Journal of Community Psychology

WILEY

JOURNAL OF COMMUNITY PSYCHOLOGY

RESEARCH ARTICLE OPEN ACCESS

Context Matters: Urban Typology and Pandemic-Related Mental Health Decline in Low-Income South African Settings

Maretha Visser[1] | Rhena Delport[2] | Ariane Neethling[3] | Edith Madela-Mntla[2] | David Everatt[4] | Thesla Palanee-Phillips[5,6] | Tobias Barnard[7] | Jannie Hugo[2,8]

[1]Department of Psychology, Faculty of Humanities, University of Pretoria, Pretoria, South Africa | [2]Department of Family Medicine, School of Medicine, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa | [3]Department of Mathematical Statistics and Actuarial Science, University of the Free State, Bloemfontein, South Africa | [4]School of Governance, University of the Witwatersrand, Johannesburg, South Africa | [5]Faculty of Health Sciences, School of Public Health, Wits RHI, University of the Witwatersrand, Johannesburg, South Africa | [6]Department of Epidemiology; School of Public Health, University of Washington, Seattle, Washington, USA | [7]Faculty of Health Sciences, Water and Health Research Centre, University of Johannesburg, Johannesburg, South Africa | [8]UP COPC Research Unit, University of Pretoria, Pretoria, South Africa

Correspondence: Rhena Delport (rhena.delport@up.ac.za)

Received: 21 January 2024 | **Revised:** 12 January 2026 | **Accepted:** 14 January 2026

Funding: Wits RHI, University of the Witwatersrand; University of the Witwatersrand, Johannesburg; Department of Science and Innovation, South Africa; Gauteng Research Triangle Initiative for the Study of Population, Infrastructure and Regional Economic Development; National Research Foundation; University of Johannesburg; University of Pretoria

Keywords: community violence | COVID-19 mitigation regulations | mental health | psychosocial and economic determinants | urban typology

ABSTRACT

Aim: We explored the negative impact of the COVID-19 pandemic on self-reported mental health and perceived social and economic challenges in very-low- to low- to middle-income households in four urban typologies in South Africa: formal township dwellings, backyard dwellings, inner-city high-density apartments, and informal settlement dwellings. The purpose was to inform urban policy and crisis-response planning.

Methods: Structured interviews were conducted with 1330 adults from a stratified random sample from each urban typology during the third SARS-CoV-2 wave.

Results: Respondents reported increases in anxiety (28.5%), depression (23.9%), and decreased social connectedness (20.0%). Conversely, some respondents reported improved mental health, with decreases in anxiety (16.3%), depression (18.4%), and increased social connectedness (17.5%). Anxiety and depression were more prevalent in formal township dwellings and high-density apartments than in informal settlements. Financial concerns, worries about isolation, crime, and community violence, and fear of COVID-19 infection and stigma were mostly associated with decreased mental health.

Conclusions: Our findings suggest that residents from different urban typologies were affected differently by the COVID-19 pandemic. This research demonstrates the impact of environmental disasters on mental health in urban communities, which is mediated by social and economic problems.

1 | Introduction

The COVID-19 pandemic is an exceptional emergency that has had devastating effects on human health, economic and social systems, education, families, and the mental health of individuals (Abubakar et al. 2022; Molebatsi et al. 2021). Globally, mental health has been severely affected by the pandemic

(Brooks et al. 2020; Camara et al. 2023; Holmes et al. 2020; Otu et al. 2020; Rossi et al. 2020; Salari et al. 2020). A systematic review performed across 204 countries estimated that the prevalence of depression and anxiety disorders increased by 27.6% and 25.6%, respectively, due to the COVID-19 pandemic. In sub-Saharan Africa, an estimated 23% increase in depression and 21.5% increase in anxiety were reported (Santomauro et al. 2021).

A longitudinal study conducted in South Africa using a large representative sample ($n = 17000$) confirmed that the rates of depressive symptoms were consistently higher during the pandemic (24%) than those reported in the same sample in 2017 before the pandemic (12%) (Hunt et al. 2021; Oyenubi and Kollaparobil 2020). Orkin et al. (2020) reported that 33% of 12312 respondents experienced depressive symptoms, 45% experienced fear, and 29% experienced loneliness during the first phase of the lockdown in 2020.

The negative impact of the COVID-19 pandemic disproportionately affected different groups in South Africa. Oyenubi and Kollamparambil (2020) showed that the demographic pattern of depression in South Africa changed during the pandemic, as men and people with higher income and education levels (usually at low risk of depression) were more likely to screen positive for depressive symptoms. Changes in mental health during the pandemic have been related mostly to increased job losses (Fisher et al. 2022; Oyenubi & Kollaparobil, 2020; Posel et al. 2021), poverty and food insecurity (Gelo and Dikgang 2022; Hunt et al. 2021), actual infection or perceived risk (De Man et al. 2022; Kim et al. 2022; Oyenubi et al. 2022; Salari et al. 2020), and increased domestic violence (Chothia 2020; Mahlangu et al. 2022; Wake and Kandula 2022). While social distancing aims to curtail the spread of the virus, it limits people's social connections, resulting in a sense of social isolation and affecting mental health (De Man et al. 2021; Galea et al. 2020; Okabe-Miyamoto et al. 2021; Posel 2021).

While accumulating research has shown that the pandemic had negative psychological outcomes, Okabe-Miyamoto and Lyubomirsky (2021) noted in the World Happiness Report that many people arguably fared better than expected, with some reporting increases in satisfaction and feelings of social connection.

This study explored the impact of the COVID-19 pandemic on mental health among residents from four different urban typologies: formal township dwellings (FTDs), formal township backyard dwellings (FTBDs), inner-city high-rise high-density apartments (HDAs), and informal settlement dwellings (ISDs). These urban typologies are characteristic of very low-income and lower-middle-income urban areas in the Gauteng Province of South Africa.

1.1 | Urban Typology

Two-thirds of the South African population lives in urban areas (Abrahams et al. 2018). In Gauteng, these rates are as high as 97% (Everatt 1999). Urban areas are places of increased population density, with many people living and interacting nearby. Although density per sé is not automatically an accelerator of the spread of COVID-19, urban typology may contribute to higher infection rates (UN-Habitat 2020). The relationships among urban typology, density, disease, and mental health are not direct because factors such as income, health care, public spaces (United Nations Human Settlements Programme 2020), environmental stressors, fear of crime, level of participation, and informal social ties (Dupéré and Perkins 2007) play intermediate roles.

1.1.1 | Formal Township Dwellings: FTDs

Townships have evolved as underdeveloped, racially segregated, urban areas reserved for separate nonwhite groups during the apartheid era and are usually located on the periphery of towns and cities (Everatt and Ebrahim 2020; Huchzermeyer 2011; Pernegger and Godehart 2007). Since 1994, infrastructure development and greater economic activity have occurred in townships (Blakely 2023), although patterns of urban poverty and inequality have not yet been reversed (Abraham et al. 2018). Townships can be described as lower- to lower-middle-income areas, with free-standing built-up houses and basic services (running water, sanitation, and electricity) of varying quality and often high levels of crime and violence (Everatt 1999).

1.1.2 | Formal Township Backyard Dwellings: FTBDs

Backyarding occurs when a formal homeowner in a township rents a portion of his/her yard area to occupants to live in a room, formal, or informal dwelling (Brueckner et al. 2018; Interactive planning workshop for Johannesburg 2000). Backyarding provides accommodation for residents wishing to rent in areas with services and amenities but cannot afford formal rental accommodation. Backyard dwellers often have poor living conditions, may be exploited by their landlords, and may feel socially disempowered (Everatt 1999; Lemanski 2009).

1.1.3 | Inner-City High-Rise High-Density Apartments: HDAs

Inner-city high-rise apartments were originally built as middle-class inner-city accommodation, but have since been devolved into lower socioeconomic accommodation, often associated with overcrowding, poverty, social isolation, crime, and a risk of mental illness (Brown et al. 2004; Wandersman and Nation 1998). In contrast, certain high-rise areas with favourable sociodemographic conditions, higher economic status, a sense of safety, attractiveness, social connectedness, and access to open spaces can be protective factors (Gruebner et al. 2017; Melis et al. 2015; Ouda et al. 2020). During the pandemic, social and physical restrictions may have negatively affected economic activity, limited residents' ability to access open spaces, and affected household relationships in overcrowded apartments, which could have affected physical and mental health.

1.1.4 | Informal Settlement Dwellings: ISDs

Informal settlements are characterized by self-built housing using available materials (corrugated iron, plastic, and cardboard) and a lack of basic services, such as running water, sanitation, waste collection, and electricity. Informal settlements are often associated with poverty, overcrowding, crime and gender-related inequalities (Nguse and Wassenaar 2021; von Seidlein et al. 2021; Weimann and Oni 2019). On the

positive side, some settlements have large open spaces and clear internal governance. During the COVID-19 pandemic, restrictions such as handwashing, sole-use toilets, physical distancing, and self-isolation were impractical in ISDs (Ellison et al. 2022; Gibson and Rush 2020; Jansen and Madhi 2022; Nyashanu et al. 2020), and infection was anticipated to spread rapidly. Additionally, during the pandemic, ISDs were economically vulnerable, infrastructure was overburdened, and residents lacked easy access to health care (Corburn et al. 2020; Jansen and Madhi 2022; Nguse and Wassenaar 2021).

2 | Aim of the Research

The aims of this research were to 1) explore the perceived mental health of residents in four different urban typologies and 2) identify the perceived social and economic challenges associated with decreased mental health during the third wave of the COVID-19 pandemic.

3 | Context and Timing of Research

South Africa is a middle-income country characterized by extreme inequality, high rates of unemployment and violence, and a high burden of communicable and noncommunicable diseases, exacerbating the risk of mental health problems. The first case of COVID-19 was diagnosed in March 2020. A national state of disaster was declared, with a strict stay-at-home order implemented for the first 6 weeks of the pandemic. An alcohol and tobacco ban was also enforced for the first few months of the pandemic. The pandemic resulted in an economic downturn that significantly impacted economic activity, employment, and resources as the economy decreased by 8% (Hunt et al. 2021; Stats 2020). Approximately 3 million South Africans lost their employment during the first 4 months of the lockdown (Ingle et al. 2020), which had a long-term effect (Jansen and Madhi 2022). In 2021, the second year of the pandemic, lockdown restrictions were gradually lifted, except in June/July 2021, during the third wave of the pandemic. This research was conducted from March to October 2021 (before and after the third wave lockdown, when the delta variant was most prominent).

4 | Materials and Methods

4.1 | Study Design

This was a cross-sectional household survey. Households were randomly sampled in a stratified manner from each urban typology. Face-to-face structured interviews were held with randomly selected respondents.

4.2 | Sampling

The population for this study included all dwellings and persons aged 18 years and older in four urban typologies selected from three geographical sites in Gauteng, South Africa, via GeoTerra Image (Pty) Ltd. (GTI) National Building Census (structure/dwelling unit type) dataset. For this study, we selected an area in the formal township of Atteridgeville comprising FTDs with an estimated population of 12106 (individuals 15 years and older) and FTBDs) with an estimated population of 4448 (individuals 15 years and older). The rapidly evolving informal settlement of Melusi in the City of Tshwane represents ISDs with an estimated population of 10991 (individuals 15 years and older). In Johannesburg, Hillbrow was chosen to represent HDAs, with an estimated population of 5481 (individuals 15 years and older). A stratified random sample of households from the four urban typologies was selected. To obtain a representative sample, all dwelling units were ordered according to their geographic coordinates, where a systematic sample of 360 visiting points was drawn within each stratum, with two sets of 90 oversample points to be used if the selected unit was empty or refused. The oversample units were selected randomly to reduce fieldwork bias while still obtaining the desired sample size.

For each dwelling type, a household, self-defined and comprising people living and eating together, was randomly selected, and one adult (18 years or older) was randomly selected from that household and interviewed to complete the questionnaire ($n = 1331$).

The respondents were selected using the following inclusion criteria: adults aged ≥ 18 years; any sex or nationality; able to understand English or an indigenous language; willing and able to provide informed consent; and willingness to comply with the COVID-19 protocols during the study activities.

4.3 | Data Collection

Structured face-to-face interviews were conducted with a structured questionnaire that covered the following topics: i) sociodemographics; ii) fear, stigma, and knowledge of COVID-19 (13 items developed into a scale from low to high knowledge); iii) the impact of COVID-19 on perceived economic status (job status and food security), social relationships, family and community violence, police violence and crime; iv) access to health care; and v) perceived mental health during the pandemic. Perceived mental health was assessed as "better," "the same," or "worse" anxiety, depression, and social connectedness than before the pandemic. The interviews took approximately 45 min, and the responses were captured electronically. Data collection started in ISDs before the third COVID-19 wave (March–May 2021), and most data in HDAs were collected after the third wave (August–October 2021). The collection of data from the FTDs and FTBDs spans both periods.

4.4 | Data Analysis and Weighted Results

The data were weighted to represent the target population. Calibration weights (Neethling and Galpin 2006) were used to adjust the design weights to the latest sampling frame of the GeoTerra image (GTI), which is based on the 2022 StatsSA mid-year district population estimates and GTI's new development database. The calibration weights were calculated according to the population estimates of age groups and genders, per community.

Following descriptive statistics, Rao–Scott chi-square analyses for survey-weighted data (using SAS) were used to explore the

associations between experienced psychosocial challenges and perceived mental health in the four urban typologies. Chi-square automatic interaction detection (CHAID) analysis (using SPSS) was used to identify which self-reported psychosocial challenges were associated with the three mental health scores (anxiety, depression, and social connectedness) for the group as a whole and each of the four urban typologies. The demographic variables, gender, age group and education group, were included, in combination with other relevant variables, as explanatory variables in the different Chaid analyses.

The term "respondent" denotes unweighted observations, whereas "residents" is relevant to weighted analyses. Significance was set to $p < 0.05$.

4.5 | Ethics Approval

Ethics approval was obtained from the research ethics committees of the University of the Witwatersrand, the University of Johannesburg, and the University of Pretoria (References: 200907; 01-20-2020; 625/2020, respectively). All participants provided informed consent.

5 | Results

5.1 | Sociodemographic Characteristics

The sociodemographic characteristics of the respondents are outlined in Table 1. The data were weighted according to the designated and estimated population totals.

According to the unweighted data, two-thirds of the respondents in the four urban typologies were women (65.8%), and 40.1% were in the 25–39 years age group. Most of them had secondary school education or a national school-leaving certificate (82.8%). The Rao–Scott Chi-square test revealed that the distribution of educational attainment differed significantly across the four urban typologies ($p < 0.0001$) (Figure 1). Residents of ISDs had lower educational levels than did residents in the other three areas.

5.2 | Perceived Mental Health

Perceived mental health is reported in terms of residents' experiences of anxiety, depression, and social connectedness during the pandemic compared with before the pandemic. Residents in all three urban sites indicated that they experienced increased anxiety (28.5%) and depression (23.9%) and lower social connectedness (20.0%) than before the pandemic. Some residents experienced improved mental health during the pandemic (16.3% less anxiety, 18.4% less depression, and 17.5% improved social connectedness), whereas the remainder reported the same level of mental health as before the pandemic (Figure 2).

Further analysis revealed that increased anxiety was more frequently reported by women (33%) than men (24.1%; $p < 0.05$), whereas experiences of increased depression and less social connectedness did not differ between genders.

Significant differences in perceived mental health were observed between residents from the four urban typologies. Residents living in FTDs and HDAs more frequently reported poorer mental health, with 37.9% and 30.1%, respectively, reporting increased anxiety and 30.7% and 24.7%, respectively, reporting increased depression. In contrast, 20.3% of the residents of ISDs reported increased anxiety, and 17.8% reported increased depression (see Figure 3).

Some residents, especially those living in FTBDs and HDAs, also reported improved mental health, such as less anxiety (26.2% and 24.5%, respectively), less depression (24.8% and 25.6%, respectively), and better social connectedness (22.0% and 27.7%, respectively), than before the pandemic. Almost two-thirds of the residents of ISDs indicated that their mental health status was similar to that before the pandemic (Figure 3).

5.3 | Perceived Psychosocial Challenges

In Table 2, perceived psychosocial challenges during the pandemic, which can be regarded as social and economic determinants of mental health, were explored in the four urban typologies. There were significant differences in the social and economic challenges reported in the four urban typologies. Concerns about finances and employment were prominent in all urban typologies.

FTDs and FTBDs had the highest percentage of residents who perceived their financial situation as poor (44.4% and 40.6%, respectively) and reported not earning money (79.5% and 75.8%, respectively), compared to HDA residents (46.8%) who reported not earning money. Residents of FTDs and FTBDs reported having better access to social support infrastructure than residents of other areas did, including access to grants (49% and 46%, respectively), health care (79% and 82%, respectively), and children receiving education (91% and 93%, respectively). These residents were, however, most worried about finances (FTD: 68.3% and FTBD: 66.9%), crime (FTD: 65.8% and FTBD: 67.2%), and social isolation (FTD: 47.3% and FTBD: 46.4%).

Food insecurity was most frequently reported (68.8%) by residents of HDAs, who also received the fewest government grants (13.5%). A lower percentage of residents in HDAs (46.8%) reported that they were not earning money and perceived their financial situation as poor (27.6%) (Table 2). They had the least access to health care (44.2%) and the highest levels of exposure to violence (community violence (42.8%), police violence (12.3%), crime (17.4%), and increased intimate partner violence (3.4%)). The highest rates of concern were related to employment (63.3%), finances (65.9%), and children's education (65.7%). High levels of fear of COVID-19 infection (69.3%) and fear of COVID-19 stigma (61.1%) were typical of residents living in HDAs.

Although rates of knowledge about COVID-19 infection and protection against COVID-19 infection were high in all urban typologies (ranging from 96.3%–98.0% [> 70% correct answers]), fear of COVID-19 infection and COVID-19 stigma were most commonly reported among residents in ISDs (50.4% and 61.5%), as was the challenge of children not going to school (46.6%). Fewer psychosocial challenges have been reported among residents of ISDs than among residents living in other urban typologies. Only 18.9% of the residents of ISDs described their financial situation as poor. Food insecurity (24.5%) was the least prevalent, and concerns about community violence (5.1%) were

TABLE 1 | Demographic characteristics (* weighted percentages) of urban forms.

	Total		FTDs		FTBDs		HDAs		ISDs		
	***n* = 1332** ***n* (%)**	**%**	***n* = 300** ***n* (%)**	**%**	***n* = 320** ***n* (%)**	**%**	***n* = 414** ***n* (%)**	**%**	***n* = 298** ***n* (%)**	**%**	***p* value****
Gender											
Male	456 (34.2%)	48.9%	100 (33.3%)	48.7%	120 (37.5%)	49.3%	130 (31.4%)	49.3%	106 (35,6%)	48.9%	NS
Female	876 (65.8%)	51.1%	200 (66.7%)	51.3%	200 (62.5%)	50.7%	284 (68.6%)	50.7%	192 (64.4%)	51.1%	
Age											
18–24	174 (13.1%)	16.8%	14 (4.7%)	17.0%	28 (8.7%)	17.1%	91 (22.0%)	16.7%	41 (13.7%)	16.5%	NS
25–39	534 (40.1%)	47.1%	64 (21.3%)	48.0%	98 (30.6%)	48.0%	196 (47.3%)	47.9%	176 (59.1%)	45.4%	
40–59	399 (30.0%)	28.1%	112 (37.3%)	27.5%	93 (29.1%)	27.5%	121 (29.2%)	29.0%	73 (24.5%)	28.7%	
60+	225 (16.9%)	7.9%	110 (36.7%)	7.5%	101 (31.6%)	7.4%	6 (1.4%)	6.4%	8 (2.7%)	9.4%	
Education											
None/primary	95 (7.2%)	7.4%	26 (8.8%)	3.0%	20 (6.3%)	2.9%	20 (4.8%)	6.4%	27 (9.2%)	14.7%	$p < 0.0001$
Secondary	532 (40.3%)	39.5%	138 (46.6%)	38.7%	129 (40.7%)	33.8%	118 (28.6%)	29.5%	147 (50.2%)	47.6%	
Grade 12	562 (42.5%)	43.3%	102 (34.5%)	45.0%	132 (41.6%)	50.0%	214 (51.8%)	49.3%	114 (38.9%)	35.6%	
Some tertiary	132 (10.0%)	9.8%	30 (10.1%)	13.2%	36 (11.3%)	13.2%	61 (14.8%)	14.8%	5 (1.7%)	2.1%	

Note: *n* = unweighted frequency and unweighted percentage in brackets. ***p* value calculated from the Rao–Scott Chi-square test statistics for differences in education between urban forms.
Abbreviations: FTBDs, formal township backyard dwellings; FTDs, formal township dwellings; HDAs, high-rise high-density apartments; ISDs, informal settlement dwellings; NS, nonsignificant.

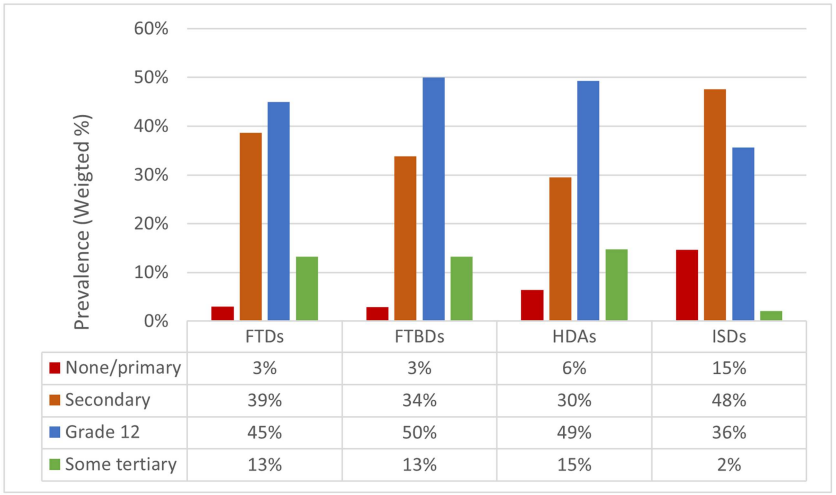


FIGURE 1 | Educational attainment per urban typology.

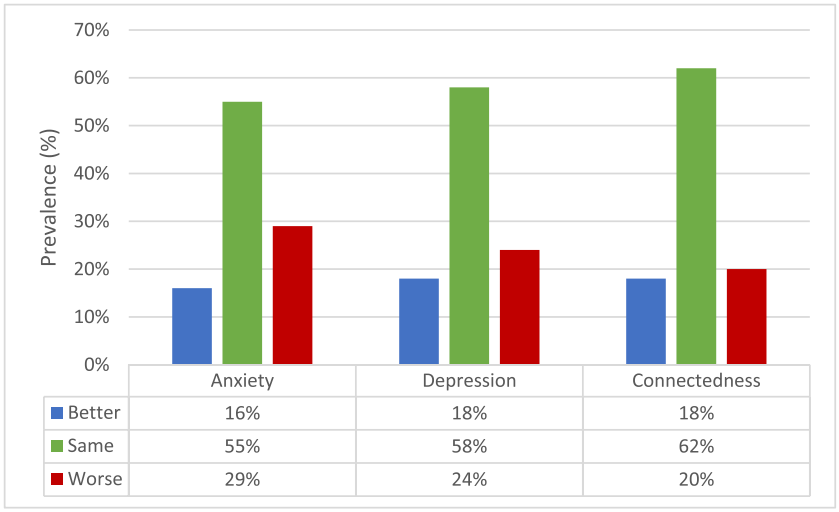


FIGURE 2 | Prevalence of perceived changes in mental status in the total sample.

infrequently expressed. Residents of ISDs were least worried about social isolation (28.7%), crime (36.4%), and finances (40.9%).

5.4 | Psychosocial Challenges Associated With Mental Health

In this research, we identified which perceived psychosocial challenges and worries were associated with *declining mental health indicators* (increased anxiety, depression, and lower social connectedness) through a series of CHAID analyses for the group as a whole and for respondents from each urban typology to understand the mental health implications of the pandemic. The results of the CHAID analysis indicating which variables were most strongly associated with anxiety for the group as a whole, are illustrated in Figure 4 as an example.

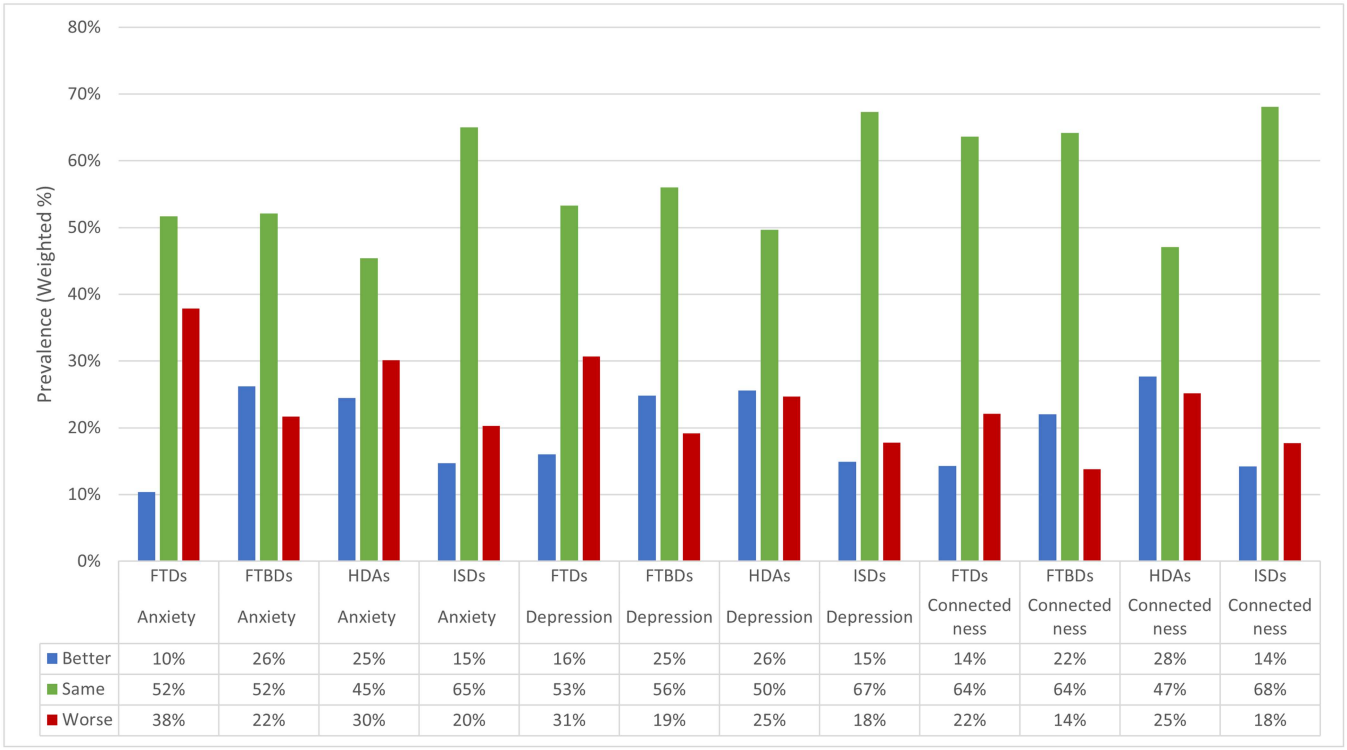
In the CHAID analysis of **increased anxiety** (compared with "same" and "decreased" levels of anxiety), the most significant predictor of increased anxiety was worrying about crime. Among those who were very worried about crime, 37.8% reported increased anxiety. This group is further significantly divided into those who reported poor financial status (with 48.4% increased anxiety) and those who did not experience a financial burden (with 29.7% increased anxiety). Among the respondents who reported poor financial status and feared COVID-19 stigma, 60.4% reported increased anxiety. The respondents who worried about crime, reported poor financial status and feared COVID-19 stigma experienced the greatest increase in anxiety.

For respondents who were worried about crime (the second branch of Figure 4) but not financially burdened, more community violence was associated with increased anxiety (42.4%).

The respondents who were not worried about crime (the third branch of Figure 4) were significantly subdivided into those who feared COVID-19 (of whom 26% experienced increased anxiety) and those who did not fear COVID-19 (of whom 10.2% experienced increased anxiety).

Thus, worries about crime, poor financial status, COVID-19 stigma, experiencing more community violence and fear of COVID-19 are strongly related to perceived increased anxiety in a nested manner, as indicated in Figure 4.

Similarly, **increased depression** was cumulatively associated with poor financial status (42.6% reported increased



	FTDs Anxiety	FTBDs Anxiety	HDAs Anxiety	ISDs Anxiety	FTDs Depression	FTBDs Depression	HDAs Depression	ISDs Depression	FTDs Connectedness	FTBDs Connectedness	HDAs Connectedness	ISDs Connectedness
Better	10%	26%	25%	15%	16%	25%	26%	15%	14%	22%	28%	14%
Same	52%	52%	45%	65%	53%	56%	50%	67%	64%	64%	47%	68%
Worse	38%	22%	30%	20%	31%	19%	25%	18%	22%	14%	25%	18%

FIGURE 3 | Perceived changes in mental health across urban typologies.

depression), being worried about isolation (55% reported increased depression), and additionally fearing COVID-19 stigma (63.4% experienced increased depression).

For respondents who were poor but did not worry so much about isolation, more community violence was associated with increased depression (37.1%). In the second branch of the analysis, 24.3% of the respondents with fewer financial concerns who were worried about isolation experienced increased depression.

A **decrease in perceived social connectedness** was cumulatively associated with financial concerns (29.5% reported less connectedness), being poor (39.7% reported less connectedness) and being worried about isolation (49.8% reported less connectedness). For respondents with fewer financial concerns, women reported less social connectedness (24.7% of women vs. 13.4% of men).

Thus, poor financial status; fear of COVID-19 and COVID-19 stigma; and worries about isolation, crime and community violence were mostly associated with a decline in the mental health of the group as a whole during the pandemic.

The declining mental health of the respondents in each urban typology was associated with the following psychosocial challenges (Table 3):

- For respondents living in FTDs, increased anxiety (70.1%) and depression (67.5%) were associated with being worried about social isolation, even though they experienced food security, whereas 41.4% who were worried about isolation reported fewer social connections. Increased anxiety was associated with fear of COVID-19 stigma for 29% of the respondents who were not very worried about isolation.
- For respondents living in FTBDs, increased anxiety was associated with concerns about crime, poor financial status, and fear of stigma if they contracted COVID-19 (58.9%). Both increased depression (59.4%) and lower social connectedness (44.4%) were associated with poor financial status and fear of COVID-19 stigma. Increased depression (15.8%) was also associated with being worried about having a job.
- For respondents living in HDAs, increased anxiety was associated with being worried about crime, more community violence, and fear of COVID-19 stigma (55.8%). Increased depression was associated with increased community violence and poor financial status (50.8%). The younger (18–24 years) and middle-aged groups (45–59 years) who did not experience more community violence but were worried about money experienced greater increases in depression (34.6%) than did the 25–39 years and 60+ years (13.2%) age groups. Less social connectedness was associated with experiencing more community violence and being worried about isolation (52.5%), and being poor was associated with less social connectedness (30.5%). Financial and security concerns were thus strongly associated with declining mental health for residents living in HDAs.
- For respondents living in ISDs, fear of actually contracting COVID-19 was associated with all aspects of decreasing mental health, whereas having financial concerns was related to lower social connectedness. Other psychosocial challenges, such as financial status, food insecurity, or being worried about isolation, were not associated with worsening mental health for residents living in ISDs (Table 3).

The most prominent associations with declining mental health during the pandemic were thus related to financial, security and isolation concerns as well as the fear of COVID-19 infection and stigma.

TABLE 2 | Perceived psycho-social challenges in the four urban forms.

	Total		FTDs		FTBDs		HDAs		ISDs		
	f	%[g]	f	%[g]	f	%[g]	f	%[g]	f	%[g]	*p* value**
Poor financial status	447	32.6	147	44.4	132	40.6	119	27.6	49	18.9	$p < 0.0001$
Not earning money	929	70.3	252	79.5	257	75.8	213	46.8	207	69.5	$p < 0.0001$
Receive government grant[a]	530	37.7	185	49.0	181	46.0	63	13.5	101	34.0	$p < 0.0001$
Food insecurity[b]	621	40.3	131	43.1	121	36.9	294	68.8	75	24.5	$p < 0.0001$
Lack of access to healthcare[c]	375	26.4	58	21.2	59	18.3	175	44.2	83	26.7	$p < 0.0001$
Children not in school[d]	188	21.2	22	8.6	19	6.8	75	28.9	72	46.6	$p < 0.0001$
Exposure to police violence	87	6.1	11	6.8	16	3.8	48	12.3	12	3.3	$p < 0.0001$
Exposure to crime[e]	133	10.0	28	11.9	23	8.1	68	17.4	14	5.1	$p < 0.001$
Partner violence	34	2.5	9	3.2	3	1.0	16	3.4	6	1.8	$p < 0.0001$
Community violence	345	20.0	68	20.4	83	27.6	179	42.8	15	5.1	$p < 0.0001$
Most worrisome issues during pandemic											
Employment	752	58.3	156	60.0	151	50.7	272	63.3	173	57.0	NS
Isolation	535	39.0	141	47.3	149	46.4	156	35.7	89	28.7	$p < 0.0001$
Crime	804	55.9	202	65.8	221	67.2	273	64.1	108	36.4	$p < 0.0001$
Children's education	781	54.8	185	61.0	194	59.8	277	65.7	125	40.6	$p < 0.0001$
Finances	822	58.7	200	68.6	215	66.9	285	65.9	122	40.9	$p < 0.0001$
Reaction to COVID-19											
Fear of COVID-19	892	62.7	211	68.2	229	69.7	295	69.3	157	50.4	$p < 0.0001$
Fear of COVID-stigma	747	55.9	158	49.3	168	53.3	240	61.1	181	61.5	$p < 0.01$
Knowledge of COVID (good knowledge)[f]	1284	97.2	292	96.3	310	96.6	391	96.3	291	98.0	NS

Note: fis unweighted frequency.
Abbreviations: FTBDs, formal township backyard dwellings; FTDs, formal township dwellings; HDAs, high-rise high-density apartments; ISDs, informal settlement dwellings; NS, non significant.
[a]All types of government grants.
[b]Combination of five items on severity of food insecurity.
[c]Combination of seven items on lack of medication and health care.
[d]% for households with children.
[e]Combination of four items on different forms of crimes.
[f]70% of 13 COVID-knowledge questions correct.
[g]Weighted percentages.
***p* value calculated from the Rao-Scott Chi-square test statistics.

6 | Discussion

In this study, residents living in low socioeconomic urban areas in Gauteng province, South Africa, reported declining mental health during the pandemic, with 28% and 24% reporting increased anxiety and depression, respectively, and 20% reporting less social connectedness than experienced before the pandemic (Figure 2). These results corroborate previous reports of declining mental health associated with the COVID-19 pandemic (Santomauro et al. 2021; Oyenubi & Kollaparobil, 2020). Residents of different urban typologies reported varying levels of declining mental health, which were associated with various psychosocial challenges experienced during the pandemic. Owing to the strong associations among the three indicators of mental health (given in the limitations), the differences in urban typology were more prominent than the differences in perceived anxiety, depression, and social connectedness (Table 3).

Declines in mental health were concentrated among residents of formal township dwellings and high-density apartments, whereas residents of backyard dwellings and informal settlements were comparatively less affected. In formal township dwellings, poorer mental health was driven primarily by concerns about social isolation, despite relatively greater access to social and institutional support, suggesting that disruption to social networks may have outweighed material protections. By contrast, mental health declines in high-density apartments reflected a convergence of crime, community violence, fear of COVID-19 stigma, and limited access to health and security services, even though a higher proportion of residents remained economically active. Elevated COVID-19 seroprevalence in these settings may have further intensified psychological stress (Delport et al. 2023). Among residents of backyard dwellings, poorer mental health was associated mainly with crime, financial strain, and stigma, highlighting the importance of localized insecurity rather than generalized deprivation in shaping pandemic-related mental health outcomes. In our study, residents with higher socioeconomic and educational statuses, who are normally at lower risk of mental health problems (Lund et al. 2011; Mungai and Bayat 2019), experienced declining mental health owing to sudden job losses, social isolation and community violence, similar to the changing demographic patterns reported by Oyenubi and Kollaparobil (2020). Gender differences were found only in terms of increased anxiety among females. Residents living in ISDs were

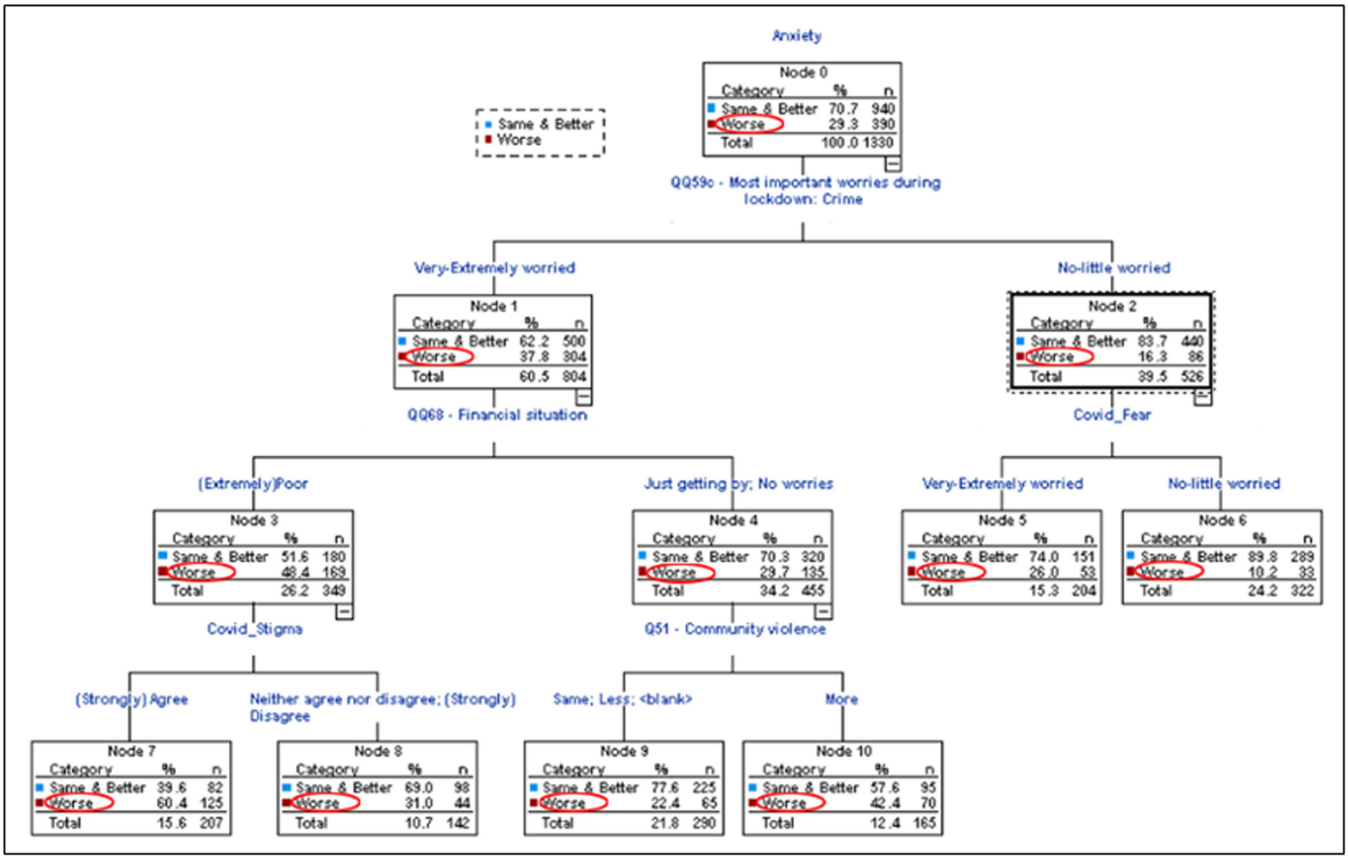


FIGURE 4 | CHAID analysis of increased anxiety in the total study sample.

less educated than residents in other areas and experienced the lowest levels of mental health decline and fewer psychosocial challenges.

Surprisingly, more than two-thirds of the ISD residents reported that their mental health was similar to that before the pandemic. Increased anxiety, depression, and reduced social connectedness among ISD residents were associated mainly with fear of contracting COVID-19—the only urban typology where fear of COVID-19 was strongly associated with mental health decline. The fear of COVID-19 in ISDs corroborates previous reports (Nyashanu et al. 2020). Additionally, financial concerns related to the loss of informal sector jobs were associated with less social connectedness. Previous research has suggested that residents living in ISDs are less affected by the pandemic's mitigation regulations since restricting movement and implementing social distancing are impractical (Ellison et al. 2022; Jansen and Madhi 2022; Nyashanu et al. 2020), making social isolation a matter of lesser concern. Larger household sizes may also have mitigated the loneliness associated with lockdown regulations (Vindegaard and Benros 2020). Life in informal settlements may have carried on as usual but for the added stressors of COVID-19 and the loss of informal sector jobs. In contrast to the expected rapid spread of infection (Corburn et al. 2020; Jansen and Madhi 2022; Nguse and Wassenaar 2021), informal settlements had the lowest seroprevalence of COVID-19 among the four typologies in our study (Delport, et al. 2023). Residing in informal settlement areas — areas that are commonly poor and underserviced — showed greater resilience than those living in formal dwellings. This reveals incorrect assumptions about how informality operates, as well as the widespread assumption at the beginning of the pandemic that Africa, especially informal Africa, would suffer the most (Duerksen 2020).

Across the sample as a whole, declining mental health was mostly associated with financial concerns, worries about social isolation, fear of infection and stigma associated with COVID-19, which is similar to the findings of previous studies (Hunt et al. 2021; Oyenubi and Kollamparambil 2020; Oyenubi et al. 2022; Posel 2021; Posel et al. 2021). Interestingly, stigma related to COVID-19 affected mental health, especially the anxiety of respondents in all areas (except for ISDs), more than the actual fear of becoming ill with COVID-19. Similar to the findings of Fisher et al. (2022) in a South African township, declining mental health was associated with the fear of crime and increased community violence, particularly in HDAs and FTBDs. This may be specific to lower socioeconomic areas, as no other research has emphasized the link with violence. In 2021, crime levels and civil unrest increased, fuelled by job layoffs and economic inequality, worsened by COVID-19 pandemic policies (Bauer 2021), which resulted in a decline in people's sense of safety (Stats 2022).

Our results thus suggest that mental health challenges during the pandemic were related primarily to economic decline and dysfunctional community and security structures during the pandemic. The characteristics of the different urban typologies may thus influence the mental health of residents differently (Dupéré and Perkins 2007; United Nations Human Settlements Programme 2020). Notably, some residents reported an improvement in mental health, as previously reported by Okabe Miyamoto and Lyubomirsky (2021).

TABLE 3 | Perceived psychosocial challenges associated with declining mental health during the pandemic as characterized by CHAID analysis[a]

Increased perceived anxiety

FTDs				FTBDs				HDAs				ISDs	
Worried: isolation	**Food security**	**COVID-stigma**		**Worried: crime**	**Financial status**	**COVID-stigma**		**Worried: crime**	**Community violence**	**COVID stigma**		**COVID fear**	
Very worried	Security		70.1%	Very worried	Poor	Fear stigma	58.9%	Very worried	More	Fear stigma	55.8%	Fear	32.5%
Very worried	Insecurity		42.6%	Very worried	Poor	No stigma	28.6%	Very worried	More	No stigma	35.0%	No fear	11.3%
Not worried		Fear stigma	29.0%	Very worried	Getting by		22.9%	Very worried	Same/less		28.3%		
Not worried		No stigma	10.6%	Not worried			6.1%	Not worried			18.6%		

Increased perceived depression

Worried: isolation	**Food security**		**Financial status**	**COVID-stigma**	**Having job**		**Community violence**	**Financial status**	**Age**		**COVID fear**	
Very worried	Security	67.5%	Poor	Fear		59.4%	More	Poor		50.8%	Fear	31.8%
Very worried	Insecurity	42.6%	Poor	No stigma		23.5%	More	Getting by		31.7%	No fear	4.3%
Not worried		12.3%	Getting by		Worried	15.8%	Same/Less	Worried: money	18–24;45–59	34.6%		
			Getting by		Not worried	4.6%	Same/Less	Worried: money	25–39; 60+	13.2%		
							Same/Less	Not worried: money		7.1%		

Less social connectedness

Worried: isolation		**Financial status**	**COVID-stigma**		**Community violence**	**Worried: isolation**	**Financial status**		**COVID fear**	**Worried: finances**	
Worried	41.4%	Poor	Fear	44.4%	More	Worried		52.5%	Fear	Worried: finances	38.1%
Not worried	10.4%	Poor	No stigma	16.2%	More	Not worried		27.7%	Fear	Not worried: finances	21.2%
		Getting by	Fear	1.0%	Same/less		Poor	30.5%	No fear		3.5%
		Getting by	No stigma	9.5%	Same/less		Money worries	17.3%			
					Same/less		No money worries	6.8%			

Abbreviations: FTBDs, formal township backyard dwellings; FTDs, formal township dwellings; HDAs, high-rise high-density apartments; ISDs, informal settlement dwellings.
[a]The analysis distinguishes worsening psychological distress versus the same/better psychological status.

In this research, psychosocial challenges such as lack of access to health care, food insecurity, and disruption of children's education were not directly associated with declining mental health, as observed by Thorn and Vincent-Lancrin (2021), as there were other factors that influenced mental health more. Government grants, mentioned as a safety measure in other studies (Oyenubi and Kollamparambil 2020), did not play a significant role in the mental health of FTD residents in our study. In contrast to previous studies, police violence associated with enforcing COVID-19 restrictions (Segalo et al. 2020) and gender-based violence during home confinement (Betron et al. 2020; Graham-Harrison et al. 2020; Taub 2020; World Health Organisation 2020) were not strongly associated with declining mental health. The low prevalence of reported police and partner violence (Table 2) may have influenced this finding. The respondents may have been hesitant to openly disclose partner or domestic violence in a research context.

Our findings suggest that the COVID-19 pandemic and mitigation regulations, especially the closing down of the informal economy and low-end formal sector jobs and the disruption of security services, exacerbated inequalities and instabilities in and between communities and revealed how increasing psychosocial challenges affected declining mental health in low socioeconomic communities.

7 | Limitations

This study had a few limitations. First, we did not assess symptoms of depression and anxiety before and during the pandemic. Mental health was assessed as the subjective experience of anxiety, depression, and social connectedness during the pandemic compared with before the pandemic. The subjective assessment thus revealed that the three indicators of mental health largely overlapped, resulting in the psychosocial variables associated with aspects of mental health being more similar than expected (Table 2). Finally, the study aimed to assess certain urban typologies of middle and lower socioeconomic conditions and not all urban typologies.

8 | Implications for Policy and Practice

Our results may be used for recovery planning in similar poor urban communities. First, the mental health implications of the COVID-19 pandemic need to be acknowledged. Mental health needs were high during and after the pandemic, yet mental health services are still not prioritized as part of the primary healthcare system in South Africa (Molebatsi et al. 2021; Nguse & Wasserman, 2021; Pillay 2019). Policymakers should recognize the impact of the pandemic on mental health and increase the capacity of the health sector to address acute mental health issues that could become chronic.

During the COVID-19 pandemic, people had different mental health needs than usual. These needs were strongly associated with financial concerns and economic decline (Oyenuhi & Kollamparambil, 2020). A large-scale economic development plan is needed to stimulate economic recovery and employment opportunities (Hunt et al. 2021) to rebuild communities and address pandemic-related mental health issues. Additionally, community services such as health and safety need to be strengthened. Addressing various typologies of crime and community violence is essential for rebuilding the community fabric and fostering safe environments, contributing to the promotion of mental health.

9 | Conclusion

This research contributes to the body of knowledge on mental health changes in communities during the COVID-19 pandemic and addresses the gap in the literature on the unique contextual variables associated with perceived mental health in these low-income communities. Studies of this nature should use standardized psychometric tests that would qualify and quantify the impact of pandemic-related challenges faced in low-income communities on mental health more accurately. This study highlights the importance of varied responses to the pandemic and lockdown restrictions. Area-specific plans are needed to address the needs expressed in specific urban typologies. Future pandemic plans also need to recognize the diversity within specific urban typologies and that there can be no one-size-fits-all approach to pandemic preparedness.

Author Contributions

D.E., R.D., E.M., T.P., T.B. and J.H. contributed substantially to the conception and design of the work and to the acquisition of the data. R.D., A.N. and M.V. contributed substantially to the data's analysis and interpretation. M.V. and R.D. drafted the work and M.V., R.D., A.N., D.E. and E.M. substantively revised it. All authors contributed to the scientific integrity of the work and approved the final version of the manuscript, taking responsibility for their responsibilities.

Acknowledgements

The contribution of fieldworkers from all three institutions, and the data analyst, Johannes Marais, are gratefully acknowledged. We thank Dr Cheryl Tosh, the scientific editor of the Faculty of Health Sciences, University of Pretoria, for her valued assistance. GeoTerra Image (PTY) Ltd are thanked for availing their data free of charge. Partial financial support was received from: Department of Science and Innovation/Medical Research Council South African Population Research Infrastructure Network (SAPRIN). Gauteng Research Triangle Initiative for the Study of Population, Infrastructure and Regional Economic Development (GRT-INSPIRED). Principal investigators appointed within this funding body were involved in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript. Wits RHI, University of the Witwatersrand. University of the Witwatersrand. University of Johannesburg. University of Pretoria. National Research Foundation Grant (R Delport; N01808).

Ethics Statement

Ethics approval was obtained from the research ethics committees of the University of the Witwatersrand, the University of Johannesburg, and the University of Pretoria (respective references: 200907; 01-20-2020; 625/2020). Informed consent was obtained from all individual participants included in the study.

Conflicts of Interest

The authors declare no conflicts of interest.

Peer Review

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1002/jcop.70084.

Data Availability Statement

The data is available upon request. The dataset used during the current study is available from the corresponding author upon reasonable request.

References

Abrahams, C., D. Everatt, A. van den Heever, et al. (2018). South Africa: National Urban Policies and City Profiles for Johannesburg and Cape Town. Research Report: Center for Sustainable Healthy and Learning Cities and Neighborhoods. https://www.wits.ac.za/media/wits-university/faculties-and-schools/commerce-law-and-management/wits-school-of-governance/documents/RTP1%20-%20South%20Africa%20291018.pdf.

Abubakar, A. R., M. A. Tor, J. Ogidigo, et al. 2022. "Challenges and implications of the COVID-19 pandemic on mental health: A systematic Review." *Psychology*: 435–464. https://doi.org/10.3390/psych4030035.

Bauer, N. (2021). 'Little to Lose'. Poverty and despair fuel South Africa's unrest. [internet]. [Jul 16 2021]: Al Jazeera News. https://www.aljazeera.com/news/2021/7/14/little-to-lose-poverty-and-despair-fuel-south-africas-unrest.

Betron, M., A. Gottert, J. Pulerwitz, D. Shattuck, and N. Stevanovic-Fenn. 2020. "Men and COVID-19: Adding a Gender Lens." *Global Public Health* 15, no. 7: 1090–1092. https://doi.org/10.1080/17441692.2020.1769702.

Blakely, S. (2023). Overview, history & locations [internet]. Jan 18 2023 [Feb 17 2023]. https://study.com/academy/lesson/south-african-townships-overview-history-locations.html.

Brooks, S. K., R. K. Webster, L. E. Smith, et al. 2020. "The Psychological Impact of Quarantine and How to Reduce It: Rapid Review of the Evidence." *Lancet* 395: 912–920.

Brown, B. B., D. D. Perkins, and G. Brown. 2004. "Incivilities, Place Attachment and Crime: Block and Individual Effects." *Journal of Environmental Psychology* 24: 359–371. https://doi.org/10.1016/j.jenvp.2004.01.001.

Brueckner, J. K., I. C. Rabe, and H. Selod (2018). Backyarding in South Africa. [internet] [Feb 17 2023]. https://housingfinanceafrica.org/app/uploads/Brueckner-South-Africa-backyarding-1.pdf.

Camara, C., P. J. Surkan, J. Van Der Waerden, et al. 2023. "COVID-19-related Mental Health Difficulties Among Marginalised Populations: A Literature Review." *Cambridge Prisms: Global Mental Health* 10: e2. https://doi.org/10.1017/gmh.2022.56.

Chothia, A. (2020). Lockdown: 87 000 Cases of Gender-Based Violence Reported. *The South African, April 3*. [Feb 17 2023]. News. https://www.thesouthafrican.com/news/gender-based-violence-reported-during-lockdown-cele/.

Corburn, J., D. Vlahov, B. Mberu, et al. 2020. "Slum Health: Arresting COVID-19 and Improving Well-Being in Urban Informal Settlements." *Journal of Urban Health* 97, no. 3: 348–357. https://doi.org/10.1007/s11524-020-00438-6.

De Man, J., V. Buffel, S. van de Velde, P. Bracke, G. F. Van Hal, and E. Wouters. 2021. "Disentangling Depression In Belgian Higher Education Students Amidst The First COVID-19 Lockdown." *Archives of Public Health* 79, no. 1. https://doi.org/10.1186/s13690-020-00522-y.

Delport, R., D. Everatt, T. Palanee, J. Hugo, and T. G. Barnard. 2023. "Urban form and health status in Gauteng, South Africa." In *The Urban Ecologies of Divided Cities. UEDC 2022*, edited by A. Osman, J. Nagle, and S. Tripathi. Advances in Science, Technology & Innovation. Springer. https://doi.org/10.1007/978-3-031-27308-7_27.

Duerksen, M. 2020Innovations Needed to Prevent COVID-19 From Catching Fire in African Cities." Africa Center for Strategic Studies-Spotlight. Apr 9 2020 [Sept 7 2023]. Available from Accessed 7 September 2023. https://africacenter.org/spotlight/innovations-needed-prevent-covid-19-catching-fire-africa-cities/.

Dupéré, V., and D. D. Perkins. 2007. "Community Types and Mental Health: A Multilevel Study of Local Environmental Stress and Coping." *American Journal of Community Psychology* 39: 107–119.

Ellison, G. T. H., R. B. Mattes, H. Rhoma, and T. De Wet. 2022. "Economic Vulnerability and Poor Service Delivery Made It More Difficult for Shack-Dwellers to Comply With COVID-19 Restrictions." *South African Journal of Science* 118, no. 5/6: 13301. https://doi.org/10.17159/sajs.2022/13301.

Everatt, D. (1999). Yet another transition? Urbanisation, Class Formation and the End of National Liberation Struggle in South Africa. Research in Community Sociology: Community Structure and Dynamics at the Dawn of the New Millennium (Volume 10, Stanford Press).

Everatt, D., and Z. Ebrahim. 2020. "Urban Policy in South Africa." In *Developing National Urban Policies*, edited by D. Kundu, R. Sietchiping, and M. Kinyanjui, 281–298. Springer. https://doi.org/10.1007/978-981-15-3738-7_11.].

Fisher, D. A., T. R. Miller, J. W. Grube, et al. 2022. "Locked Down: Economic and Health Effects of COVID-19 Response on Residents of a South African Township." *Global Social Welfare* 11: 293–305. https://doi.org/10.1007/s40609-022-00230-1.

Galea, S., R. M. Merchant, and N. Lurie. 2020. "The Mental Health Consequences of COVID-19 and Physical Distancing: The Need for Prevention and Early Intervention." *JAMA Internal Medicine* 180, no. 6: 817–818. https://doi.org/10.1001/jamainternmed.2020.1562.

Gelo, D., and J. Dikgang. 2022. "Implications of COVID-19 Labour Market Shock for Child and Household Hungers in South Africa: Do Social Protection Programs Protect?" *PLoS One* 17, no. 7: e0269848. https://doi.org/10.1371/journal.pone.0269848.

Gibson, L., and D. Rush. 2020. "Novel Coronavirus in Cape Town Informal Settlements: Feasibility of Using Informal Dwelling Outlines to Identify High Risk Areas for COVID-19 Transmission From a Social Distancing Perspective." *JMIR Public Health and Surveillance* 6, no. 2: e18844. https://doi.org/10.2196/18844.

Graham-Harrison, E., A. Giuffrida, H. Smith, and L. Ford. 2020 March 28. "Lockdowns Around the World Bring Rise in Domestic Violence." The Guardian. Mar 28 2020 [Feb 17 2023]. https://www.theguardian.com/society/2020/mar/28/lockdowns-world-rise-domestic-violence.

Gruebner, O., M. A. Rapp, M. Adli, U. Kluge, S. Galea, and A. Heinz. 2017. "Cities and Mental Health." *Deutsches Ärzteblatt international* 114: 121–127. https://doi.org/10.3238/arztebl.2017.0121.

Holmes, E. A., R. C. O'Connor, V. H. Perry, et al. 2020. "Multidisciplinary Research Priorities for the COVID-19 Pandemic: A Call for Action for Mental Health Science." *Lancet Psychiatry* 7, no. 6: 547–560. https://doi.org/10.1016/S2215-0366(20)30168-1.

Huchzermeyer, M. 2011. *Cities With 'Slums': From Informal Settlement Eradication to a right to the City in Africa*. Cape Town (SA): University of Cape Town Press.

Hunt, X., E. Breet, D. J. Stein, and M. Tomlinson. 2021. *The COVID-19 Pandemic, Hunger, and Depressed Mood Among South Africans. National Income Dynamics Study (NIDS) – Coronavirus Rapid Mobile Survey (CRAM)* (5). Wave. [internet Feb 17 2023]. https://cramsurvey.org/wp-content/uploads/2021/07/6.-Hunt-X.-Breet-E.-Stein-D.-_-Tomlinson-M.-2021-The-COVID-19-Pandemic-Hunger-and-Depressed-Mood-Among-South-Africans.pdf.

Ingle, K., T. Brophy, and R. C. Daniels (2020). *National Income Dynamics Study–Coronavirus Rapid Mobile Survey (NIDS-CRAM) panel user manual*. Technical Note Version 1. [internet]. Cape Town:

Southern Africa Labour and Development Research Unit. [Feb 17 2023]. https://guides.library.uq.edu.au/referencing/vancouver/books#s-lg-box-16449824.

Interactive planning workshop for Johannesburg. (2000). Greater Johannesburg Metropolitan Council. Johannesburg, South Africa. September 27-30. [Oct 8 2023]. http://web.mit.edu/urbanupgrading/upgrading/case-examples/overview-africa/alexandra-township.html.

Jansen, J., and S. A. Madhi. 2022. "How to Do Social Distancing in a Shack: COVID-19 in the South African Context." *South African Journal of Science* 118, no. 5/6: 13989. https://doi.org/10.17159/sajs.2022/13989.

Kim, A. W., T. Nyengerai, and E. Mendenhall. 2022. "Evaluating the Mental Health Impacts of the COVID-19 Pandemic: Perceived Risk of COVID-19 Infection and Childhood Trauma Predict Adult Depressive Symptoms in Urban South Africa." *Psychological Medicine* 52, no. 8: 1587–1599. https://doi.org/10.1017/S0033291720003414.

Lemanski, C. 2009. "Augmented Informality: South Africa's Backyard Dwellings as a Byproduct of Formal Housing Policies." *Habitat International* 33: 472–484.

Lund, C., M. De Silva, S. Plagerson, et al. 2011. "Poverty and Mental Disorders: Breaking the Cycle in Low-Income and Middle-Income Countries." *Lancet* 378, no. 9801: 1502–1514. https://doi.org/10.1016/S0140-6736(11)60754-X.

Mahlangu, P., A. Gibbs, N. Shai, M. Machisa, N. Nunze, and Y. Sikweyiya. 2022. "Impact of COVID-19 Lockdown and Link to Women and Children's Experiences of Violence in the Home in South Africa." *BMC Public Health* 22, no. 1: 1029. https://doi.org/10.1186/s12889-022-13422-3.

De Man, J., M. R. Smith, M. Schneider, and H. Tabana. 2022. "An Exploration of the Impact of COVID-19 on Mental Health in South Africa." *Psychology, Health & Medicine* 27, no. 1: 120–130. https://doi.org/10.1080/13548506.2021.1954671.

Melis, G., E. Gelormino, G. Marra, E. Ferracin, and G. Costa. 2015. "The Effects of the Urban Built Environment on Mental Health: A Cohort Study in a Large Northern Italian City." *International Journal of Environmental Research and Public Health* 12: 14898–14915. https://doi.org/10.3390/ijerph121114898.

Molebatsi, K., O. Musindo, V. Ntlantsana, and G. N. Wambua. 2021. "Mental Health and Psychosocial Support During COVID-19: A Review of Health Guidelines in Sub-Saharan Africa." *Frontiers in Psychiatry* 12: 571342. https://doi.org/10.3389/fpsyt.2021.571342.

Mungai, K., and A. Bayat. 2019. "An Overview of Trends in Depressive Symptoms in South Africa." *South African Journal of Psychology* 49, no. 4: 518–535. https://doi.org/10.1177/0081246318823580.

Neethling, A., and J. S. Galpin. 2006. "Weighting of Household Survey Data: A Comparison of Various Calibration, Integrated and Cosmetic Estimators." *South African Statistical Journal* 40: 123–150. http://hdl.handle.net/10019.1/12505.

Nguse, S., and D. Wassenaar. 2021. "Mental Health and COVID-19 in South Africa." *South African Journal of Psychology* 51, no. 2: 304–313. https://doi.org/10.1177/00812463211001543.

Nyashanu, M., P. Simbanegavi, and L. Gibson. 2020. "Exploring the Impact of COVID-19 Pandemic Lockdown on Informal Settlements in Tshwane Gauteng Province, South Africa." *Global Public Health* 15, no. 10: 1443–1453. https://doi.org/10.1080/17441692.2020.1805787.

Okabe-Miyamoto, K., D. Folk, S. Lyubomirsky, and E. W. Dunn. 2021. "Changes in Social Connection During COVID-19 Social Distancing: It's Not (Household) Size That Matters, It's Who You're With." *PLoS One* 16, no. 1: e0245009. https://doi.org/10.1371/journal.pone.0245009.

Okabe-Miyamoto, K., and S. Lyubomirsky. 2021. *Social Connection and Well-Being during COVID-19*. World Happiness Report. New York: Sustainable Development Solutions Network. [Feb 17 2023]. https://worldhappiness.report/ed/2021/social-connection-and-well-being-during-covid-19/#:~:text=Accumulating%20research%20has%20shown%20that,satisfaction%20and%20felt%20social%20connection.

Orkin, M., B. Roberts, N. Bohler-Muller, and K. Alexander. 2020The Hidden Struggle: The Mental Health Effects of the COVID-19 Lockdown in South Africa." The Daily Maverick13 May 2020. [Feb 17 2023]. https://www.dailymaverick.co.za/article/2020-05-13-the-hidden-struggle-the-mental-health-effects-of-the-COVID-19-lockdown-in-south-africa.

Otu, A., C. H. Charles, and S. Yaya. 2020. "Mental Health and Psychosocial Well-Being During the COVID-19 Pandemic: The Invisible Elephant in the Room." *International Journal of Mental Health Systems* 14: 38. https://doi.org/10.1186/s13033-020-00371-w.

Ouda, M., M. Stino, and A. N. Aziz. 2020. "The Effect of Urban Density on Mental Well-Being." *Journal of Engineering and Applied Science* 67, no. 6: 415–1433. https://www.jeasonline.org/paper/1146/preview.

Oyenubi, A., A. W. Kim, and U. Kollamparambil. 2022. "COVID-19 Risk Perceptions and Depressive Symptoms in South Africa: Causal Evidence in a Longitudinal and Nationally Representative Sample." *Journal of Affective Disorders* 308: 616–622. https://doi.org/10.1016/j.jad.2022.04.072.

Oyenubi, A., and U. Kollamparambil. 2020. *COVID-19 and Depressive Symptoms in South Africa. National Income Dynamics Study (NIDS) – Coronavirus Rapid Mobile Survey (CRAM)* (2). Wave. 30 September 2020. [Feb 17 2023]. https://cramsurvey.org/wp-content/uploads/2020/09/12.-Oyenubi-A.-_-Kollamparambil-U.-2020-COVID-19-and-depressive-symptoms-in-South-Africa.pdf.

Pernegger, L., and S. Godehart. 2007. Townships in the South African geographic landscape – Physical and social legacies and challenges. *Training for Township Renewal Initiative*. South Africa (SA): TTRI; Oct 7 2007 [Feb 17 2023]. https://www.treasury.gov.za/divisions/bo/ndp/ttri/ttri%20oct%202007/day%201%20-%2029%20oct%202007/1a%20keynote%20address%20li%20pernegger%20paper.pdf.

Pillay, Y. 2019. "State of Mental Health and Illness in South Africa." *South African Journal of Psychology* 49, no. 4: 463–466.

Posel, D. 2021. "Living Alone and Depression in a Developing Country Context: Longitudinal Evidence From South Africa." *SSM - Population Health* 14: 100800. https://doi.org/10.1016/j.ssmph.2021.100800.

Posel, D., A. Oyenubi, and U. Kollamparambil. 2021. "Job Loss and Mental Health During the COVID-19 Lockdown: Evidence From South Africa." *PLoS One* 16, no. 3: e0249352. https://doi.org/10.1371/journal.pone.0249352.

Rossi, R., V. Socci, D. Talevi, et al. 2020. "COVID-19 Pandemic and Lockdown Measures Impact on Mental Health Among the General Population in Italy." *Frontiers in Psychiatry* 11: 790. https://doi.org/10.3389/fpsyt.2020.00790.

Salari, N., A. Hosseinian-Far, R. Jalali, et al. 2020. "Prevalence of Stress, Anxiety, Depression Among the General Population During the COVID-19 Pandemic: A Systematic Review and Meta-Analysis." *Globalization and health* 16: 57. https://doi.org/10.1186/s12992-020-00589-w.

Santomauro, D. F., A. M. Mantilla Herrera, J. Shadid, et al. 2021. "Global Prevalence and Burden of Depressive and Anxiety Disorders in 204 Countries and Territories in 2020 Due to the COVID-19 Pandemic." *Lancet* 398: 1700–1712. COVID-19 Mental Disorders Collaborators. https://doi.org/10.1016/S0140-6736(21)02143-7.

Segalo, P., N. Molebatsi, and T. Vokwana. 2020Lockdown Blues: The End of Ritual as We Know It, Again." National Institute for the Humanities and Social Sciences 1–3. [Feb 17 2023]. Available from https://www.nihss.ac.za/content/lock-down-blue-end-ritual-we-know-it-again.

von Seidlein, L., G. Alabaster, J. Deen, and J. Knudsen. 2021. "Crowding Has Consequences: Prevention and Management of COVID-19 in Informal Urban Settlements." *Building and Environment* 188: 107472. https://doi.org/10.1016/j.buildenv.2020.107472.

Stats, S. A. 2020. *Steep Slump in GDP as COVID-19 Takes Its Toll on the Economy. [internet]*. South Africa (SA): Stats SA. https://www.statssa.gov.za/?p=13601.

Stats, S. A. 2022. Experience of Crime in South Africa Increased Over the 2021/2022 period. *[internet]*, 2022. South Africa (SA): Stats SA. https://www.statssa.gov.za/?p=15700#:~:text=The%20percentage%20of%20individuals%20who,7%25%20in%202021%2F22.&text=According%20to%20the%20report%2C%20the,844%20000%20in%202021%2F22.

Taub, A. 2020A New COVID-19 Crisis: Domestic Abuse Rises Worldwide." The New York Times.Apr 6 2020 [Feb 17 2023]. https://www.nytimes.com/2020/04/06/world/coronavirus-domestic-violence.html.

Thorn, W., and S. Vincent-Lancrin. 2021. *Schooling During a Pandemic: The Experience and Outcomes of Schoolchildren During the First Round of COVID-19 lockdowns*. Paris: OECD Publishing. https://doi.org/10.1787/1c78681e-en.

UN-Habitat. (2020). Spatial Planning Guidelines During COVID-19 September 2020. [internet] https://unhabitat.org/sites/default/files/2020/11/covid19_spatialplanning_eng1.pdf.

United Nations Human Settlements Programme. (2020). Urban Form and COVID-19: Thinking Through Issues of Density,Overcrowding, Public Space and health. [internet]. Jul 9 2020 [Feb 17 2023]. https://sustainabledevelopment.un.org/index.php?page=view&type=20000&nr=7020&menu=2993.

Vindegaard, N., and M. E. Benros. 2020. "COVID-19 Pandemic and Mental Health Consequences: Systematic Review of the Current Evidence." *Brain, Behavior, and Immunity* 89: 531–542.

Wake, A. D., and U. R. Kandula. 2022. "The Global Prevalence and Its Associated Factors Toward Domestic Violence Against Women and Children During COVID-19 Pandemic, 'The Shadow Pandemic': A Review of Cross-Sectional Studies." *Women's Health* 18: 17455057221095536. https://doi.org/10.1177/17455057221095536.

Wandersman, A., and M. Nation. 1998. "Urban Neighborhoods and Mental Health: Psychological Contributions to Understanding Toxicity, Resilience, and Interventions." *American Psychologist* 53, no. 6: 647–656.

Weimann, A., and T. Oni. 2019. "A Systematised Review of the Health Impact of Urban Informal Settlements and Implications for Upgrading Interventions in South Africa, a Rapidly Urbanising Middle-Income Country." *International Journal of Environmental Research and Public Health* 16: 3608. https://doi.org/10.3390/ijerph16193608.

World Health Organization. 2020. COVID-19 and Violence Against Women: What the Health Sector/System Can Do. *Reference no. WHO/SRH/20.04. [internet]*. WHO. https://www.who.int/publications/i/item/WHO-SRH-20.04.