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Research Article

Keywords: Food security, depression, perinatal, domestic abuse, COVID

Posted Date: July 9th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-692244/v1>

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Abstract

Objective: Common mental disorders (CMDs) such as depression and anxiety are highly prevalent during the perinatal period, and are associated with food insecurity, domestic violence and lack of social support. This study explores the relationship between household food insecurity, mental health status and several adverse social and economic factors experienced by perinatal women during the COVID-19 pandemic.

Design: Cohort study, using telephonic interviews at two time-points, three months apart. Logistic regression analysis was used to model the associations of several baseline risk factors with the occurrence of household food insecurity at follow-up as the outcome.

Setting: Midwife obstetric units or basic antenatal care units in Cape Town, South Africa.

Participants: The sample comprised of 880 perinatal women at baseline and 660 women at follow-up.

Results: At baseline 23% were pregnant, 54% were unemployed, 13% had a probable CMD, 43% were severely food insecure and 21% experienced domestic abuse in the past year. Of the 660 women interviewed at follow-up, 71% were unemployed, 3.5% were pregnant, 7% had a probable CMD, and 32% were severely food insecure. In the multivariate regression model, after controlling for ethnicity, number of children, being HIV-infected, and having a planned pregnancy, the odds of being food insecure were greater in women who were unemployed (OR=1.88; p=0.001) or had probable CMD (OR=2.20; p=0.019) at baseline.

Conclusions: This study highlights a range of socio-demographic and mental health related variables that predict food insecurity among perinatal women during the COVID-19 pandemic.

Introduction

Late in March 2020, the South African government enforced a national lockdown to curb the spread of the Coronavirus (COVID-19) pandemic⁽¹⁾. For more than two months the majority of South Africans were confined to their homes, except those performing essential services^(2,3). Even when restrictions started easing in June 2020, many industries remained under lockdown⁽⁴⁾. The COVID-19 pandemic triggered an increase in unemployment and poverty in South Africa, affecting already vulnerable populations, especially those working in the informal sector who were unskilled and had low levels of education⁽⁵⁾. Unemployment rates, which had remained at about 20% for the last decade, rose to 31% by September 2020⁽⁶⁾.

South Africa is characterised by high levels of inequality and poverty⁽⁷⁾, evidenced by having one of the highest Gini coefficients in the world⁽⁸⁾. The high inequality rates are responsible for South Africa being food secure at a national level, i.e., enough food is being produced and imported to ensure that all South Africans have sufficient food, yet more than 20% of South African households are food insecure⁽⁹⁾. Household food insecurity exists when households do not have "physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"⁽¹⁰⁾. Based on the 2017 General Household Survey in South Africa, households with the greatest levels of food insecurity are headed by Black Africans, have more than eight household members and are living in urban areas⁽⁹⁾. As a result of the COVID-19 pandemic and the subsequent high levels of unemployment, raised food prices and economic decline⁽¹¹⁾, acute food insecurity was experienced throughout South Africa⁽¹²⁾. Food security is especially important for pregnant and lactating women as inadequate nutrition during pregnancy, lactation and infancy is associated with poor infant and child health outcomes⁽¹³⁾.

In low- and middle-income countries (LMIC), common mental disorders (CMDs) such as depression and anxiety are highly prevalent during the perinatal period⁽¹⁴⁻¹⁶⁾ and are associated with food insecurity^(17,18) and domestic violence⁽¹⁹⁾. However, pregnant women with mild to moderate symptoms of depression during their first and second trimester of pregnancy, have shown a natural remission of symptoms during the perinatal period, even without intervention^(20,21). Recent studies have reported elevated levels of perinatal depression and anxiety during the COVID-19 pandemic⁽²²⁻²⁴⁾, compared to studies done previously. In addition, pregnant women in the first and third trimester of pregnancy, and those with other children, were at greater risk than other pregnant women⁽²⁴⁾.

The relationship between CMDs and food insecurity is thought to be bidirectional, particularly during the perinatal period. The social causation hypothesis proposes that those living in poverty and food insecurity develop poor mental health because of the stress resulting from their economic difficulties, while the social drift hypothesis proposes that poor mental health causes loss of employment and increased medical expenditure resulting in increased poverty⁽²⁵⁾. While many studies have explored the social causation hypothesis, few studies have examined the impact of poor mental health on food security, i.e., the social drift hypothesis, in perinatal women⁽²⁶⁾. To our knowledge, no studies have reported on the relationship between food insecurity and CMDs in perinatal women living in South Africa during the COVID-19 pandemic. This study uses data collected at two time-points during the COVID-19 pandemic to investigate the relationship between food insecurity, poverty and CMDs in a population of perinatal women living in low socio-economic settings in Cape Town, South Africa.

Methods

Setting

The Health Systems Strengthening in sub-Saharan Africa (ASSET) study⁽²⁷⁾ includes a cluster randomised control trial (ISRCTN41483663) to evaluate an intervention to strengthen detection, referral and care for antenatal women with probable CMDs and experiences of domestic violence. Study sites consisted

of 14 midwife obstetric units (MOUs) or basic antenatal care (BANC) clinics that were randomly selected from 23 facilities in the Cape Metropolitan Health District in Cape Town. As part of the study, the clinical notes of 2149 perinatal women were reviewed. Patients' contact details, and gestational and medical history was captured during the review. All healthcare facilities are managed by the Western Cape Department of Health and offer free antenatal and postnatal care. All facilities are situated in low-resource urban communities, across a large flat area known as the 'Cape Flats'⁽²⁸⁾ on the outskirts of Cape Town. The Cape Flats is made up of Black and Coloured (people of mixed ancestry⁽²⁹⁾) communities living in low-cost housing and informal settlements, where residents experience high levels of unemployment and poverty⁽³⁰⁾, gang violence⁽³¹⁾ and domestic abuse⁽¹⁹⁾. During the pandemic, a survey among perinatal women living in vulnerable communities in Cape Town, reported that 71% of women were unemployed, and almost 40% of women reported that they had gone to bed hungry due to lack of food in the household⁽³²⁾.

Data collection

Between June and July 2020 (baseline), using the contact details obtained from the clinical notes, perinatal women were telephonically contacted and invited to participate in a telephonic survey. Fieldworkers verbally explained the study in participants' home language before seeking informed consent. The following questionnaires were administered to women who consented to participate in the study: (1) a socio-demographic questionnaire, (2) the Edinburgh Postnatal Depression Scale (EPDS)⁽³³⁾, (3) a psychological distress questionnaire⁽³⁴⁾, (4) the Household Food Insecurity and Access Scale (HFIAS)⁽³⁵⁾, and (5) the short form of the Composite Abuse Scale (CAS-SF)⁽³⁶⁾. Three months later (follow-up), the same questionnaires were telephonically administered to all women who participated in the baseline data collection.

The EPDS is a ten-question screening tool with a seven-day recall period. It has been validated against the Diagnostic and Statistical Manual (DSM-IV)^(37,38) for depression and anxiety in a sample of postnatal women in South Africa^(33,39) with a cut-off of ≥ 13 indicating a probable CMD (sensitivity=80%; specificity=76.6%)⁽³³⁾. The psychological distress questionnaire uses a 14-day recall period and has been validated against the EPDS with a cut-point of ≥ 2 indicating the presence of psychological distress (sensitivity=85.7%; specificity=92.9%)⁽³⁴⁾. The HFIAS uses a 9-item scale with a 30-day recall period to measure the household's frequency of running out of food or eating inadequate amounts of food⁽³⁵⁾. Self-reported experiences and frequency of psychological, physical and sexual abuse were captured using the 15-item CAS-SF⁽³⁶⁾. At baseline the recall period was 12 months, while at follow-up women were asked whether they had experienced any form of domestic violence since the previous interview, approximately 3 months earlier.

The HFIAS was used to categorise households into four levels of household food insecurity experienced during the past 30 days: food secure, mildly food insecure, moderately food insecure and severely food insecure⁽⁴⁰⁾. The CAS-SF was used to categorise the frequency of experiences of domestic violence during the past 12 months into physical, sexual and psychological abuse⁽³⁶⁾.

Data analysis

Data analysis was carried out using STATA/SE statistical software package version 15.1 (StataCorp., College Station, TX, USA). Participants with incomplete data were excluded from the analysis. Variables were described using frequency and percentages, and associations measured using Chi-square tests.

We hypothesized that worse mental health and socio-demographic adversities experienced at baseline would predict worse food security at follow-up. To test this hypothesis, we used logistic regression to model the associations of several baseline risk factors with the occurrence of food insecurity at follow-up, as the outcome. Food insecurity was classified as experiencing any level of food insecurity – mild, moderate or severely food insecure. Variables with a p-value of < 0.2 in the univariate model were entered in the multivariate model to generate adjusted odds ratios⁽⁴¹⁾.

Ethical approval

Ethical approval for the study was obtained from the Human Research Ethics Committee at the Faculty of Health Sciences, University of Cape Town (Ref No: 139/2018) and the Psychiatry, Nursing and Midwifery Research Ethics Subcommittee at Kings College London (Ref No: 17/18-7807). The Western Cape Department of Health approved the use of the research sites (Ref No: WC_201807_008). Consent forms were available in English, Afrikaans and isiXhosa. All participants were informed that they were free to withdraw from the study at any time without consequences. Women who screened positive for CMDs or experiences of domestic violence or severe food insecurity, were provided with a resource list of organisations that provided telephonic counselling and support. No financial incentives were provided for participating in the study.

Results

The socio-demographic characteristics of participants at baseline and follow-up are presented in **Table 1**. At baseline, 880 perinatal women were recruited, while 660 women participated in the telephonic interviews at follow-up (3 months later). The 25% of women who were lost-to-follow-up were no longer contactable on the cell number used at baseline. At follow-up, significantly more women were unemployed (71% vs. 54%; $p < 0.001$), receiving grants (62% vs. 50%; $p < 0.001$), and had already given birth (95% vs. 74%; $p < 0.001$), compared to baseline.

Table 2 provides an overview of the mental health, food insecurity and domestic violence characteristics of participants at baseline and follow-up. Significantly fewer women experienced psychological distress (14% vs. 26%; $p < 0.001$) and probable CMD (7% vs. 12.5%; $p < 0.001$) at follow-up, compared to baseline. At follow-up the prevalence of food insecurity had significantly reduced ($p < 0.001$). More women were food secure (31% vs. 20%) and mildly food

insecure (13% vs. 9%), while fewer women were moderately (24% vs. 28%) and severely food insecure (32% vs. 43%) at follow-up, compared to baseline. All forms of domestic abuse decreased significantly ($p < 0.001$) from baseline to follow-up.

Table 3 presents the bivariate cross-sectional associations between food security status and a number of participant characteristics at baseline and follow-up. At baseline, significantly more women who were food insecure were unemployed (85% vs. 15%; $p < 0.001$), received a grant (52% vs. 41%; $p = 0.012$), experienced psychological distress (30% vs. 12%; $p < 0.001$), had a probable CMD (14% vs. 4%; $p < 0.001$) and experienced domestic violence (33% vs. 13%; $p < 0.001$), compared to those who were food secure. At follow-up the pattern remained the same - significantly more women who were food insecure were unemployed (76% vs. 24%; $p < 0.001$), received a grant (52% vs. 39%; $p = 0.002$), experienced psychological distress (31% vs. 21%; $p = 0.006$), had a probable CMD (9% vs. 4%; $p = 0.034$) and experienced domestic violence (14% vs. 8%; $p = 0.020$), compared to those who were food secure. In addition, at follow-up significantly fewer women who were food insecure had planned their pregnancy (34% vs. 43%; $p = 0.024$), while significantly more women who were food insecure were HIV-infected (24% vs. 12%; $p = 0.001$), compared to those who were food secure.

The odds of experiencing food insecurity at follow-up, based on participants baseline characteristics is shown in **Table 4**. In the unadjusted model, being aged 18-24 years (odds ratio (OR)=0.67; $p = 0.029$), receiving financial support from a partner (OR=0.61; $p = 0.005$), or having a planned pregnancy (OR=0.64; $p = 0.025$), significantly decreased the odds of being food insecure, while Black African women (OR=2.87; $p < 0.001$), those with ≥ 3 children (OR=1.96; $p = 0.036$), those who were HIV-infected (OR=2.21; $p = 0.001$) or who experienced psychological distress (OR=1.72; $p = 0.007$) had greater odds of being food insecure. Several markers of poverty at baseline - being unemployed (OR=1.67; $p = 0.003$), receiving a social support grant (OR=1.64; $p = 0.004$), increasing number of people per room (OR=1.17; $p = 0.034$) - significantly increased the odds of being food insecure at follow-up.

In the multivariate model, after controlling for ethnicity, number of children, being HIV-infected, and having a planned pregnancy, the odds of being food insecure were greater in women who were unemployed (OR=1.88; $p = 0.001$) or had probable CMD (OR=2.20; $p = 0.019$) at baseline.

Discussion

We used data collected at two time-points during the COVID-19 pandemic in South Africa to explore the relationship between household food insecurity and a range of social, economic and mental health related variables in perinatal women attending public healthcare facilities situated in low socio-economic communities in Cape Town. At baseline, we found that 80% of perinatal women lived in food insecure households, 26% experienced psychological distress and that 12% had a probable CMDs. Three months later the prevalence of food insecurity, psychological distress and probably CMDs was significantly lower. At both baseline and follow-up, we showed that food insecurity was significantly associated with ethnicity, several markers of poverty (including employment status, receipt of grants, and number of people per room), a probable CMD, psychological distress and experiences of domestic violence. Using multivariate logistic regression modelling, we showed that being a Black African woman, having three or more children or having a probable CMD at baseline increased the odds of being food insecure at follow-up.

Following the strict lockdown imposed by the South African government in March 2020, the World Health Organisation praised South Africa for its effective fight against COVID-19⁽⁴²⁾. However, the same lockdown measures used to curb the spread of the COVID-19 pandemic, disproportionately affected those living in low resource settings⁽⁴³⁾. In South Africa, where 29% of the population were already unemployed⁽⁴⁴⁾ and 35% of employed individuals worked in the informal sector, the lockdown plunged millions more into unemployment, poverty and food insecurity⁽⁵⁾. In June 2020, when the lockdown restrictions had just started easing, we found that 54% of perinatal women were unemployed and 80% were living in food insecure households. Three months later, we found that the number of unemployed had risen by 17%, yet the proportion of women living in food insecure households had decreased by 11%. The decrease in the proportion of food insecure households is likely due to measures the South African government employed, such as providing unemployed individuals who were over 18 years with a COVID-19 social relief and distress grant, valued at R350 (25 USD) per month⁽⁴⁵⁾. In addition, the South African government⁽⁴⁶⁾, as well as several non-profit organisations, distributed thousands of food parcels and food vouchers to those in need^(32,47-49). Even though the levels of food insecurity were significantly lower at follow-up, more than two thirds of the perinatal women were still living in food insecure households. In South Africa, persistent food insecurity is associated with the double burden of malnutrition, where undernutrition co-exists with overweight and obesity in the same household and is characterised by an overweight or obese mother living with her underweight, wasted or stunted child⁽⁵⁰⁾. Pregnant and lactating women, with their increased nutrient requirements, are particularly vulnerable to malnutrition⁽⁵¹⁾, which can take the form of underweight or obesity. Malnutrition is associated with anaemia, hypertension and haemorrhage in the mother and pre-term delivery, low birth weight and intrauterine growth retardation in infants⁽⁵²⁾.

We found that both CMDs and experiences of psychological distress decreased between baseline and follow-up. Although 12.5% of women reported experiencing a probable CMDs at baseline, only 7% experienced CMD at the follow-up data collection time-point. Similar prevalence estimates have been reported in studies on postnatal CMDs from Ethiopia⁽⁵³⁾ and Zimbabwe⁽⁵⁴⁾ where the prevalence ranged between 9% and 34%. The low prevalence of CMDs at baseline and follow-up is likely because the majority of women were in the third trimester of pregnancy or had already given birth, as studies have found that mild to moderate symptoms of depression improve during the last trimester of pregnancy and after birth^(20,55), and that the prevalence of depression is higher during pregnancy compared to after childbirth⁽⁵⁶⁾.

Several systematic reviews have described the impact of food insecurity on poor mental health. The studies included in the reviews provide evidence that food insecurity increases the risk of common mental disorders throughout the life cycle⁽⁵⁷⁻⁶⁰⁾. Qualitative studies report that food insecurity is experienced as acute psychological suffering, with overwhelming feelings of shame⁽⁵⁹⁾. These findings are in keeping with the social causation pathway which hypothesizes that unfavourable social and economic conditions such as poverty, food insecurity and domestic violence increases the risk of poor mental health⁽²⁵⁾. While many studies have examined the social causation pathway, few studies investigated the impact of poor maternal mental health on food insecurity. A study in Cape

Town reported that the odds of household food insecurity were four time greater in pregnant women who were depressed⁽¹⁷⁾, and a birth cohort study, located in a small city outside Cape Town reported that maternal depression significantly predicted perceived household food insecurity⁽⁶¹⁾. Our study found that having a probable CMD increased the subsequent odds of household food insecurity. As food insecurity is a consequence of poverty, our results provide further support of the social drift hypothesis which proposes that people living with a mental illness drift into poverty due to the stigma of mental illness, the cost of healthcare, and reduced income generating potential associated with the disability of their mental illness⁽²⁵⁾.

Our study has strengths and limitations. We interviewed women attending 14 randomly selected MOUs and BANC clinics in Cape Town and collected data at two time-points. This allowed us to measure incidence and generalise our findings to Cape Town, instead of being limited to a smaller population. Interviewer bias may be present as 14 fieldworkers were telephonically trained to administer the questionnaires and we were not able to assess inter-rater reliability. We did not have a control group, which would have allowed us to better understand the effect of the COVID-19 lockdown on the women's mental health and experiences of food insecurity. We did not do any qualitative interviews which would have helped us understand the relationship between poor mental health and food insecurity.

Further research is needed to better understand the how experiences of mental health problems lead to food insecurity and malnutrition among pregnant and lactating women, as well as to investigate the long-term effects of food insecurity on mothers and infants born during the pandemic.

Conclusions

This study provides evidence of the social drift hypothesis, by showing that perinatal women with poor mental health and adverse social and economic challenges are at an increased risk of drifting into poverty and food insecurity. While the lockdown restrictions imposed during the COVID-19 pandemic may have decreased COVID-related illness and death, it came at a high price for those living in already vulnerable circumstances. The effect of the high levels of food insecurity and related poor mental health of pregnant and lactating women during the COVID-19 pandemic indicates the need for interventions to address both mental health and food insecurity among pregnant women in low resource settings.

Declarations

Acknowledgments: We are grateful to the women who participated in the study for generously giving their time and energy to complete interviews. We thank Mbali Mohlamonyane for coordinating the data collection and Sonet Boisits for providing mental health support to the data collectors.

Financial support: The ASSET study is funded by the National Institute for Health Research (NIHR) Global Health Research Unit on Health System Strengthening in Sub-Saharan Africa, King's College London (GHRU 16/136/54).

Conflict of interest: None

Authorship: ZA and CL proposed and designed the study. ZA performed the data analysis and prepared the first draft of the manuscript. CL reviewed all drafts of the manuscript and provided input. All authors approved the final version of the manuscript.

Ethical Standards Disclosure: This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Human Research Ethics Committee at the Faculty of Health Sciences, University of Cape Town (139/2018) and the Psychiatry, Nursing and Midwifery Research Ethics Subcommittee at Kings College London (17/18-7807). In addition, the Western Cape Department of Health approved the use of the research sites (WC_201807_008). Verbal informed consent was obtained from all subjects/patients. Verbal consent was witnessed and formally recorded.

Tables

Table 1: Socio-demographic characteristics of participants at baseline and follow-up

	Baseline (n=880) n (%)	Follow-up (n=660) n (%)	P-value*
Age			
<18 Years	12 (1.4)	6 (0.9)	0.844
18-24 years	279 (31.7)	204 (30.9)	
25-30 years	310 (35.2)	227 (34.4)	
31-35 years	173 (19.7)	141 (21.4)	
>35 years	106 (12.1)	82 (12.4)	
Ethnicity			
Black African	606 (72.7)	464 (74.0)	0.567
Mixed ancestry	228 (27.3)	163 (26.0)	
Other children			
No children	307 (35.9)	236 (36.8)	0.768
1-2 children	467 (54.5)	338 (52.7)	
≥3 children	83 (9.7)	67 (10.5)	
Planned pregnancy	318 (36.5)	238 (36.8)	0.881
Employment status			
Employed	349 (39.5)	154 (24.1)	<0.001
Unemployed	476 (54.0)	452 (70.6)	
Student	57 (6.5)	34 (5.3)	
Financial support from partner	355 (40.3)	272 (41.8)	0.571
Any grants	447 (50.1)	549 (61.5)	<0.001
Child support grant	424 (48.0)	304 (46.1)	0.991
People per room [mean (SD)]	2.59 (1.2)	2.62 (1.2)	0.527**
HIV-infected	162 (18.7)	129 (20.1)	0.518
Pregnancy status			
Pregnant	223 (23.3)	23 (3.5)	<0.001
Post birth	649 (73.6)	627 (95.0)	
Miscarriage/Stillbirth	10 (1.13)	10 (1.5)	

*Chi-squared test

**T-test

Table 2: Descriptive characteristics of mental health, food insecurity and domestic violence among participants at baseline and follow-up

	Baseline (n=880) n (%)	Follow-up (n=660) n (%)	P-value*
Psychological distress**	232 (26.2)	91 (13.8)	<0.001
Probable CMD***	110 (12.5)	46 (7.0)	<0.001
Food security status			
Food secure	175 (19.9)	205 (31.3)	<0.001
Mildly food insecure	81 (9.2)	84 (12.8)	
Moderately food insecure	243 (27.7)	156 (23.9)	
Severely food insecure	379 (43.2)	209 (32.0)	
Domestic abuse			
Psychological abuse	136 (84.2)	61 (9.4)	<0.001
Physical abuse	120 (13.9)	53 (8.2)	<0.001
Sexual abuse	14 (1.6)	5 (0.8)	<0.001
Any form of abuse	176 (20.6)	78 (12.2)	<0.001

*Chi-squared test

** ≥ 2 on the psychological distress questionnaire

*** ≥ 13 on the EPDS

Table 3: Bivariate associations with food security status at baseline and follow-up

	Baseline		P-value**	Follow-up		P-value
	Food secure n (%) (n=175)	Food insecure* n (%) (n=703)		Food secure n (%) (n=205)	Food insecure n (%) (n=449)	
Age						
<18 years	2 (16.7)	10 (83.3)	0.666	1 (16.7)	5 (83.3)	0.065
18-24 years	62 (22.5)	214 (77.5)		73 (36.0)	130 (64.0)	
25-30 years	62 (20.1)	247 (79.9)		77 (34.2)	148 (65.8)	
31-35 years	31 (18.0)	141 (82.0)		37 (26.4)	103 (73.6)	
>35 years	18 (16.5)	91 (83.5)		17 (21.2)	63 (78.8)	
Ethnicity						
Black	108 (17.8)	498 (82.2)	0.027	112 (24.4)	347 (75.6)	<0.001
Mixed ancestry	56 (24.7)	171 (75.3)		77 (47.5)	85 (52.5)	
Other children						
No children	63 (20.7)	241 (79.3)	0.585	83 (35.5)	151 (64.5)	0.046
1-2 children	93 (20.0)	371 (80.0)		102 (30.5)	233 (69.5)	
≥3 children	13 (15.7)	70 (84.3)		13 (19.7)	53 (80.3)	
Planned pregnancy	72 (41.6)	245 (35.3)	0.123	86 (43.2)	150 (33.9)	0.024
Employment status						
Employed	86 (24.9)	260 (75.1)	<0.001	82 (54.3)	69 (45.7)	<0.001
Unemployed	69 (14.6)	405 (85.4)		110 (24.4)	340 (75.6)	
Student	20 (35.7)	36 (64.3)		5 (15.2)	28 (84.8)	
Financial support from partner	84 (48.0)	270 (38.4)	0.021	101 (50.2)	170 (38.3)	0.004
Any grants	72 (41.1)	364 (51.8)	0.012	79 (38.5)	233 (51.9)	0.002
Child support grant	69 (39.4)	353 (50.2)	0.011	74 (36.1)	226 (50.3)	0.001
People per room [mean(SD)]	2.31 [1.05]	2.66 [1.23]	<0.001 [§]	2.46 [1.10]	2.68 [1.29]	0.033 [§]
HIV-infected	25 (14.8)	135 (19.7)	0.147	24 (12.2)	103 (23.5)	0.001
Pregnancy status						
Pregnant	62 (28.1)	159 (71.9)	0.002	12 (52.2)	11 (47.8)	0.073
Post birth	111 (17.2)	534 (82.8)		189 (30.4)	432 (69.6)	
Miscarriage/stillbirth	2 (20.0)	8 (80.0)		4 (40.0)	6 (60.0)	
Psychological distress [^]	21 (12.0)	208 (29.6)	<0.001	42 (20.9)	139 (31.3)	0.006
Probable CMD ^{^^}	7 (4.0)	101 (14.4)	<0.001	8 (3.9)	38 (8.5)	0.034
Domestic violence						
Psychological abuse	18 (10.7)	118 (17.1)	0.043	14 (6.9)	46 (10.3)	0.163
Physical abuse	14 (8.4)	106 (15.3)	0.023	7 (3.5)	46 (10.4)	0.003
Sexual abuse	0	14 (2.0)	0.063	0	5 (1.1)	0.131
Any form of abuse	22 (13.3)	154 (33.4)	0.010	15 (7.6)	62 (14.0)	0.020

*Food insecure (mild, moderate and severely food insecure)

**Chi-squared test

[§]t-test

[^]≥2 on the psychological distress questionnaire

^{^^}≥13 on the EPDS

Table 4: Logistic regression model: Baseline characteristics associated with food insecurity at follow-up

	Unadjusted model		Multivariate model*	
	Odds ratio (95% CI)	P-value	Odds ratio (95% CI)	P-value
<18 years [ref: ≥35 years]	4.17 (0.52-33.15)	0.177		
18-24 years [ref: ≥35 years]	0.67 (0.47-0.96)	0.029		
25-30 years [ref: ≥35 years]	0.92 (0.65-1.31)	0.640		
31-35 years [ref: ≥35 years]	1.34 (0.88-2.05)	0.169		
Black [ref: Coloured]	2.87 (1.98-4.16)	<0.001	3.27 (2.12-5.04)	<0.001
1-2 child [ref: no children]	1.07 (0.76-1.50)	0.673		
≥3 children [ref: no children]	1.96 (1.04-3.69)	0.036	2.05 (1.03-4.05)	0.030
Planned pregnancy	0.64 (0.47-0.95)	0.025	0.62 (0.42-0.90)	0.013
Unemployed [ref: employed]	1.67 (1.19-2.33)	0.003	1.88 (1.29-2.74)	0.001
Student [ref: employed]	1.61 (0.75-3.44)	0.223		
Financial support from partner	0.61 (0.44-0.86)	0.005		
Child support grant	1.64 (1.17-2.31)	0.004		
Any grant	1.63 (1.17-2.28)	0.004		
People per room	1.17 (1.01-1.36)	0.034		
HIV-infected	2.21 (1.37-3.58)	0.001	1.49 (0.88-2.74)	0.138
Post birth [ref: pregnant]	1.41 (0.98-2.03)	0.061		
Miscarriage/stillbirth [ref: pregnant]	0.67 (0.19-2.41)	0.546		
Psychological distress**	1.72 (1.16-2.56)	0.007		
Probable CMD***	1.69 (0.96-2.97)	0.069	2.20 (1.14-4.24)	0.019
Psychological abuse	1.30 (0.81-2.11)	0.279		
Physical abuse	1.02 (0.62-1.69)	0.938		
Sexual abuse	1.55 (0.32-7.56)	0.583		
Any abuse	1.21 (0.78-1.88)	0.376	1.18 (0.73-1.91)	0.507

*Variables with a p-value of <0.2 in the univariate model, were entered in the multivariate model

**≥2 on the psychological distress questionnaire

*** ≥13 on the EPDS

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