

BMJ Open Anxiety, depression and post-traumatic stress disorder in displaced and non-displaced individuals after armed conflict: cross-sectional survey evidence from Kasai, Democratic Republic of Congo

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ABSTRACT

Objectives The study aims to estimate the prevalence of anxiety, depression and post-traumatic stress disorder (PTSD) in the Greater Kasai region of the Democratic Republic of the Congo (DRC) and to examine how demographic and socio-economic factors, such as displacement status and livelihood conditions, are associated with these mental health outcomes.

Design A cross-sectional two-stage multi-cluster sampling survey.

Setting In 2016–2019, a violent conflict in the Greater Kasai region of the DRC led to widespread atrocities and massive displacement. The population not only has to cope with the aftermath of interpersonal violence, loss of loved ones and displacement but also faces severe food shortages and livelihood crises.

Participants Data were collected in 2022 from 4069 randomly selected heads of households (displaced and non-displaced) within 126 randomly selected localities in 27 health zones in the Greater Kasai. The study collected data from households with different displacement experiences: internally displaced people (IDPs), returned IDPs, repatriated refugees and members of the host community (those without a displacement history).

Primary and secondary outcome measures The primary outcomes are mental health disorders. Anxiety, depression and PTSD were measured with the Generalised Anxiety Disorder-7, the Patient Health Questionnaire-9 and the Primary Care PTSD Screen for the Diagnostic and Statistical Manual of Mental Disorders, 5th edition.

Results The prevalence of anxiety, depression and PTSD was 8.3%, 18.3% and 37.8%, respectively. Anxiety affected 10% of non-displaced respondents, with a similar prevalence among IDPs (9%) and returned IDPs (8%), compared with a substantially lower prevalence among repatriated refugees (4%). About 17% of non-displaced respondents have symptoms of depression; this number is considerably higher for IDPs (22%) and returned IDPs (22%) but lower for repatriated refugees (11%). Around 40% of the non-displaced individuals, IDPs and repatriated refugees are characterised by PTSD, while this share is lower for returned IDPs (31%). Overall, a one unit increase

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Representative face-to-face survey with a large sample from Congo's conflict-affected Greater Kasai region.
- ⇒ The use of an innovative sampling frame in an area with extremely limited infrastructure and databases.
- ⇒ By design, the study targeted internally displaced people (IDPs), returned IDPs, repatriated refugees and members of the host community.
- ⇒ The cross-sectional nature of the study design cannot establish causal relationships between mental health symptoms and explanatory variables.
- ⇒ The survey targeted household heads, who may not be representative of the broader adult population.

in food insecurity (on a 0–7 scale) is associated with higher levels of anxiety (0.33 on a 0–21 scale, $p<0.001$), depression (0.60 on a 0–27 scale, $p<0.001$) and PTSD (0.07 on a 0–5 scale, $p<0.05$); these associations exist for those with and without a displacement history.

Conclusions Food insecurity is associated with poor mental health in Greater Kasai. Further research needs to explore how to develop synergistic interventions to improve both mental health and livelihoods in conflict-affected populations.

BACKGROUND

Starting in 2016 and phasing out in 2019, a violent conflict in the Greater Kasai in the Democratic Republic of the Congo (DRC) displaced 1.4 million Congolese within the country and forced 35 000 individuals abroad.¹ The fighting broke out over a succession dispute between the government and the claimant of a main customary chieftainship (the *Kamwina Nsapu*) in Kasai-Central. Intense fighting erupted, peaking in 2017 and spreading from Kasai-Central to other provinces, including Kasai and

Kasai-Oriental. The conflict was characterised by intense brutality towards civilians who were targeted in a 'wide-spread and systematic manner' (page 16)². The *Kamwina Nsapu* militia murdered, mutilated, raped and forced children to fight. Government troops used excessive violence against the militia and civilians considered sympathetic to *Kamwina Nsapu*.² While active fighting decreased after 2017, ethnic tensions and pockets of insecurity remained, at times leading to additional waves of displacement and violence.¹ The conflict worsened pre-existing hardship; in 2026, an estimated 3.0 million people, around 24% of the Kasai population, are projected to face an acute food and livelihood crisis or worse.³

Due to the conflict, many people in the Greater Kasai have experienced potentially traumatic events, including the death of family members, threats of violence and the destruction of their homes and villages. Such events have been associated with mental health conditions such as anxiety, depression and post-traumatic stress disorder (PTSD).^{4,5} The prevalence of mental disorders has been found to be more than three times higher in areas affected by conflict compared with non-conflict settings⁶ and significantly higher among refugees compared with host populations.⁷ Many people who develop mental health symptoms after exposure to potentially traumatic events recover within a few months, but for others, the condition may linger for many years.⁸

While the repercussions of the conflict in the Greater Kasai are likely profound, there is hardly any systematic data on mental health outcomes in the region. A review of mental health outcomes in the DRC included 50 studies, but most of these were conducted in the eastern region of the DRC, with no study from Kasai.⁹ Since then, one study collected data in Tshikapa, the capital city of Kasai Province, across two survey waves and found a high incidence of major depressive disorder (36% and 33%) and moderate or severe anxiety (31% and 22%), highlighting the region's mental health burden.¹⁰ However, that study did not assess PTSD and focused on only two of the 21 health areas in the health zone of the city of Tshikapa and is not representative of the broader Greater Kasai region.

Conflicts and displacement may also affect mental health in indirect ways, for example, through the erosion of social connections and communal support and the loss of livelihood opportunities.^{11,12} The association between food insecurity and mental health has been well documented but has not been systematically explored in conflict-affected settings.^{13–16}

OBJECTIVE

The current study aims to explore the prevalence and comorbidity of anxiety, depression and PTSD among displaced and non-displaced people in the Greater Kasai region. Additionally, the study examined the association of anxiety, depression and PTSD with various demographic factors (age, gender and education) and socio-economic factors such as respondent wealth, physical

health, daily stressors like food insecurity and social cohesion. By design, the analysis encompasses households with diverse displacement experiences: internally displaced people (IDPs), returned IDPs, repatriated refugees and members of the host community (ie, those without a displacement history).

METHODS

Study population and sample

Together with the office of the United Nations High Commissioner for Refugees (UNHCR) in the DRC and Congo's National Institute of Statistics, we conducted a cross-sectional survey of (returned) IDPs, repatriated refugees and host community members. The study focused on the three provinces in the Greater Kasai region most affected by the violence: Kasai, Kasai-Central and Kasai-Oriental. Within these provinces, the 27 health zones (out of a total of 62) most affected by violence and displacement were purposively selected.

As no complete and up-to-date list of villages and towns exists for the Greater Kasai region, we constructed a sampling frame relying on satellite imagery from Google AI that maps all dwellings in the region (data available online: <https://sites.research.google/open-buildings>). We overlaid these data with a 1 km×1 km grid and identified 5302 localities, defined as grid cells containing at least 100 dwellings. Localities were randomly selected in two stages: (1) the number of localities within a health zone was determined proportional to the total number of dwellings in that zone, and subsequently (2) within each health zone, individual localities were selected proportional to locality dwelling numbers. In total, 126 localities were randomly selected.

Next, we created a sampling frame allowing us to randomly select households within each selected locality. Between July and November 2022, we conducted a listing survey of all households in these localities. The survey classified households into four types based on their displacement experiences: members of the host community (those not displaced due to conflict for more than 3 months since 2016), returned IDPs (displaced within the DRC and returned to the location they fled from), IDPs (displaced within the DRC but not yet returned) and repatriated refugees (those who fled abroad and have returned). These categories were part of the original study design and were pre-registered (<https://osf.io/a3ghd>). They were defined in collaboration with UNHCR, which identified these populations as key groups of policy and operational interest. We randomly selected around 1000 households of each type and targeted the household head as the respondent. In total, our survey contains information on 4069 households. A detailed discussion of the sampling procedure can be found in online supplementary information.

Data collection

Data were collected face-to-face using a structured survey. The surveys were conducted by 53 experienced

interviewers who had followed an intensive 2-week training (more information in online supplementary information). Voluntary and informed consent was obtained prior to the interview. Surveys took place in a private space, mostly in the respondent's home. The survey was developed in English and French and subsequently translated into Tshiluba, the primary local language in the study region, and back-translated to French by independent language experts. All data and instruments are available online¹⁷: <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/PHKNSU>.

Given the cultural and linguistic complexities surrounding mental health, this survey module was translated and validated using best-practice procedures.¹⁸ To ensure that respondents could answer these questions in their preferred language, they were translated into two other commonly spoken languages—Lingala and Swahili—as well. We organised a workshop with bilingual individuals to carefully phrase each statement, ensuring comprehensibility, acceptability and relevance. The measures were then field-tested in Tshiluba, Lingala and Swahili, followed by debriefing sessions with pilot respondents to ensure proper understanding and to make final adaptations to the survey tools.

We ensured data quality before analysis by carefully checking the dataset. 'Don't know' and 'Refuse to answer' responses were recoded as missing, with no imputation or outlier removal required.

Measures

This study has three primary outcomes—anxiety, depression and PTSD. To eliminate ordering effects, the three measures were presented to respondents in a random order across surveys. In line with common practice in settings with low literacy and limited connectivity, questions were read aloud by interviewers and respondents provided their answers independently, without discussion or interpretation by the enumerators. Detailed information about all variables used in this study, including description and summary information, can be found in online supplementary information.

Anxiety symptoms were assessed with the Generalised Anxiety Disorder-7 (GAD-7), which consists of 7 items evaluating the likelihood of generalised anxiety symptoms over the previous 2 weeks. Each item is scored from 0 (not at all) to 3 (nearly every day), with the total score ranging from 0 to 21.¹⁹ GAD-7 scores of 5–9 suggest mild anxiety, 10–14 moderate anxiety and 15–21 severe anxiety. The scale has been widely used in low- and middle-income countries, including in Africa.²⁰

Depression was measured using the Patient Health Questionnaire-9 (PHQ-9).²¹ The measure asks individuals how many days out of the last 2 weeks they felt about nine different items, such as 'Little interest or pleasure in doing things' and 'Feeling down, depressed or hopeless'. Responses range from 0 (not at all) to 3 (nearly every day), with the total score across the 9 items ranging from 0 to 27. Scores on the PHQ-9 are interpreted as probable mild

(5–9), moderate (10–14), moderate-to-severe (15–19) and severe (20–27) depression.²² This scale has been widely used globally, including in Sub-Saharan Africa and in the DRC.²³

Finally, the 5-item Primary Care PTSD Screen for DSM-5 (PC-PTSD-5) was used to measure PTSD.²⁴ The scale has been used with populations in Africa.²⁵ Respondents who indicated having experienced a traumatic event were presented with five statements and asked to indicate whether they applied to them in the past month. Answers were either yes (1) or no (0), with the total score ranging from 0 to 5.

For all three mental health scales, binary outcome measures were created, where we follow common practice and define anxiety as GAD-7 scores of 10 or higher,¹⁹ depression as PHQ-9 scores of 10 or higher²¹ and PTSD as scores of 3 or more.²⁴

Based on previous empirical research²⁶ and clinical judgement, potential explanatory variables were chosen for the regression analysis. We included demographic variables (head of the household, age, gender, literacy and marital status) and socioeconomic variables, such as employment status and the quality of the dwelling's walls, which serves as a good proxy for wealth in this region.²⁷ The association with physical health is explored by considering whether the respondent had any health problems in the 2 weeks preceding the survey. We also measured access to healthcare based on walking distance to the nearest health centre. To explore the influence of daily stressors, we included measures for food insecurity, personal safety and the legal status of the respondent's dwelling. To measure food insecurity, we used the World Food Programme's Reduced Coping Strategies Index, which is a standardised proxy indicator measuring household food insecurity by analysing the frequency and severity of five behavioural coping strategies used over the past 7 days. We further explored the role of social cohesion²⁸ by measuring civic engagement (the respondent's membership of a wide set of village associations) and trust in their neighbours. Detailed information about all variables can be found in online supplementary information. The main model presented in the paper is robust to the exclusion of individual predictors from the regression specification (see online supplementary information and yields results consistent with those obtained from a simple descriptive correlational matrix between mental health outcomes and explanatory variables.

Statistical analysis

To investigate the association between mental health outcomes and a wide set of sociodemographic variables, we use least squares models with fixed effects at the health zone level. We thus control for all unobserved factors at the health zone level and above that may confound the relationship between our explanatory variables and mental health outcomes, such as population density, conflict occurrence, environmental and geographical factors and access to healthcare. SEs are clustered at the

Table 1 Respondent summary information

Variable	All respondents N (%)	Non-Displaced N (%)	IDPs N (%)	Returned IDPs N (%)	Repatriated refugees N (%)
	(1)	(2)	(3)	(4)	(5)
Respondent type					
Head of the household	2595 (64.39)	791 (52.35)	661 (67.04)*	591 (73.78)*	552 (75.41)*
Spouse or other	1435 (35.61)	720 (47.65)	325 (32.96)*	210 (26.22)*	180 (24.59)*
Gender					
Male	2028 (49.85)	707 (46.15)	459 (46.18)	453 (56.13)*	409 (55.65)*
Female	2030 (49.90)	820 (53.52)	534 (53.72)	352 (43.62)*	324 (44.08)*
Age group					
Young adulthood (18–24 years)	636 (15.64)	280 (18.29)	166 (16.7)	95 (11.77)*	95 (12.94)*
Middle adulthood (25–49 years)	2383 (58.61)	877 (57.28)	571 (57.44)	457 (56.63)	478 (65.12)*
Late adulthood (50+ years)	1003 (24.67)	352 (22.99)	242 (24.35)	252 (31.23)*	157 (21.39)
Marital status					
Married	3033 (74.72)	1160 (75.82)	707 (71.27)*	631 (78.29)	535 (73.19)
Single or other	1026 (25.28)	370 (24.18)	285 (28.73)*	175 (21.71)	196 (26.81)
Literacy					
Literate	2906 (71.49)	1079 (70.48)	667 (67.24)	587 (72.74)	573 (77.96)*
Illiterate	1159 (28.51)	452 (29.52)	325 (32.76)	220 (27.26)	162 (22.04)*
Job status					
Has a job	2228 (54.77)	808 (52.74)	545 (54.83)	515 (63.82)*	360 (48.98)
Has no job	1840 (45.23)	724 (47.26)	449 (45.17)	292 (36.18)*	375 (51.02)
Type of wall					
High quality	963 (23.67)	386 (25.2)	162 (16.3)*	232 (28.75)	183 (24.9)
Low/medium quality	3105 (76.33)	1146 (74.8)	832 (83.7)*	575 (71.25)	552 (75.1)
Health condition					
Good health	3100 (76.22)	1202 (78.46)	758 (76.26)	575 (71.25)*	565 (76.98)
Health problems	967 (23.78)	330 (21.54)	236 (23.74)	232 (28.75)*	169 (23.02)
Distance health centre (hours), mean (SD)	1.46 (5.34)	1.79 (6.51)	1.06 (3.69)*	1.96 (6.2)	0.73 (2.81)*
Food insecurity (0–7), mean (SD)	2.49 (1.69)	2.44 (1.74)	2.64 (1.67)*	2.62 (1.57)*	2.22 (1.71)*
Violence incident (0–16), mean (SD)	0.16 (0.54)	0.16 (0.55)	0.16 (0.52)	0.15 (0.52)	0.17 (0.58)
Legal rights to dwelling					
Legal rights	2737 (67.3)	1054 (68.84)	655 (65.9)	605 (74.97)*	423 (57.55)*
No legal rights	1330 (32.7)	477 (31.16)	339 (34.1)	202 (25.03)*	312 (42.45)*
Civic engagement (0–16), mean (SD)	1.30 (1.74)	1.29 (1.75)	1.05 (1.61)*	1.50 (1.76)*	1.43 (1.85)
Trust neighbours					
Not at all	360 (8.85)	135 (8.82)	92 (9.26)	81 (10.05)	52 (7.07)
Not really	722 (17.76)	239 (15.61)	203 (20.42)*	141 (17.49)	139 (18.91)
Some	1782 (43.83)	659 (43.04)	424 (42.66)	345 (42.80)	354 (48.16)*
Very much	1202 (29.56)	498 (32.53)	275 (27.67)*	239 (29.65)	190 (25.85)*

Respondent summary information: unless indicated otherwise, we report absolute numbers and, in parentheses, the percentages they represent relative to the respective group total. Detailed variable descriptions can be found in online supplementary information.

*Indicates a statistically significant difference ($p < 0.05$) from the non-displaced group (using a two-proportion Z-test). IDPs are respondents who have been displaced due to violence for at least 3 months since 2016 and have not yet returned to the village they fled from; returned IDPs are IDPs who have returned; repatriated refugees are similar to IDPs but have crossed the country's border; non-displaced respondents are members of the host community who were not displaced since 2016.

IDPs, internally displaced people.

Table 2 Summary information on mental health outcomes

	Anxiety (GAD-7)		Depression (PHQ-9)		PTSD (PC-PTSD-5)	
	Mean (95% CI)	Prevalence (%) (95% CI)	Mean (95% CI)	Prevalence (%) (95% CI)	Mean (95% CI)	Prevalence (%) (95% CI)
All respondents	4.49 (4.37 to 4.62)	8.34 (7.48% to 9.19%)	6.04 (5.88 to 6.19)	18.34 (17.15% to 19.53%)	2.00 (1.94 to 2.05)	37.78 (36.29% to 39.28%)
Non-displaced	4.58 (4.38 to 4.79)	9.71 (8.22% to 11.19%)	6.12 (5.86 to 6.37)	17.29 (15.39% to 19.19%)	2.07 (1.98 to 2.16)	39.75 (37.28% to 42.21%)
IDPs	4.97* (4.7 to 5.24)	9.47 (7.64% to 11.29%)	6.82* (6.47 to 7.17)	21.92* (19.34% to 24.5%)	2.06 (1.95 to 2.17)	38.66 (35.62% to 41.71%)
Returned IDPs	4.46 (4.19 to 4.72)	8.10 (6.2% to 9.99%)	6.01 (5.67 to 6.36)	22.48* (19.59% to 25.37%)	1.74* (1.63 to 1.86)	31.47* (28.25% to 34.68%)
Repatriated refugees	3.71* (3.47 to 3.95)	4.22* (2.77% to 5.68%)	4.83* (4.52 to 5.15)	11.17* (8.89% to 13.46%)	2.04 (1.91 to 2.17)	39.45 (35.9% to 43.01%)

Summary information by mental health outcomes. Cut-offs: anxiety defined as GAD-7 scores of 10 or higher, depression as PHQ-9 scores of 10 or higher and PTSD as scores of 3 or more. Detailed variable descriptions can be found in online supplementary information.

*Indicates a statistically significant difference ($p < 0.05$) from the non-displaced group (using a two-tailed t-test for means and two-proportion z-test for prevalence variables). IDPs are respondents who have been displaced due to violence for at least 3 months since 2016 and who have not yet returned to the village they fled from; returned IDPs are IDPs who have returned; repatriated refugees are similar to IDPs but have crossed a border; non-displaced respondents are members of the host community who were not displaced since 2016. DSM-5, The Diagnostic and Statistical Manual of Mental Disorders, 5th edition; GAD-7, Generalised Anxiety Disorder-7; IDPs, internally displaced people; PC-PTSD-5, Primary Care PTSD Screen for DSM-5; PHQ-9, Patient Health Questionnaire-9; PTSD, post-traumatic stress disorder.

locality level. The significance threshold for all analyses was set at $p < 0.05$. We analysed our data using R statistical software V.4.5.3.

Patient and public involvement

The UNHCR disseminated the findings of the survey among policymakers and the public.

FINDINGS

Sample characteristics

Between November 2022 and February 2023, data were collected from 4069 households across 119 localities; for logistical reasons, seven localities could not be visited. In 3.5% of cases, the household was not available during the survey period, and interviews were conducted with (pre-selected) replacement households.

Respondent characteristics are presented in [table 1](#), where we also provide information by displacement type. Focusing on all respondents (column 1), in 64% of cases, the respondent was the head of the household, 27% were the spouse of the household head and 9% were other knowledgeable household members. Half of the respondents are men (50%); 16% of respondents are in their young adulthood (18–24 years), 59% in their middle adulthood (25–49 years) and 25% in their late adulthood (50+ years). The typical respondent is married (75%) and literate (72%). The economic conditions are dire, with only about half of respondents having worked in the 2 weeks preceding the survey (55%), and only 24% of respondents lived in a dwelling with high-quality walls (made of cement, stone or brick). Three in four respondents (76%) report no health problems in the 2 weeks preceding the survey. On average, respondents need to walk 1.5 hours to reach the nearest health centre, but there is much variation, with some respondents having to walk an estimated 3 days. Respondents face daily stressors. Food insecurity is high, with respondents having

to undertake activities to respond to food shortages—like borrowing food or relying on help from friends or relatives—on average 2.5 days per week. The typical respondent experienced 0.16 out of a total of 16 violent incidents in the year preceding the survey. Most households (67%) own their dwelling. The typical respondent is a member of 1.3 (out of a possible 16) village associations, and 73% of respondents trust their neighbour somewhat or very much to go to the market for them.

[Table 1](#) also summarises the results by household type and includes a comparison between those with a displacement history and those without. Notable differences emerge in demographic characteristics. In households with a displacement history, the respondent was more often the head of household (IDPs: 67%; returned IDPs: 74%; repatriated refugees: 75%) compared with households that had not been displaced (52%). In returned IDPs and repatriated refugee households, the respondent was more likely to be male (56% and 56% vs 46%), and these households have a smaller proportion of young adults (12% and 13% vs 18%). There are also differences in socioeconomic characteristics. IDPs were economically worse off; only 16% live in a dwelling with high-quality walls compared with 25% of non-displaced respondents. IDPs and returned IDPs also resort more frequently to coping strategies for food shortages, averaging 2.6 days per week compared with 2.4 days among the non-displaced. IDPs and repatriated refugees lived closer to health centres, with average travel times of 1.06 and 0.73 hours, respectively, compared with 1.60 hours for the non-displaced. For exposure to violence, we do not find any significant differences across the four groups.

Mental health outcomes

The first row of [table 2](#) provides summary information on the mental health outcomes. In the full sample, the prevalence of anxiety, depression and PTSD was 8.3%,

Table 3 Main regression results for anxiety

Variable (response options)	Unadjusted	Regression adjusted	Non-displaced	IDPs	Returned IDPs	Repatriated refugees
	(1)	(2)	(3)	(4)	(5)	(6)
Head of the household (0/1)	−0.06 (0.13)	−0.26 (0.16)	−0.37 (0.23)	0.21 (0.27)	−0.51 (0.39)	−0.29 (0.35)
Male respondent (0/1)	−0.00 (0.12)	0.01 (0.15)	0.36 (0.24)	−0.83** (0.29)	0.21 (0.40)	−0.22 (0.31)
Middle adulthood (25–49 years) (0/1)	−0.21 (0.13)	0.23 (0.14)	0.23 (0.23)	0.32 (0.26)	−0.00 (0.33)	0.74* (0.28)
Late adulthood (50+ years) (0/1)	0.53*** (0.14)	0.65*** (0.17)	0.36 (0.25)	0.69 (0.38)	0.65 (0.43)	1.27** (0.38)
Married (0/1)	0.24 (0.14)	−0.02 (0.17)	−0.23 (0.23)	0.47 (0.24)	0.15 (0.41)	−0.02 (0.33)
Literacy (0/1)	−0.78*** (0.14)	0.03 (0.17)	0.31 (0.23)	−0.13 (0.28)	0.02 (0.32)	−0.13 (0.38)
Has a job (0/1)	0.89*** (0.12)	0.67** (0.22)	0.69* (0.26)	0.76 (0.39)	0.40 (0.35)	0.36 (0.36)
High-quality walls (0/1)	−1.61*** (0.14)	−1.05*** (0.24)	−0.22 (0.24)	−1.32** (0.41)	−2.06*** (0.51)	−1.05*** (0.29)
Good health (0/1)	−0.89*** (0.14)	−0.73*** (0.17)	−1.11*** (0.27)	−0.54 (0.29)	−0.86** (0.31)	−0.54 (0.34)
Distance health centre (hours)	−0.03** (0.01)	−0.03*** (0.01)	−0.03** (0.01)	−0.02 (0.02)	−0.01 (0.02)	−0.04 (0.03)
Food insecurity (0–7)	0.57*** (0.04)	0.33*** (0.06)	0.43*** (0.08)	0.22* (0.11)	0.36*** (0.10)	0.41** (0.13)
Violence incident (0–16)	0.10 (0.11)	0.28* (0.14)	0.06 (0.15)	0.36 (0.25)	0.63** (0.22)	0.12 (0.31)
Legal rights to dwelling (0/1)	0.73*** (0.13)	0.17 (0.17)	0.19 (0.23)	0.87** (0.31)	−0.35 (0.33)	−0.46 (0.31)
Civic engagement (0–16)	−0.16*** (0.04)	−0.10 (0.05)	−0.10 (0.06)	−0.20* (0.09)	0.11 (0.11)	−0.02 (0.08)
Trust neighbours (0–3)	−0.19** (0.07)	−0.21* (0.10)	−0.47** (0.18)	−0.08 (0.17)	−0.15 (0.15)	−0.05 (0.15)
Displacement (0/1)	−0.14 (0.13)	−0.14 (0.15)				
Observations	n/a	3986	1492	981	795	718
Number of health zones:	n/a	27	27	27	27	20
Adjusted R ²	n/a	0.27	0.29	0.38	0.24	0.22

SEs in parentheses. Column (1) reports results from a series of bivariate linear regressions, whereas columns (2)–(6) are based on linear regressions, including all variables, health zone fixed effects and errors clustered at the village level. Columns (3)–(6) present results per subgroup: non-displaced respondents are members of the host community who have not been displaced since 2016; IDPs are respondents who have been displaced due to violence for at least 3 months since 2016 and have not yet returned to the village they fled from; returned IDPs are IDPs who have returned; repatriated refugees are similar to IDPs but crossed a border. Anxiety (GAD-7) is scored from 0 to 21. Detailed variable descriptions can be found in online supplementary information.

*p<0.05; **p<0.01; ***p<0.001.

GAD-7, Generalised Anxiety Disorder-7; IDPs, internally displaced people.

18.3% and 37.8%, respectively. Comorbidity is high. In total, 7.3% of respondents experienced both anxiety and depression, 8.2% depression and PTSD and 5.6% anxiety and PTSD. In total, 4.9% of our respondents experienced all three mental health symptoms. There were strong, linear associations between anxiety and depression scores ($r=0.80$, $p<0.001$), depression and PTSD ($r=0.30$, $p<0.001$) and anxiety and PTSD ($r=0.372$, $p<0.001$).

Rows 2–5 of table 2 show the prevalence of mental health disorders across households with different displacement experiences and include a statistical comparison among them. Anxiety affected 10% of non-displaced respondents, with a similar prevalence among IDPs (9%) and returned IDPs (8%) compared with a substantially lower prevalence among repatriated refugees (4%). About 17% of non-displaced respondents have symptoms of depression; this number is considerably higher for IDPs (22%) and returned IDPs (22%) but lower for repatriated refugees (11%). Around 40% of the non-displaced IDPs and repatriated refugees are

characterised by PTSD, while this share is significantly lower for returned IDPs (31%).

Factors associated with mental health outcomes

Tables 3–5 show regression results for anxiety, depression and PTSD, respectively. Column (1) presents results from a series of bivariate linear regressions. Each estimate is obtained from a separate regression of the dependent variable on a single explanatory variable. These results provide an unadjusted, descriptive overview of the relationships among key variables. Column (2) reports results from two-sided linear regressions that include all variables, health zone fixed effects and errors clustered at the village level. The estimates indicate the change in the dependent variable associated with a one-unit increase in the independent variable. For readers interested in comparing effect sizes, results from models in which all variables are standardised (z-scores) are provided in online supplementary information. Focusing on column (2) in tables 3–5, there was no association between mental

Table 4 Main regression results for depression

Variable (response options)	Unadjusted	Regression adjusted	Non-displaced	IDPs	Returned IDPs	Repatriated refugees
	(1)	(2)	(3)	(4)	(5)	(6)
Head of the household (0/1)	0.20 (0.17)	-0.19 (0.21)	0.05 (0.32)	0.06 (0.38)	-0.78 (0.44)	-0.45 (0.44)
Male respondent (0/1)	0.09 (0.16)	0.03 (0.20)	0.34 (0.33)	-1.20** (0.38)	0.62 (0.44)	-0.04 (0.36)
Middle adulthood (25–49 years) (0/1)	-0.48** (0.16)	0.06 (0.20)	-0.07 (0.30)	-0.22 (0.37)	0.37 (0.46)	0.99* (0.45)
Late adulthood (50+ years) (0/1)	0.89*** (0.19)	0.84*** (0.24)	0.64 (0.34)	0.27 (0.52)	1.75** (0.58)	1.32* (0.55)
Married (0/1)	-0.06 (0.19)	-0.23 (0.21)	-0.41 (0.31)	0.15 (0.36)	0.03 (0.46)	-0.24 (0.44)
Literacy (0/1)	-1.07*** (0.18)	0.11 (0.21)	0.28 (0.30)	0.21 (0.38)	-0.25 (0.41)	0.19 (0.44)
Has a job (0/1)	0.42** (0.16)	0.46 (0.30)	0.53 (0.33)	0.37 (0.53)	0.35 (0.43)	0.14 (0.41)
High-quality walls (0/1)	-1.95*** (0.19)	-0.94** (0.35)	0.03 (0.29)	-0.84 (0.61)	-2.37*** (0.68)	-0.89 (0.48)
Good health (0/1)	-1.19*** (0.19)	-0.93*** (0.22)	-1.68*** (0.38)	-0.13 (0.35)	-1.21** (0.42)	-0.93* (0.40)
Distance health centre (hours)	-0.04** (0.02)	-0.04*** (0.01)	-0.04** (0.01)	-0.07* (0.03)	-0.03 (0.03)	-0.04 (0.04)
Food insecurity (0–7)	0.84*** (0.05)	0.61*** (0.07)	0.65*** (0.10)	0.50*** (0.14)	0.78*** (0.13)	0.82*** (0.15)
Violence incident (0–16)	0.08 (0.15)	0.26 (0.19)	0.05 (0.17)	0.09 (0.27)	0.91** (0.30)	-0.07 (0.45)
Legal rights to dwelling (0/1)	1.22*** (0.17)	0.34 (0.21)	0.14 (0.27)	1.53*** (0.43)	-0.50 (0.42)	-0.32 (0.40)
Civic engagement (0–16)	-0.23*** (0.05)	-0.13* (0.06)	-0.15 (0.07)	-0.16 (0.12)	0.08 (0.12)	-0.01 (0.10)
Trust neighbours (0–3)	-0.12 (0.09)	-0.23 (0.13)	-0.60* (0.24)	-0.03 (0.22)	-0.12 (0.18)	-0.01 (0.21)
Displacement (0/1)	-0.13 (0.17)	0.07 (0.20)				
Observations	n/a	3987	1494	978	797	718
Number of health zones:	n/a	27	27	27	27	20
Adjusted R ²	n/a	0.29	0.30	0.38	0.28	0.25

SEs in parentheses. Column (1) reports results from a series of bivariate linear regressions, whereas columns (2)–(6) are based on linear regressions, including all variables, health zone fixed effects and errors clustered at the village level. Columns (3)–(6) present results per subgroup: non-displaced respondents are members of the host community who have not been displaced since 2016; IDPs are respondents who have been displaced due to violence for at least 3 months since 2016 and have not yet returned to the village they fled from; returned IDPs are IDPs who have returned; repatriated refugees are similar to IDPs but crossed a border. Depression (PHQ-9) is scored from 0 to 27. Detailed variable descriptions can be found in online supplementary information.

*p<0.05; **p<0.01; ***p<0.001.

IDPs, internally displaced people; n/a, not applicable; PHQ-9, Patient Health Questionnaire-9.

health and household head status, gender, marital status, literacy or dwelling ownership. In contrast, there is an association between mental health and age. Older respondents report higher symptoms compared with young adults (anxiety: +0.65, p<0.001; depression: +0.84, p<0.01; PTSD: +0.20, p<0.05). Respondents from wealthier households had significantly better mental health outcomes (anxiety: -1.05, p<0.001; depression: -0.94, p<0.01; PTSD: -0.33, p<0.01). Respondents with a job are more likely to face anxiety symptoms (+0.67,

p<0.01). Those respondents in good physical health are significantly less likely to experience symptoms of anxiety (-0.73, p<0.001), depression (-0.93, p<0.001) and PTSD (-0.37, p<0.001). Distance from a health centre is, surprisingly, associated with fewer symptoms of anxiety and depression. Respondents experiencing food insecurity score significantly worse on all mental health outcomes (anxiety: +0.33, p<0.001; depression: +0.61, p<0.001; PTSD: +0.08, p<0.05). Those respondents who experienced one additional violent incident

Table 5 Main regression results for PTSD

Variable (response options)	Unadjusted	Regression adjusted	Non-displaced	IDPs	Returned IDPs	Repatriated refugees
	(1)	(2)	(3)	(4)	(5)	(6)
Head of the household (0/1)	−0.05 (0.06)	−0.13 (0.07)	0.01 (0.11)	0.08 (0.14)	−0.41** (0.15)	−0.03 (0.20)
Male respondent (0/1)	0.02 (0.06)	−0.06 (0.07)	−0.10 (0.12)	−0.39** (0.13)	0.19 (0.16)	0.02 (0.14)
Middle adulthood (25–49 years) (0/1)	−0.10 (0.06)	0.00 (0.07)	−0.14 (0.10)	0.19 (0.15)	−0.05 (0.15)	−0.02 (0.19)
Late adulthood (50+ years) (0/1)	0.17** (0.07)	0.20* (0.09)	−0.02 (0.12)	0.45** (0.17)	0.17 (0.17)	0.11 (0.20)
Married (0/1)	0.21** (0.06)	0.03 (0.07)	0.05 (0.10)	0.28 (0.15)	−0.16 (0.15)	−0.09 (0.16)
Literacy (0/1)	−0.14* (0.06)	0.05 (0.08)	0.15 (0.11)	−0.02 (0.12)	−0.08 (0.15)	0.04 (0.17)
Has a job (0/1)	0.49*** (0.06)	0.20 (0.10)	0.11 (0.12)	0.17 (0.17)	0.15 (0.14)	0.22 (0.19)
High-quality walls (0/1)	−0.47*** (0.07)	−0.33** (0.12)	0.11 (0.13)	−0.54* (0.25)	−0.55** (0.19)	−0.39* (0.17)
Good health (0/1)	−0.60*** (0.07)	−0.37*** (0.07)	−0.48*** (0.10)	−0.16 (0.15)	−0.39** (0.12)	−0.39* (0.15)
Distance health centre (hours)	0.01 (0.01)	0.00 (0.00)	0.01 (0.00)	−0.02*(0.01)	0.01 (0.01)	−0.02 (0.03)
Food insecurity (0–7)	0.16*** (0.02)	0.08* (0.03)	0.18*** (0.04)	0.00 (0.06)	0.14** (0.05)	−0.01 (0.06)
Violence incident (0–16)	0.36*** (0.05)	0.30*** (0.05)	0.20** (0.07)	0.32** (0.10)	0.30** (0.10)	0.30** (0.09)
Legal rights to dwelling (0/1)	0.17** (0.06)	−0.06 (0.09)	0.07 (0.10)	0.19 (0.19)	−0.16 (0.12)	−0.35 (0.18)
Civic engagement (0–16)	0.18*** (0.02)	0.14*** (0.03)	0.18*** (0.03)	0.11* (0.04)	0.14** (0.05)	0.19*** (0.05)
Trust neighbours (0–3)	0.24*** (0.03)	0.14*** (0.04)	0.03 (0.07)	0.12 (0.07)	0.20** (0.07)	0.09 (0.08)
Displacement (0/1)	−0.12* (0.06)	−0.24** (0.09)				
Observations	n/a	3971	1485	976	796	714
Number of health zones:	n/a	27	27	27	27	20
Adjusted R ²	n/a	0.18	0.26	0.21	0.25	0.26

SEs in parentheses. Column (1) reports results from a series of bivariate linear regressions, whereas columns (2)–(6) are based on linear regressions, including all variables, health zone fixed effects and errors clustered at the village level. Columns (3)–(6) present results per subgroup: non-displaced respondents are members of the host community who have not been displaced since 2016; IDPs are respondents who have been displaced due to violence for at least 3 months since 2016 and have not yet returned to the village they fled from; returned IDPs are IDPs who have returned; repatriated refugees are similar to IDPs but have crossed a border. PTSD (PC-PTSD-5) is scored from 0 to 5. Detailed variable descriptions can be found in online supplementary information.

*p<0.05; **p<0.01; ***p<0.001.

DSM-5, The Diagnostic and Statistical Manual of Mental Disorders, 5th edition; IDPs, internally displaced people; PC-PTSD-5, Primary Care PTSD Screen for DSM-5; PTSD, post-traumatic stress disorder.

in the preceding year have a higher likelihood of anxiety (+0.28, p<0.05) and PTSD (+0.30, p<0.001). Respondents who are civically engaged are less likely to face depression (−0.13, p<0.05) but more likely to face symptoms of PTSD (0.14, p<0.001). Higher trust is associated with fewer symptoms of anxiety (−0.21, p<0.05) but more PTSD (+0.14, p<0.001). Having been displaced is associated with a lower likelihood of PTSD (−0.24, p<0.01).

Factors associated with mental health outcomes by displacement experience

Columns (3)–(6) in tables 3–5 disaggregate the results by the respondent displacement status. While the

magnitude and significance of the coefficients vary, the strong negative association between food insecurity and mental well-being across all four groups is noteworthy. Several other factors stand out because their association with mental health differs considerably by household types. Among IDPs, men are significantly better off than women (anxiety: −0.83, p<0.01; depression: −1.20, p<0.01; PTSD: −0.39, p<0.01); this association does not exist for other household types. Whereas household wealth is associated with better mental health for IDPs (anxiety: −1.32, p<0.01), returned IDPs (anxiety: −2.06, p<0.001; depression: −2.37, p<0.001; PTSD: −0.55, p<0.01) and repatriated refugees (anxiety: −1.05, p<0.001; PTSD: −0.39, p<0.05);

Table 6 Prevalence of anxiety, depression and PTSD across recent studies

Sample (year of data collection)	Anxiety (GAD-7)	Depression (PHQ-9)	PTSD (PC-PTSD-5)
Present study (2022), n=4069	4.5; 8.3%	6.0; 18.3%	2.0; 37.8%
Population in one health zone in Kasai (2025), n=200 ¹⁰	7.2; 30.9%	8.4; 35.5%	
Population in one health zone in Kasai (2025), n=185 ¹⁰	6.6; 21.6%	7.4; 33.0%	
Patients with skin conditions in Kasai (2023), n=118 ³⁹	10.6; 57.6%	13.2; 66.7%	
Adults in Kinshasa during the COVID-19 pandemic (2022), n=100 ⁴⁰	8.5; n/a	9.1; n/a	
Adults in Kinshasa during the COVID-19 pandemic (2024), n=334 ⁴¹	n/a; 4.1%		
Female former child soldiers in eastern DRC (2019), n=92 ⁴²		12.8; n/a	
Representative community sample of adults in eastern DRC (2021), n=1058 ⁴³		6.8; n/a	
Women in Bukavu, DRC, with SVRP and termination (2016), n=82 ⁴⁴	n/a; 33%		

Prevalence of anxiety, depression and PTSD in related studies: means and shares above critical thresholds (PHQ-9 scores of 10 or higher, GAD-7 scores of 10 or higher and PTSD scores of 3 or more). 'n/a' indicates not provided in the study. Based on a PubMed search for: "Congo" [Title/Abstract] AND ("anxiety" [Title/Abstract] OR "depression" [Title/Abstract] OR "post-traumatic stress disorder" [Title/Abstract]), which returned 81 studies (search date: 18 April 2025). Studies were required to collect original data on GAD-7, PHQ-9 or PC-PTSD-5. DRC, Democratic Republic of the Congo; GAD-7, Generalised Anxiety Disorder-7; PC-PTSD-5, Primary Care PTSD Screen for DSM-5; PHQ-9, Patient Health Questionnaire-9; PTSD, post-traumatic stress disorder; SVRP, sexual violence related pregnancy.

there is no such relationship among non-displaced respondents. Experiencing an additional violent incident is associated with a higher likelihood of PTSD symptoms across all groups. However, violence is associated with a higher likelihood of anxiety and depression symptoms only for returned IDPs (+0.63, $p<0.05$ and +0.91, $p<0.01$, respectively). Finally, owning one's dwelling is associated, surprisingly, with worse mental health outcomes for IDPs (anxiety: 0.87, $p<0.01$; depression: 1.53, $p<0.001$).

DISCUSSION

The aim of this paper was to examine the prevalence and correlates of anxiety, depression and PTSD symptoms among displaced and non-displaced people living in the Kasai region of the DRC, where many people had experienced potentially traumatic events. The prevalence of anxiety, depression and PTSD was high at 8.3%, 18.3% and 37.8%, respectively. A systematic review conducted in conflict-affected populations estimated a prevalence rate of 12.9% for PTSD.²⁹ In comparison, the prevalence of PTSD in the presented study, at 37.8%, is considerably higher. The finding that people living in conflict-affected areas have higher mental health morbidity is well known.^{6 30 31}

Table 6 presents a comparison with other studies from the DRC that measured levels of anxiety, depression and PTSD using the same measures used in this study (GAD-7, PHQ-9 and PC-PTSD-5, respectively). Two items stand out. First, this study is considerably larger than other studies. Second, the prevalence of anxiety and depression is lower in this study. The latter may be because this study's sample is different. For example,¹⁰ another study focusing on the Kasai region targets only 2 of the 21 health areas in only one health zone of the city of Tshikapa. This study, in contrast, collected representative

data from 27 health zones across all three provinces of the Greater Kasai region.

In contrast to other research, which usually finds that mental health disorders are more commonly reported among women compared with men,^{32 33} we find no overall difference in the prevalence of anxiety, depression and PTSD between genders. However, the finding that poor economic conditions were associated with mental disorders among our study population is in line with a large body of research, including among displaced and conflict-affected populations.^{32 34 35} Moreover, a systematic review found that food insecurity is not only associated with poor cognitive and motor development in children but also consistently increases the risk of adult mental disorders in developing countries.³⁶ The fact that food insecurity is associated with poorer mental health calls for targeted interventions aiming to improve livelihoods and reduce mental health symptoms. The findings in Kasai also confirm that older age is a risk factor for depression, PTSD and anxiety in line with a systematic literature review of the long-term mental health of war refugees.³⁷

This study has several strengths. First, the study used an innovative sampling frame to secure a large and randomly selected population sample from Congo's Greater Kasai region. This is an area with extremely limited infrastructure and databases, about which we lack information, despite the area experiencing violent conflict since 2016. Second, by design, the study targeted IDPs, returned IDPs, repatriated refugees and members of the host community. To our knowledge, this is the first study providing insight into the prevalence of anxiety and depressive symptoms among Congolese displaced and non-displaced populations. Third, the study used a large, face-to-face survey to collect information from respondents on their sociodemographic characteristics and factors commonly associated with mental health.

The study also has limitations. First, all outcomes were self-reported by respondents and recorded by interviewers. While this method is common practice in settings of low literacy and low connectivity, it may induce biases such as recall bias or social desirability bias. Second, the cross-sectional nature of the study design cannot establish causal relationships between mental health symptoms and explanatory variables. Third, the survey targeted the head of the household and not a representative adult. Fourth, the study was targeted to collect data from 126 localities, but for logistical reasons, seven of them could not be visited. Finally, the findings in the present study might not be generalisable to other populations.

CLINICAL IMPLICATIONS

Conclusions

This study contributes to research on mental health in conflict zones by providing a large-scale, well-powered account of the prevalence of common mental health conditions in a general, randomly selected population. The described prevalence of anxiety and depression, and particularly of PTSD, is high among displaced and non-displaced populations in the conflict-affected area of the Greater Kasai region in the DRC.

Food insecurity is a strong correlate of poor mental health. Based on these results, it seems critical to address the underlying causes of food insecurity, as a lack of food could deteriorate the mental health of affected populations. However, the relationship between mental health status and food insecurity is likely bidirectional. Having a mental health condition can reduce people's ability to navigate difficult circumstances effectively and ensure a stable income. Interventions that combine mental health and psychosocial support with livelihood improvements are therefore likely to produce synergistic benefits; however, further operational research is needed to better understand this relationship. Such research is particularly critical in a context like the Greater Kasai region in the DRC, where targeted mental health services that address both displaced and host communities are missing. Guided by the evidence presented here, these interventions should focus on the impact of food insecurity, older populations and the existence of other mental health conditions. The findings from this large-scale survey of an under-researched population aim to contribute to addressing remaining knowledge gaps around mental health interventions in humanitarian settings.³⁸

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Ethics approval This study involves human participants and was approved by UNHCR. The data collection was commissioned by UNHCR to learn about the socioeconomic context in Greater Kasai. The proposal was extensively reviewed internally by protection specialists and Data and Information Management Specialists in the UNHCR country office and regional bureau. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Declaration of Helsinki of 1975, as revised in 2008. Local and international ethics approval was obtained before programme start (IRB: Official University of Bukavu (UOB/CEM/007/2022) and New York University Abu Dhabi (HRPP-2022-34)). All respondents provided verbal informed consent. The confidentiality of all information provided by respondents was ensured. The respondents were informed that there was no compensation for participating and that they could stop the interview at any time. The study involved minimal risk of harm and did not entail deception. Participants provided informed consent prior to participation.

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REFERENCES

- 1 UNHCR. Violent attacks displace thousands in DR Congo's Kasai region. 2021.
- 2 United Nations Human Rights Council. Report of the team of international experts on the situation in Kasai. A/HRC/41/31. 2019.
- 3 IPC. Republique Democratique du Congo: Analyse de l'insécurité alimentaire aigüe. septembre – juin 2026. 2025.
- 4 Mesa-Vieira C, Haas AD, Buitrago-Garcia D, *et al*. Mental health of migrants with pre-migration exposure to armed conflict: a systematic review and meta-analysis. *Lancet Public Health* 2022;7:e469–81.
- 5 Steel Z, Chey T, Silove D, *et al*. Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. *JAMA* 2009;302:537–49.
- 6 Charlson F, van Ommeren M, Flaxman A, *et al*. New WHO prevalence estimates of mental disorders in conflict settings: a systematic review and meta-analysis. *Lancet* 2019;394:240–8.
- 7 Pozuelo JR, Bradenbrink R, Stierma MF, *et al*. Depression, violence and socioeconomic outcomes among refugees in East Africa:

- evidence from a multicountry representative survey. *BMJ Ment Health* 2023;26.
- 8 Bryant RA. Post-traumatic stress disorder: a state-of-the-art review of evidence and challenges. *World Psychiatry* 2019;18:259–69.
- 9 Ngamaba KH, Lombo LS, Makopa IK, *et al.* Mental health outcomes, literacy and service provision in low- and middle-income settings: a systematic review of the Democratic Republic of the Congo. *Npj Mental Health Res* 2024;3.
- 10 Seekles ML, Kadima JK, Omumbu POL, *et al.* Prevalence of mental health conditions in post-conflict Kasai Province, Democratic Republic of the Congo: A repeated, cross-sectional study. *PLOS Glob Public Health* 2025;5.
- 11 Garry S, Checchi F. Armed conflict and public health: into the 21st century. *J Public Health (Oxf)* 2020;42:e287–98.
- 12 Miller KE, Rasmussen A. War exposure, daily stressors, and mental health in conflict and post-conflict settings: bridging the divide between trauma-focused and psychosocial frameworks. *Soc Sci Med* 2010;70:7–16.
- 13 Pourmotabbed A, Moradi S, Babaei A, *et al.* Food insecurity and mental health: a systematic review and meta-analysis. *Public Health Nutr* 2020;23:1778–90.
- 14 Ae-Ngibise KA, Asare-Doku W, Peprah J, *et al.* The Mental Health Outcomes of Food Insecurity and Insufficiency in West Africa: A Systematic Narrative Review. *Behav Sci (Basel)* 2021;11.
- 15 Militao EMA, Salvador EM, Uthman OA, *et al.* Food Insecurity and Health Outcomes Other than Malnutrition in Southern Africa: A Descriptive Systematic Review. *Int J Environ Res Public Health* 2022;19:5082.
- 16 Ejiohuo O, Onyeaka H, Unegbu KC, *et al.* Nourishing the Mind: How Food Security Influences Mental Wellbeing. *Nutrients* 2024;16:501.
- 17 Windt P, Stoop N, Weber S. Data from "Household survey data (2023) Kasai, DR Congo by the World Bank-UNHCR joint data center. Harvard Dataverse Repository. 2024. Available: <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/PHKNSU>
- 18 Kasujja R, Bangirana P, Chiumento A, *et al.* Translating, contextually adapting, and pilot testing of psychosocial and mental health assessment instruments for Congolese refugees in Rwanda and Uganda. *Confl Health* 2022;16:1–13.
- 19 Spitzer RL, Kroenke K, Williams JBW, *et al.* A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;166:1092–7.
- 20 Mughal AY, Devadas J, Ardman E, *et al.* A systematic review of validated screening tools for anxiety disorders and PTSD in low to middle income countries. *BMC Psychiatry* 2020;20.
- 21 Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606–13.
- 22 Manea L, Gilbody S, McMillan D. Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. *CMAJ* 2012;184:E191–6.
- 23 Sweetland AC, Belkin GS, Verdell H. Measuring depression and anxiety in sub-saharan Africa. *Depress Anxiety* 2014;31:223–32.
- 24 Prins A, Bovin MJ, Smolenski DJ, *et al.* The Primary Care PTSD Screen for DSM-5 (PC-PTSD-5): Development and Evaluation Within a Veteran Primary Care Sample. *J Gen Intern Med* 2016;31:1206–11.
- 25 Andualem F, Melkam M, Takelle GM, *et al.* Prevalence of posttraumatic stress disorder and associated factors among displaced people in Africa: a systematic review and meta-analysis. *Front Psychiatry* 2024;15.
- 26 Acarturk C, McGrath M, Roberts B, *et al.* Prevalence and predictors of common mental disorders among Syrian refugees in Istanbul, Turkey: a cross-sectional study. *Soc Psychiatry Psychiatr Epidemiol* 2021;56:475–84.
- 27 Tusting LS, Bisanzio D, Alabaster G, *et al.* Mapping changes in housing in sub-Saharan Africa from 2000 to 2015. *Nature New Biol* 2019;568:391–4.
- 28 Verduin F, Smid GE, Wind TR, *et al.* In search of links between social capital, mental health and sociotherapy: a longitudinal study in Rwanda. *Soc Sci Med* 2014;121:1–9.
- 29 Charlson FJ, Flaxman A, Ferrari AJ, *et al.* Post-traumatic stress disorder and major depression in conflict-affected populations: an epidemiological model and predictor analysis. *Glob Ment Health (Camb)* 2016;3.
- 30 Ahmed SH, Zakai A, Zahid M, *et al.* Prevalence of post-traumatic stress disorder and depressive symptoms among civilians residing in armed conflict-affected regions: a systematic review and meta-analysis. *Gen Psychiatry* 2024;37:e101438.
- 31 Carpinello B. The Mental Health Costs of Armed Conflicts-A Review of Systematic Reviews Conducted on Refugees, Asylum-Seekers and People Living in War Zones. *Int J Environ Res Public Health* 2023;20:2840.
- 32 Porter M, Haslam N. Predisplacement and postdisplacement factors associated with mental health of refugees and internally displaced persons: a meta-analysis. *JAMA* 2005;294:602–12.
- 33 Chapman C, Mills K, Slade T, *et al.* Remission from post-traumatic stress disorder in the general population. *Psychol Med* 2012;42:1695–703.
- 34 Ridley M, Rao G, Schilbach F, *et al.* Poverty, depression, and anxiety: Causal evidence and mechanisms. *Science* 2020;370.
- 35 Beltramo T, Nimoh F, Sequeira S, *et al.* Interconnected Challenges: Examining the Impact of Poverty, Disability, and Mental Health on Refugees and Host Communities in Northern Mozambique. *Healthcare (Basel)* 2025;13:3187.
- 36 Lund C, Brooke-Sumner C, Baingana F, *et al.* Social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews. *Lancet Psychiatry* 2018;5:357–69.
- 37 Bogic M, Njoku A, Priebe S. Long-term mental health of war-refugees: a systematic literature review. *BMC Int Health Hum Rights* 2015;15:1–41.
- 38 Tol WA, Le PD, Harrison SL, *et al.* Mental health and psychosocial support in humanitarian settings: research priorities for 2021–30. *Lancet Glob Health* 2023;11:e969–75.
- 39 Seekles ML, Kadima JK, Ding Y, *et al.* Mental health, stigma and the quality of life of people affected by neglected tropical diseases of the skin in Kasai Province, Democratic Republic of the Congo: a sex-disaggregated analysis. *Int Health* 2023;15:iii28–36.
- 40 Ngamaba KH, Lombo LS, Makopa IK, *et al.* Are COVID-19's restrictive measures associated with people's quality of life and the prevalence of anxiety and depression in Kinshasa in the Democratic Republic of Congo? *J Public Health Afr* 2022;13:1728.
- 41 Li M, Beckwith S, Fine SL, *et al.* Understanding Trajectories of Generalized Anxiety Disorder Among Adolescents During the COVID-19 Pandemic: Evidence From China and the Democratic Republic of the Congo. *J Adolesc Health* 2024;75:S24–S34.
- 42 Robjant K, Koebach A, Schmitt S, *et al.* The treatment of posttraumatic stress symptoms and aggression in female former child soldiers using adapted Narrative Exposure therapy - a RCT in Eastern Democratic Republic of Congo. *Behav Res Ther* 2019;123:103482.
- 43 Schmitt S, Robjant K, Koebach A. When reintegration fails: Stigmatization drives the ongoing violence of ex-combatants in Eastern Democratic Republic of the Congo. *Brain Behav* 2021;11:e02156.
- 44 Rouhani SA, Scott J, Burkhardt G, *et al.* A quantitative assessment of termination of sexual violence-related pregnancies in eastern Democratic Republic of Congo. *Confl Health* 2016;10:9.