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Psychological distress among informal caregivers of patients with cancer: a cross- sectional hospital-based study from Nepal

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Abstract

Background

Informal cancer caregivers in low- and middle-income countries bear a disproportionate emotional and mental health burden. However, evidence regarding the factors influencing caregiver psychological well-being in these settings remains limited. We assessed psychological distress and factors associated with it among informal cancer caregivers in Nepal.

Methods

A hospital-based cross-sectional survey was conducted among 408 adult informal caregivers at two tertiary cancer hospitals in Nepal. Data was collected through face-to-face interviews while participants were recruited using purposive consecutive sampling approach. We used validated Nepali Hopkins Symptoms Checklist (HSCL-25) to estimate overall psychological distress; the checklist contained 25 items divided into two primary domain subscales: anxiety (items 1–10) and depression (items 11–25). Data was analyzed using RStudio (version 4.5.1). Bootstrap multivariable linear regression (5,000 replications; BCa 95% Cis was used to identify factors associated with psychological distress.

Results

Overall, 61.8%, 52.7%, and 58.8% of informal cancer caregivers had symptoms of anxiety, depression, and psychological distress, respectively. Out-of-pocket expenditure demonstrated a significant dose-response association with all three outcomes; caregivers in the highest out-of-pocket expenditure quintile had markedly greater anxiety (B = 9.73), depression (B = 13.52), and psychological distress symptoms (B = 23.25) than those in the lowest quintile. Female caregiver gender, advanced or unknown cancer stage of patient, outpatient chemotherapy follow-up, and non-ambulatory patient mobility were significant factors across all outcomes.

Conclusions

Cancer caregivers in Nepal face a high symptom burden of psychological distress. Routine caregiver distress screening, targeted financial protection policies, and psychosocial interventions are warranted in resource-constrained oncology settings.

Clinical trial registration

Not applicable

Background

Cancer places significant physical, emotional, and financial strain on patients and their families and caregivers (1, 2). With the increased cancer burden as well as improved access to diagnosis, the number of cancer caregivers has risen sharply in recent years, particularly in low-and middle-income countries (LMICs). In these settings, formal survivorship infrastructure and social support systems are scarce, and families typically take on caregiving mainly through an unpaid role, which is often guided by a sense of obligation (3–5). They provide varying types and levels of support to their loved ones depending on the disease's complexity, treatment intensity, stage, or proximity to death, which typically range from emotional and practical support to assistance with medical care and financial support (6).

Literature depicts that cancer and its treatment can hinder the psychological well-being of caregivers because these demanding tasks often result in physical exhaustion and psychological burden, leading to considerable psychological distress, with symptoms primarily manifested as anxiety and depression (7, 8). These caregivers are more likely to experience poor mental health, compared to the general population (9). Studies in cancer-care settings confirm this pattern. A recent study among primary caregivers of patients with cancer at a tertiary center in eastern Nepal, using the National Comprehensive Cancer Network Distress Thermometer, reported clinically significant distress in 91.9% of caregivers and severe distress in 49.7% (10).

In LMICs like Nepal, where health care is largely financed out-of-pocket, the financial burden of cancer treatment primarily falls on patients and their families (11). Such costs often comprise both direct medical and non-medical costs (12). Driven by the financial burden, caregivers remain in conflict between being forced to quit or reduce work for informal caregiving while needing to maintain employment for insurance, medical debt, and income for the treatment of cancer patients (13, 14). It, therefore, precipitates life-altering economic sacrifice and serves as a significant factor for profound psychological distress among cancer caregivers (15, 16). Evidence on the psychological burden borne by caregivers remains limited in LMICs, only a few studies from Nepal assessed anxiety and depression among caregivers while a prior study has assessed psychological distress among patients with cancer (17–19). However, caregivers who commonly finance the care have received less attention (12, 20, 21). Adequate screening and necessary intervention for distress, with a primary focus on the caregivers' costs, has been an overlooked issue. To our knowledge, this is one of the few studies to investigate the association of objective financial burden with psychological distress within the cancer caregivers' context. This study first examines the symptoms of psychological distress and then assesses association between out-of-pocket expenditure (OOPE) and psychological distress during caregiving demands.

Methods

Study design and setting

This was a hospital-based cross-sectional study conducted in two tertiary cancer hospitals of Nepal. The study sites were BP Koirala Memorial Cancer Hospital (Chitwan) and Bhaktapur Cancer Hospital (Bhaktapur) (Fig. 1). These sites are the largest government-accredited cancer treatment facilities in the country, with the highest bed capacity and patient load. They offer affordable cancer care and serve as the principal alternatives to higher-cost private hospitals, drawing patients from across the country.

Study population

The study population included primary informal caregivers (unpaid family members) of patients undergoing active treatment. Inclusion criteria were: (1) age ≥ 18 years; (2) primary caregiver for a patient with cancer diagnosed for ≥ 1 month; (3) providing care for ≥ 1 month duration; (4) currently attending inpatient or outpatient chemotherapy visits; and (5) residing together in the same household as the patient. Participants were excluded if they had a documented history of psychological or debilitating physical illness; if they were individuals providing paid healthcare services or functioning as professional caregivers; or if they were unable to respond to the questionnaires.

Sample size and sampling strategy

The sample size was calculated using the formula for infinite populations: $n = \frac{Z^2 p(1-p)}{e^2}$. In this formula, Z is the standard normal deviate corresponding to the 95% confidence level (1.96) and p is the assumed prevalence of caregiver psychological distress (0.45), taken from a comparable Nepal-based study (17), and $e = 0.05$ (margin of error or Type I error). This yielded an initial sample of 380 participants. After adjusting for the finites source population and assuming 10% non-response rate, the final calculated sample size was 418 participants. A total of 408 caregivers completed the study, with ten participants excluded for incomplete responses. The sample was allocated proportionally between the two study sites based on annual patient volume.

We employed purposive-consecutive sampling. Firstly, two tertiary cancer centers were purposively selected. Secondly, we used consecutive sampling to recruit eligible caregivers attending outpatient chemotherapy visits or inpatient stays until the allocated sample size per site was reached.

Data collection instruments

Annual Out-of-Pocket expenditure assessment

We assessed OOPE using an adapted questionnaire developed from previously published health economics literature (2, 12, 20). OOPE was classified into two categories: 1) Direct medical costs that comprised diagnostics, expenses for systemic therapy and radiotherapy, medications, laboratory investigations, hospital bills, consultation fees, hospitalization costs and other treatment-related expenses. 2) Direct non-medical costs that included transportation fuel and parking, accommodation,

meals, caregiving supplies, and communication expenses. Caregivers were first asked to provide the total direct medical and non-medical costs incurred in the past month, explicitly during the treatment of cancer patients. They were then asked to specify their personal contribution to these costs, selecting from the options: “Yes Fully”, “Yes Partially”, or “No.” They were then asked how much of that amount they had personally paid, with the response options “Yes, fully” (the caregiver had met the entire amount reported), “Yes, partially” (the caregiver had met part of it, the remainder being met by the patient or by other household members), or “No” (the caregiver had met none of it). Caregivers who answered “Yes, partially” were asked to specify the amount they had contributed; for those who answered “Yes, fully, the entire reported amount was attributed to the caregiver, and for those who answered “No” no cost was attributed. Only those costs that would not later be reimbursed to the caregivers for their contribution through family, private insurance, and government subsidies were included in the OOPE calculation.

All prices were reported in Nepalese Rupees (NPR) and converted into US Dollars (USD) using the exchange rate prevailing during the study period (USD1 equals NPR 152). The total annual cost was estimated using a prevalence-based approach, extrapolating from the one-month data based on the duration of cancer treatment up to the survey date. A one-month recall period was used for the assessment, based on pilot-testing feedback indicating difficulty with a three-month recall.

Psychological distress assessment

We used the validated Nepali version of the Hopkins Symptoms Checklist-25 (HSCL-25) to assess psychological distress among the cancer caregivers. Globally, the HSCL-25 has demonstrated high internal consistency and reliability across various patient and caregiver populations, supporting its use as a standard measure for psychological distress in oncology (22, 23). It has previously been used in Nepal to measure anxiety, depression, and psychological distress among internally displaced persons during armed conflict, earthquake survivors, tortured Bhutanese refugees, trauma-affected outpatients, and healthcare professionals, demonstrating strong psychometric properties across these varied populations (24–26). The instrument comprises ten items measuring anxiety symptoms and 15 items assessing depressive symptoms. Respondents rated each item on a 4-point Likert scale (1 = "not at all", 2= “little bit”, 3= “quite a bit”, 4 = "extremely"). The mean score across all items was computed as the primary distress metric. A cutoff score of ≥ 1.75 was applied to identify clinically significant psychological distress (Yes/No), with separate anxiety (items 1 to 10) and depression (items 11 to 25) subscales evaluated using identical threshold criteria to evaluate the specific symptom dimensions individually and defined as “symptomatic anxiety” and “symptomatic depression” according to the conventional international cut-off scores of > 1.75 for each subscale (27). For bivariate, and multivariable regression analysis, the summed -raw scores were used as continuous outcomes (anxiety, range 10–40; depression, range 15–60; total psychological distress, range 25–100).

Sociodemographic and clinical characteristics

Structured questionnaires assessed caregiver sociodemographic characteristics, including age, gender, ethnicity, education level, marital status, employment status, family structure (nuclear, joint, or extended), residential area (urban or rural), and self-rated income sufficiency. Patient characteristics included age, gender, cancer anatomical site, cancer stage (I–IV or unknown), duration of treatment, and health insurance status. A detailed list of study variables is presented in **Supplementary File 1**.

Data collection procedures

Data was collected between February 2025 and March 2025 using a questionnaire developed in Kobo Toolbox, a digital data collection platform. Trained data enumerators, including first author with a public health background, administered questionnaires in the Nepali language through face-to-face interviews at study sites. Data enumerators received comprehensive training on study protocols, informed consent procedures, interview administration, and ethical guidelines. All interviews were conducted in settings ensuring privacy and confidentiality. Each interview lasted 40–50 minutes.

Data management and statistical analysis

We imported raw data from Kobo Toolbox into Microsoft Excel for cleaning and verification. Following data validation, the cleaned dataset was exported to R (version 4.5.1) and analyzed in RStudio. The geographical study map was prepared using QGIS software (desktop version 3.36.0). We summarized sociodemographic and clinical characteristics using frequencies and percentages for categorical variables and means with standard deviations for continuous variables. As out-of-pocket cost data showed marked positive skewness, we log-transformed them and then categorized the log-transformed values into quintiles for use as a predictor in subsequent analyses.

We assessed the distribution of the outcome variables (anxiety, depression, and total HSCL-25 scores) with the Kolmogorov–Smirnov test. As the test confirmed non-normality, we examined associations between predictors and outcomes using the Mann–Whitney U test for variables with two groups and the Kruskal–Wallis test for variables with more than two categories (**Supplementary File 2**). Before multivariable regression analysis, we assessed multicollinearity among predictor variables using Generalized Variance Inflation Factors (GVIF). A GVIF value of ≥ 2.5 was used as the threshold indicating problematic multicollinearity. The diagnostics identified two variables, duration of diagnosis (GVIF = 3.10) and duration of treatment (GVIF = 3.13), with values exceeding the threshold. Given their high collinearity, the duration of diagnosis was removed from subsequent regression models.

We assessed the factors associated with anxiety, depression, and psychological distress using three separate multivariable linear regression models, each adjusted for confounders. To account for the non-normally distributed outcome variables and small sample size, we ran multivariable linear regression analyses using a non-parametric bootstrap method with 5,000 replications. This approach provided stable parameter estimates and robust Bias-Corrected and Accelerated (BCa) 95% confidence intervals (28, 29). Variables with a p-value < 0.2 during bivariate analysis and few variables of interest were

entered into the multivariable linear regression model (30). Statistical significance was defined as $p < 0.05$, with 95% confidence intervals reported for all point estimates.

Pilot Testing

Before full-scale implementation, pilot testing of measurement instruments was conducted with 40 informal caregivers of cancer patients at Suresh Wagle Memorial Cancer Centre. The pilot phase evaluated questionnaire comprehensibility, response burden, and cultural appropriateness. Reliability analysis of the HSCL-25 yielded Cronbach's $\alpha = 0.91$, indicating high internal consistency. Based on pilot feedback, the recall period for the OOPE was shortened from three months to one month because caregivers had difficulties accurately recalling costs over extended periods.

Ethics

Written informed consent was obtained from all participants before data collection. Participants were informed that their participation in the study was voluntary and that they could discontinue at any time without any consequence. Furthermore, participants exhibiting significant symptoms of psychological distress and who had suicidal ideation (according to question 18 in HSCL-25) were advised to seek consultation at their nearest health clinic for appropriate psychiatric evaluation and support. We obtained ethical approval of the study from the Ethical Review Board of Nepal Health Research Council (ref. No. 2965/2024). Administrative approval was secured from both study hospitals

Results

Sociodemographic Characteristics of Informal Caregivers

Table 1 presents the sociodemographic, caregiving-related, health, and financial characteristics of the informal caregiver sample. Most of the participants were male (67.6%), belonged to Brahmin/Chhetri ethnic group (37.5%), and followed Hinduism religion (81.6%). Secondary education was the most common level of attainment (45.1%). Nearly half (45.6%) were engaged in paid work, and 64.7% of families had incurred debt due to the patient's illness. Full-time caregiving was the predominant form (80.1%), with children constituting the most common caregiver relationship (46.1%).

Table 1
Sociodemographic characteristics of informal caregivers (n = 408)

Characteristic	n (%)	95% CI
Age (years)		
<30	104 (25.5)	21.5–29.9
30–44	174 (42.6)	37.9–47.5
45–59	93 (22.8)	19.0–27.1
≥60	37 (9.1)	6.7–12.3
Gender		
Male	276 (67.6)	63.0–72.0
Female	132 (32.4)	28.0–37.0
Marital status		
Married	322 (78.9)	74.7–82.6
Single	86 (21.1)	17.4–25.3
Ethnicity		
Brahmin/Chhetri	153 (37.5)	32.9–42.3
Janajati	104 (25.5)	21.5–29.9
Madhesi	68 (16.7)	13.4–20.6
Dalit	35 (8.6)	6.2–11.7
Newar	24 (5.9)	4.0–8.6
Indigenous	16 (3.9)	2.4–6.3
Muslim	8 (1.9)	1.0–3.8
Province		
Bagmati	117 (28.7)	24.5–33.2
Lumbini	78 (19.1)	15.6–23.2
Madhesh	68 (16.7)	13.4–20.6
Gandaki	61 (14.9)	11.8–18.7
Koshi	55 (13.5)	10.5–17.1
Sudurpaschim	17 (4.2)	2.6–6.6

CI, confidence interval (Wilson score method).

Characteristic	n (%)	95% CI
Age (years)		
Karnali	12 (2.9)	1.7–5.1
Religion		
Hindu	333 (81.6)	77.6–85.1
Buddhist	42 (10.3)	7.7–13.6
Christian	13 (3.2)	1.9–5.4
Kirat	12 (2.9)	1.7–5.1
Muslim	8 (2.0)	1.0–3.8
Education		
No formal education	54 (13.2)	10.3–16.9
Basic education	106 (26.0)	22.0–30.4
Secondary education	184 (45.1)	40.3–49.9
Bachelor's and above	64 (15.7)	12.5–19.5
Family type		
Nuclear	206 (50.5)	45.7–55.3
Joint/Extended	202 (49.5)	44.7–54.3
Residence		
Urban	270 (66.2)	61.5–70.6
Rural	138 (33.8)	29.4–38.5
Relationship to cancer patient		
Child	188 (46.1)	41.3–50.9
Spouse	115 (28.2)	24.0–32.7
Parent	66 (16.2)	12.9–20.1
Sibling	29 (7.1)	5.0–10.0
Relative	10 (2.4)	1.3–4.5
Form of caregiving		
Full-time	327 (80.1)	76.0–83.7
CI, confidence interval (Wilson score method).		

Characteristic	n (%)	95% CI
Age (years)		
Part-time	81 (19.9)	16.3–24.0
Caregiver co-morbidities		
No	296 (72.5)	68.0–76.7
Yes	112 (27.5)	23.3–32.0
Alcohol consumption		
No	317 (77.7)	73.4–81.5
Yes	91 (22.3)	18.5–26.6
Tobacco consumption		
No	348 (85.3)	81.5–88.4
Yes	60 (14.7)	11.6–18.5
Self-rated mental health (post-caregiving)		
Excellent	2 (0.5)	0.1–1.8
Good	65 (15.9)	12.7–19.8
Moderate	90 (22.1)	18.3–26.3
Poor	212 (52.0)	47.1–56.8
Very poor	39 (9.5)	7.1–12.8
Self-rated physical health (post-caregiving)		
Excellent	7 (1.7)	0.8–3.5
Good	172 (42.2)	37.5–47.0
Moderate	102 (25.0)	21.0–29.4
Poor	101 (24.7)	20.8–29.2
Very poor	26 (6.4)	4.4–9.2
Self-rated financial status (post-caregiving)		
Excellent	5 (1.2)	0.5–2.8
Good	56 (13.7)	10.7–17.4
Moderate	71 (17.4)	14.0–21.4
CI, confidence interval (Wilson score method).		

Characteristic	n (%)	95% CI
Age (years)		
Poor	182 (44.6)	39.9–49.5
Very poor	94 (23.1)	19.2–27.4
Currently engaged in paid work		
No	222 (54.4)	49.6–59.2
Yes	186 (45.6)	40.8–50.4
Household size		
≤ 6 members	285 (69.9)	65.2–74.1
> 6 members	123 (30.1)	25.9–34.8
Household income sufficiency		
Sufficient	101 (24.8)	20.8–29.2
Insufficient	307 (75.2)	70.8–79.2
Family in debt (due to patient illness)		
Yes	264 (64.7)	60.0–69.2
No	144 (35.3)	30.8–40.0
Wealth quintile		
Lowest	77 (18.9)	15.4–23.0
Lower	67 (16.4)	13.1–20.3
Middle	76 (18.6)	15.1–22.7
Higher	92 (22.6)	18.8–26.8
Highest	96 (23.5)	19.7–27.9
Out-of-pocket cost quintile		
Lowest	82 (20.1)	16.5–24.3
Lower	82 (20.1)	16.5–24.3
Middle	82 (20.1)	16.5–24.3
Higher	81 (19.9)	16.3–24.0
Highest	81 (19.9)	16.3–24.0
CI, confidence interval (Wilson score method).		

Characteristic	n (%)	95% CI
Age (years)		
Personally paid direct cost		
Yes, fully	205 (50.2)	45.4–55.1
No	106 (26.0)	22.0–30.4
Yes, partially	97 (23.8)	19.9–28.1
Household member abroad		
No	258 (63.2)	58.5–67.8
Yes	150 (36.8)	32.2–41.5
CI, confidence interval (Wilson score method).		

<Table 1 to be inserted here>

Clinical and Treatment Characteristics of Cancer Patient

Table 2 summarizes the clinical and treatment-related characteristics of cancer patients whose caregivers were enrolled in the study. Because many less-frequent cancers: uterus, neck, throat, prostate, brain, bone, liver, lymphoid/lymphoma, rectum, skin, nose, testis, blood, oesophagus, small intestine were combined into a residual "Other" category, that aggregate formed the largest single group (51.9%), and among specifically named sites, breast cancer was the most common (12.3%), followed by colorectal (10.8%) and lung (9.3%) cancers. Advanced-stage disease was prevalent, with 25.5% at Stage IV. Nearly half (47.3%) were staying temporarily away from home for treatment. The majority (83.6%) were admitted as inpatients, and 57.6% were classified as early ambulatory. Over one-third of patients (37.3%) had at least one co-morbidity.

Table 2
Clinical and treatment characteristics of patients (n = 408)

Characteristic	n (%)	95% CI
Age (years)		
<30	53 (13.0)	10.1–16.6
30–44	89 (21.8)	18.1–26.1
45–59	123 (30.1)	25.9–34.8
≥60	143 (35.1)	30.6–39.8
Gender		
Female	233 (57.1)	52.3–61.8
Male	175 (42.9)	38.2–47.7
Cancer anatomical site		
Other sites (aggregate)	212 (51.9)	47.1–56.8
Breast	50 (12.3)	9.4–15.8
Colorectal	44 (10.8)	8.1–14.2
Lung	38 (9.3)	6.9–12.5
Cervix	32 (7.9)	5.6–10.9
Oral	32 (7.8)	5.6–10.9
Cancer stage		
Stage I	60 (14.7)	11.6–18.5
Stage II	81 (19.9)	16.3–24.0
Stage III	82 (20.1)	16.5–24.3
Stage IV	104 (25.5)	21.5–29.9
Unknown	81 (19.8)	16.3–24.0
Metastasis status		
No	224 (54.9)	50.1–59.7
Yes	184 (45.1)	40.3–49.9
Patient co-morbidities		

CI, confidence interval (Wilson score method).

Characteristic	n (%)	95% CI
Age (years)		
No	256 (62.7)	58.0–67.3
Yes	152 (37.3)	32.7–42.0
Duration of diagnosis		
< 6 months	176 (43.1)	38.4–48.0
6 months–1 year	149 (36.5)	32.0–41.3
> 1 year	83 (20.4)	16.7–24.5
Duration of treatment		
< 6 months	192 (47.0)	42.3–51.9
6 months–1 year	137 (33.6)	29.2–38.3
> 1 year	79 (19.4)	15.8–23.5
Treatment type		
Single treatment	284 (69.6)	65.0–73.9
Multiple treatments	124 (30.4)	26.1–35.0
Staying temporarily away for treatment		
No	215 (52.7)	47.8–57.5
Yes	193 (47.3)	42.5–52.2
Current hospital interaction status		
Inpatient (admitted)	341 (83.6)	79.7–86.9
Outpatient (chemotherapy follow-up)	67 (16.4)	13.1–20.3
Current mobility status		
Early ambulatory	235 (57.6)	52.8–62.3
Early non-ambulatory	25 (6.1)	4.2–8.9
Late ambulatory	99 (24.3)	20.4–28.7
Late non-ambulatory	49 (12.0)	9.2–15.5
Patient self-care ability (caregiver-rated)		
Independent	161 (39.5)	34.8–44.3

CI, confidence interval (Wilson score method).

Characteristic	n (%)	95% CI
Age (years)		
Mildly dependent	63 (15.4)	12.3–19.3
Moderately dependent	80 (19.6)	16.0–23.7
Severely dependent	104 (25.5)	21.5–29.9
Health facilities visited (frequency)		
≤ 3	331 (81.1)	77.0-84.6
> 3	77 (18.9)	15.4–23.0
Hospital admissions (days)		
≤ 7	212 (52.0)	47.1–56.8
> 7	196 (48.0)	43.9–52.9
CI, confidence interval (Wilson score method).		

<Table 2 to be inserted here>

Out-of-pocket expenditure

The estimated total annual OOPE per caregiver averaged NRS 325,041 ± 675,050 (USD 2,243 ± 4,658). This overall burden was driven by an average direct medical cost of NRS 251,824 ± 612,440 (USD 1,738 ± 4,226) and an average direct non-medical cost of NRS 73,217 ± 127,611 (USD 505 ± 881).

Anxiety, Depression, and Psychological Distress among Informal Caregivers

Overall, 61.8% of the participants were symptomatic for anxiety, 52.7% had symptoms for depression, and 58.8% had symptoms of overall psychological distress (Fig. 2).

<Figure 2: Anxiety, Depression, and Psychological Distress among Informal Caregivers>

Multivariable Linear Regression: Factors associated with Anxiety, Depression, and Psychological Distress among Informal Caregivers

Table 3 presents the results of multivariable linear regression analyses examining the factors associated with caregiver anxiety, depression, and overall psychological distress symptoms. Female caregiver

gender was the strongest and most consistent factor across all three outcomes (anxiety B = 3.06; depression B = 4.13; distress B = 7.19; $p < 0.05$). Among caregiver characteristics, nuclear family type significantly predicted higher anxiety (B = 1.41) and psychological distress (B = 3.19), and caregivers who were the patient's parent had significantly higher symptoms of anxiety (B = 3.51) and distress (B = 7.48). Secondary education was associated with lower depression scores compared with bachelor's degree or above (B = − 2.34). Alcohol consumption was associated with lower anxiety (B = − 1.84). Among financial factors, OOPE quintiles showed a strong, significant association with all three outcomes, with caregivers in the highest OOPE quintile having markedly higher distress scores (anxiety B = 9.73; depression B = 13.52; distress B = 23.25). Among patient characteristics, longer treatment duration (≥ 6 months) was associated with lower anxiety and distress scores. Cancer stages III, IV, and unknown staging were associated with significantly higher scores across all outcomes. Breast and colorectal cancer sites were associated with higher caregiver distress compared to cervical cancer. Outpatient chemotherapy follow-up and non-ambulatory mobility status were significant positive predictors across all outcomes.

Table 3
Multivariable bootstrap linear regression: Factors associated with anxiety, depression and psychological distress among informal caregivers (n = 408)

Factor	Anxiety, B (95% BCa CI)	Depression, B (95% BCa CI)	Psychological Distress, B (95% BCa CI)
Caregiver Characteristics			
Age (Ref: ≤ 30 years)			
≥ 60 years	2.678 (-0.96, 6.07)	-1.748 (-6.31, 3.12)	0.930 (-6.64, 8.76)
30–44 years	0.824 (-1.05, 2.56)	-0.737 (-3.39, 1.89)	0.087 (-4.20, 4.19)
45–59 years	0.408 (-2.03, 2.81)	-0.945 (-4.20, 2.60)	-0.538 (-5.95, 5.31)
Gender (Ref: Male)			
Female	**3.058 (1.86, 4.21)**	**4.128 (2.42, 5.78)**	**7.186 (4.47, 9.74)**
Ethnicity (Ref: Brahmin/Chhetri)			
Janajati	-1.120 (-2.87, 0.52)	-1.589 (-4.00, 0.74)	-2.713 (-6.76, 0.85)
Other groups	-1.000 (-2.44, 0.47)	-1.585 (-3.60, 0.41)	-2.587 (-5.85, 0.66)
Religion (Ref: Hindu)			
Non-Hindu	-1.140 (-2.81, 0.70)	0.205 (-2.17, 2.68)	-0.931 (-4.84, 3.14)
Alcohol consumption (Ref: No)			
Yes	**-1.836 (-3.19, -0.67)**	-0.614 (-2.69, 1.31)	-2.450 (-5.52, 0.48)
Tobacco consumption (Ref: No)			
Yes	-0.895 (-2.38, 0.56)	-1.280 (-3.66, 0.84)	-2.176 (-5.69, 1.05)
Education (Ref: Bachelor's and above)			

B, unstandardized regression coefficient; BCa CI, bias-corrected and accelerated bootstrap 95% confidence interval (5,000 resamples); Ref, reference category. Bold values are statistically significant (95% BCa CI excludes zero).

Factor	Anxiety, B (95% BCa CI)	Depression, B (95% BCa CI)	Psychological Distress, B (95% BCa CI)
Caregiver Characteristics			
Age (Ref: ≤ 30 years)			
Basic education	0.612 (-1.27, 2.36)	-1.626 (-4.48, 0.71)	-1.015 (-5.08, 3.10)
No formal education	-0.156 (-2.32, 2.21)	-1.482 (-4.56, 1.42)	-1.639 (-7.11, 3.17)
Secondary education	-0.654 (-2.26, 0.72)	**-2.337 (-4.77, -0.16)**	**-2.992 (-6.91, -0.03)**
Family type (Ref: Joint/Extended)			
Nuclear	**1.413 (0.18, 2.61)**	1.771 (-0.01, 3.50)	**3.185 (0.57, 5.67)**
Form of caregiving (Ref: Part-time)			
Full-time	0.349 (-0.95, 1.61)	-0.301 (-2.23, 1.57)	0.047 (-3.14, 2.73)
Caregiver co-morbidities (Ref: No)			
Yes	0.621 (-0.72, 1.90)	0.580 (-1.03, 2.37)	1.201 (-1.62, 3.86)
Relationship with patient (Ref: Other)			
Child	1.521 (-0.85, 3.86)	2.391 (-2.24, 7.36)	3.912 (-2.38, 11.13)
Parent	**3.510 (0.79, 6.59)**	3.972 (-1.18, 9.77)	**7.482 (0.20, 15.40)**
Sibling	1.610 (-1.15, 4.81)	0.332 (-4.38, 5.96)	1.942 (-5.03, 9.55)
Spouse	2.438 (-0.16, 5.31)	3.172 (-1.31, 8.56)	5.610 (-1.65, 13.39)
Wealth quintile (Ref: Lowest)			
Lower	0.920 (-0.51, 2.59)	-0.022 (-2.15, 2.28)	0.894 (-2.42, 4.47)

B, unstandardized regression coefficient; BCa CI, bias-corrected and accelerated bootstrap 95% confidence interval (5,000 resamples); Ref, reference category. Bold values are statistically significant (95% BCa CI excludes zero).

Factor	Anxiety, B (95% BCa CI)	Depression, B (95% BCa CI)	Psychological Distress, B (95% BCa CI)
Caregiver Characteristics			
Age (Ref: ≤ 30 years)			
Middle	**1.870 (0.24, 3.71)**	1.905 (-0.29, 4.24)	**3.774 (0.13, 7.70)**
Higher	1.400 (-0.46, 3.24)	1.279 (-1.33, 3.89)	2.682 (-1.47, 6.75)
Highest	**2.160 (0.37, 4.27)**	1.892 (-1.11, 4.57)	4.057 (-0.25, 8.54)
Out-of-pocket cost quintile (Ref: Lowest)			
Lower	**1.497 (0.07, 2.94)**	**2.395 (0.58, 4.56)**	**3.892 (0.95, 6.96)**
Middle	**2.879 (1.55, 4.28)**	**4.519 (2.68, 6.93)**	**7.397 (3.84, 10.51)**
Higher	**6.596 (4.92, 8.30)**	**10.356 (7.73, 12.84)**	**16.953 (12.61, 20.32)**
Highest	**9.732 (8.00, 11.45)**	**13.520 (10.89, 16.23)**	**23.253 (19.10, 27.38)**
Household size (Ref: > 6 members)			
≤ 6 members	0.012 (-1.24, 1.15)	-0.409 (-2.21, 1.36)	-0.397 (-3.05, 1.99)
Employment status (Ref: Employed)			
Unemployed	-0.375 (-1.47, 0.52)	0.681 (-0.73, 2.23)	0.305 (-1.87, 2.59)
Staying temporarily for treatment (Ref: No)			
Yes	0.827 (-0.32, 1.93)	**1.589 (0.02, 2.91)**	2.416 (-0.06, 4.68)
PATIENT CHARACTERISTICS			
Age (Ref: ≤ 30 years)			

B, unstandardized regression coefficient; BCa CI, bias-corrected and accelerated bootstrap 95% confidence interval (5,000 resamples); Ref, reference category. Bold values are statistically significant (95% BCa CI excludes zero).

Factor	Anxiety, B (95% BCa CI)	Depression, B (95% BCa CI)	Psychological Distress, B (95% BCa CI)
Caregiver Characteristics			
Age (Ref: ≤ 30 years)			
≥ 60 years	-2.224 (-5.81, 1.77)	-0.738 (-6.21, 4.51)	-2.962 (-11.49, 6.21)
30–44 years	-0.676 (-3.79, 2.71)	0.535 (-4.09, 5.23)	-0.141 (-7.27, 7.97)
45–59 years	-0.461 (-3.79, 3.17)	0.864 (-3.98, 6.01)	0.403 (-7.04, 9.34)
Gender (Ref: Male)			
Female	-0.838 (-2.13, 0.32)	-0.708 (-2.29, 0.86)	-1.547 (-4.08, 0.96)
Treatment duration (Ref: < 6 months)			
6 months–1 year	**-2.001 (-3.06, -0.91)**	**-1.576 (-3.24, -0.01)**	**-3.577 (-5.99, -1.15)**
> 1 year	**-1.779 (-3.18, -0.46)**	-1.993 (-4.07, 0.04)	**-3.772 (-6.56, -0.46)**
Treatment type (Ref: Combination)			
Single treatment	-0.799 (-2.11, 0.38)	0.180 (-1.82, 1.92)	-0.619 (-3.48, 2.41)
Cancer stage (Ref: Stage I)			
Stage II	0.875 (-0.83, 2.62)	1.598 (-0.53, 4.25)	2.473 (-1.24, 5.83)
Stage III	**2.864 (1.06, 4.75)**	**4.282 (1.60, 6.87)**	**7.146 (2.98, 12.01)**
Stage IV	**2.892 (0.73, 4.95)**	**3.305 (0.37, 6.44)**	**6.197 (1.59, 11.57)**
Unknown	**2.651 (1.06, 4.28)**	**4.746 (2.54, 7.20)**	**7.397 (3.75, 10.94)**
Cancer anatomical site (Ref: Cervical)			

B, unstandardized regression coefficient; BCa CI, bias-corrected and accelerated bootstrap 95% confidence interval (5,000 resamples); Ref, reference category. Bold values are statistically significant (95% BCa CI excludes zero).

Factor	Anxiety, B (95% BCa CI)	Depression, B (95% BCa CI)	Psychological Distress, B (95% BCa CI)
Caregiver Characteristics			
Age (Ref: ≤ 30 years)			
Breast	**2.464 (0.51, 4.42)**	**3.147 (0.27, 6.02)**	**5.609 (1.51, 9.71)**
Colorectal	**2.779 (0.78, 4.78)**	**3.263 (0.35, 6.18)**	**6.041 (1.82, 10.26)**
Lung	1.950 (-0.12, 4.02)	3.056 (-0.38, 6.49)	5.006 (-0.05, 10.06)
Oral	1.575 (-0.48, 3.63)	3.106 (-0.51, 6.72)	4.681 (-0.72, 10.08)
Other sites	**2.223 (0.57, 3.69)**	2.417 (-0.77, 5.29)	**4.639 (0.53, 8.82)**
Patient co-morbidities (Ref: No)			
Yes	-0.031 (-1.03, 0.89)	-0.928 (-2.26, 0.70)	-0.959 (-3.10, 1.41)
Hospital interaction (Ref: Inpatient)			
Outpatient (chemotherapy follow-up)	**1.739 (0.42, 3.04)**	**3.371 (1.52, 5.47)**	**5.111 (2.43, 7.84)**
Mobility status (Ref: Ambulatory)			
Non-ambulatory	**1.539 (0.19, 3.06)**	**3.104 (1.02, 5.26)**	**4.643 (1.58, 8.46)**

B, unstandardized regression coefficient; BCa CI, bias-corrected and accelerated bootstrap 95% confidence interval (5,000 resamples); Ref, reference category. Bold values are statistically significant (95% BCa CI excludes zero).

<Table 3 to be inserted here>

Discussion

This study revealed a significant psychological burden among informal cancer caregivers in Nepal, with more than half of the study participants having symptoms of depression, anxiety, and psychological distress. These rates are notably higher than the pooled global prevalence estimates reported in a recent meta-analysis of 15 studies of family caregivers of cancer patients, which documented depression among 37.2% of caregivers, anxiety among 49.5%, and psychological distress burden among 64% (58.8%

for overall psychological distress) (31). This suggests that caregivers in Nepal operate within a high-pressure intersection of cultural mandate and systemic healthcare limitations, often leading to a state of chronic emotional crisis (32). Similar to the global prevalence, the rate of anxiety and depression among caregivers in our study is higher compared to the other two studies conducted at tertiary cancer treatment centers in Nepal (20, 21). However, the level of psychological distress in our study remains lower than in a study conducted at a tertiary hospital in Eastern Nepal, reported to have a 91.9% burden of distress (10).

This study identified several factors associated with psychological distress. Unlike earlier studies focusing on general psychological burden, our study highlights the association between OOPE and psychological distress with caregivers in the highest OOPE quintile exhibiting higher levels of anxiety, depression, and psychological distress symptoms. In contrast to the Western context, family caregivers in LMICs, including Nepal, are placed in a primary position to bear responsibility for costs and financial management (33). As public financing for cancer care is limited and fragmented in Nepal, health care expenditure is largely financed by OOPE (2). This poses a responsibility and subsequent financial burden on the family caregiver, posing the threat of mental health problems (10), which implies the necessity of routine assessment of caregiver financial burden in clinical settings to identify caregivers under financial strain and link them to social protection schemes and support services.

Notably, in our study, female caregivers, who often assume the role of primary physical and emotional support providers, report higher levels of anxiety, depression, and psychological distress symptoms, which is consistent with the global literature (34, 35) and the findings from Nepal (10). This might be due to profound patriarchal culture in South Asia, including Nepal, where caregiving is perceived as a societal expectation of women providing a greater degree of care, exposing them to cumulative role conflict and emotional exhaustion while receiving less support and recognition than their male counterparts (36, 37). Furthermore, first-degree relatives, primarily parents, report significantly higher levels of mental health burden compared to other family caregivers. Prior literature (38–40) has also supported this evidence, indicating that the emotional attachments, extended caregiving hours, and more comprehensive involvement in both direct medical care and household responsibilities leave less time for self-care, which ultimately increases their vulnerability to mental health problems.

In addition to examining the association of caregivers' characteristics with psychological distress, we also examined the critical role of patient clinical characteristics in the mental health outcomes. Partially consistent with previous literature (41, 42), the significant association between treatment duration and reduced psychological distress was identified. However, this finding contrasts with a study from Iran, where caregiving for longer than 24 months showed higher psychological burden (15). In Nepal, the stabilization of distress after six months identifies the early treatment phase as the most critical window for psychological screening and intervention for cancer caregivers.

Importantly, our study found that caregivers of patients with advanced-stage cancer experience significantly higher symptoms of anxiety, depression, and psychological distress compared to patients in

their early stages of cancer treatment. Literature suggests that the level of psychological distress in caregivers exceeds when the disease stages advance during the disease course (43–46). In LMICs like Nepal, it is also important to note that most of the patients present at the terminal stages of cancer, putting them in a vulnerable position where they become deprived of advanced curative care (47–49). More interestingly, in our study the caregivers of patients who didn't know about the patient's cancer stage possessed the highest coefficients across all outcomes: anxiety, depression, and psychological distress, which is in line with the findings from Nepal (17). This might be further explained by the fact that when the patient's cancer stage is unknown, the caregivers experience uncertainty about whether the medications will work, whether the symptoms will become severe, how they will cope with the disease in case of relapse, and how care will be provided for the patient, in turn posing significant psychological distress (50, 51).

Caregivers of patients in outpatient chemotherapy follow-up demonstrated a higher level of psychological distress consistent with the Japanese study of spouses and intimate partners of patients receiving outpatient chemotherapy (52). This can be explained by the fact that the treatment and monitoring of cancer necessitate repeated hospitalizations and ambulatory visits, frequently requiring caregivers to miss workdays (53), which could subsequently augment the mental health burden. Distress was likewise higher when patients were non-ambulatory, reflecting the continuous physical care such patients need alongside the caregiver's own work and family demands (54, 55). It, therefore, underscores the necessity of better health infrastructure and systems, encompassing not only the provision of support for the patient's needs but also the adoption of strategies to resolve the mental health issues among caregivers.

Strength and Limitations

To our knowledge, this is the first study from Nepal, and one of very few from LMICs, to investigate association of financial burden (OOPE) with psychological distress. However, this study has some limitations. As a cross-sectional design, it captured data at a single time point, precluding causal inference between OOPE and psychological distress. Since many participants were supporting patients undergoing active treatment, the reported total costs may underestimate total treatment expenses. Recall bias may have affected the accuracy of reported expenditures and care activities despite attempts to capture costs in a short recall period. The study's restriction to two public tertiary cancer centers may limit generalizability to private hospitals. The absence of comprehensive national databases on caregiver financial activities prevented validation of self-reported cost data. Social desirability bias and mental health stigma may have resulted in underreporting of psychological distress symptoms. Additionally, the quantitative design did not capture qualitative dimensions of psychological impact or cultural factors influencing caregiving experiences.

Conclusion

This study demonstrates that cancer caregivers in Nepal bear a substantial and intersecting burden of high OOPE and psychological distress. Female caregivers, first-degree relatives, and those supporting patients with advanced or unknown-stage cancer were disproportionately affected. These findings underscore the urgent need to integrate caregiver distress screening into routine oncology care, strengthen financial protection mechanisms, and develop targeted psychosocial interventions, recognizing that caregiver wellbeing is inseparable from the quality of cancer care delivered in resource-constrained settings like Nepal.

Abbreviations

BCa
Bias-corrected and accelerated
CI
Confidence interval
GVIF
Generalized variance inflation factor
HSCL-25
Hopkins Symptom Checklist-25
IQR
Interquartile range
LMIC
Low- and middle-income country
NHRC
Nepal Health Research Council
NPR
Nepalese Rupee
OOPE
Out-of-pocket expenditure
SD
Standard deviation
SE
Standard error
USD
United States Dollar
WHO
World Health Organization

Declarations

Ethical approval and consent to participants

This study was reviewed and approved by the Ethical Review Board of Nepal Health Research Council (ref. No. 2965/2024). Written informed consent was obtained from all participants prior to data collection.

Consent for publication

Not applicable

Clinical trial registration

Not applicable

Availability of data and materials

All data generated during this study are included in the manuscript and the supplementary file.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SW led the conceptualization, study design, data collection, analysis, and drafting of the original manuscript. PreK, GB, DRN, AR, and SN contributed to literature review, study design, interpretation of data and manuscript editing. SG and AT critically reviewed the content. SBP and RK offered clinical input and oversight and critically reviewed the content. PraK and AB provided overall supervision, contributed to study design, and critically revised the manuscript for intellectual content. All authors have read and approved the final manuscript.

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Figures

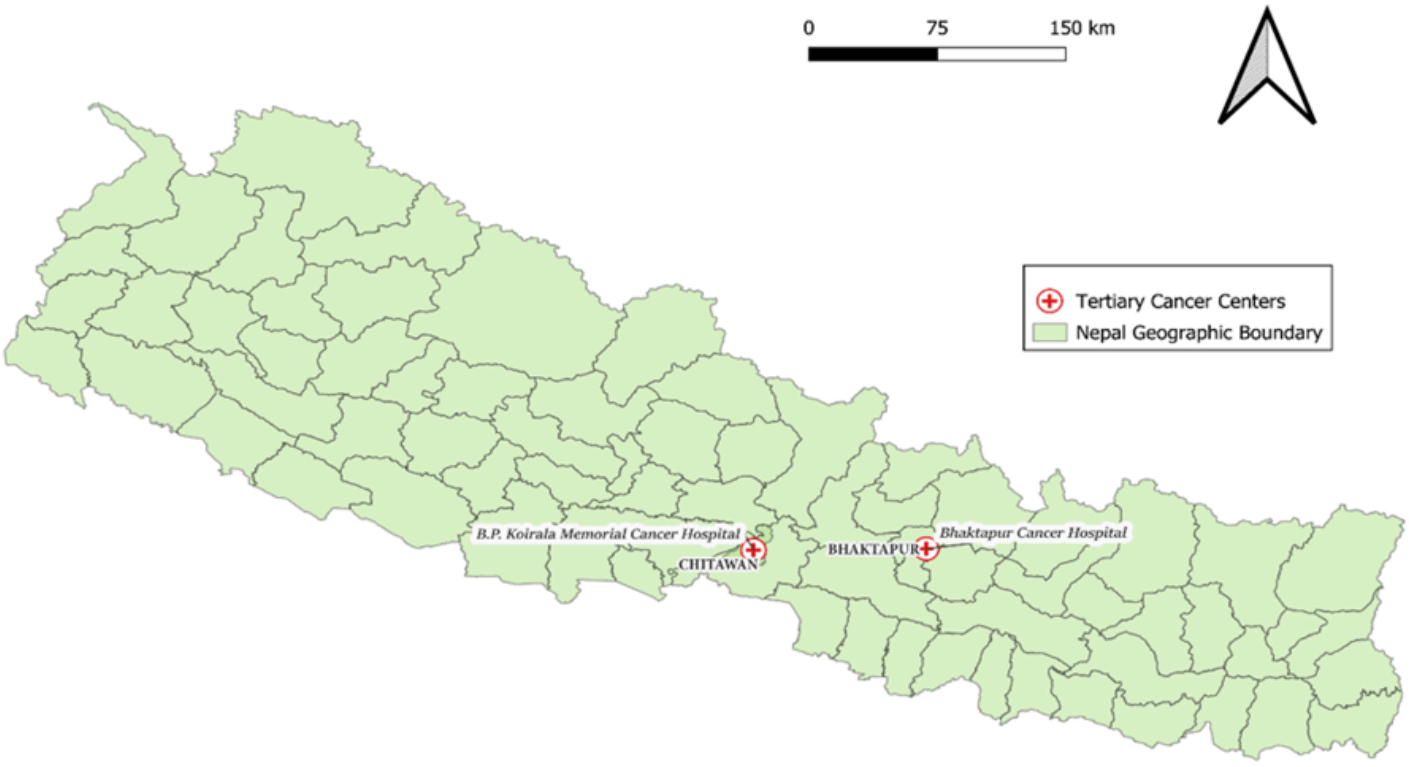


Figure 1

Study sites

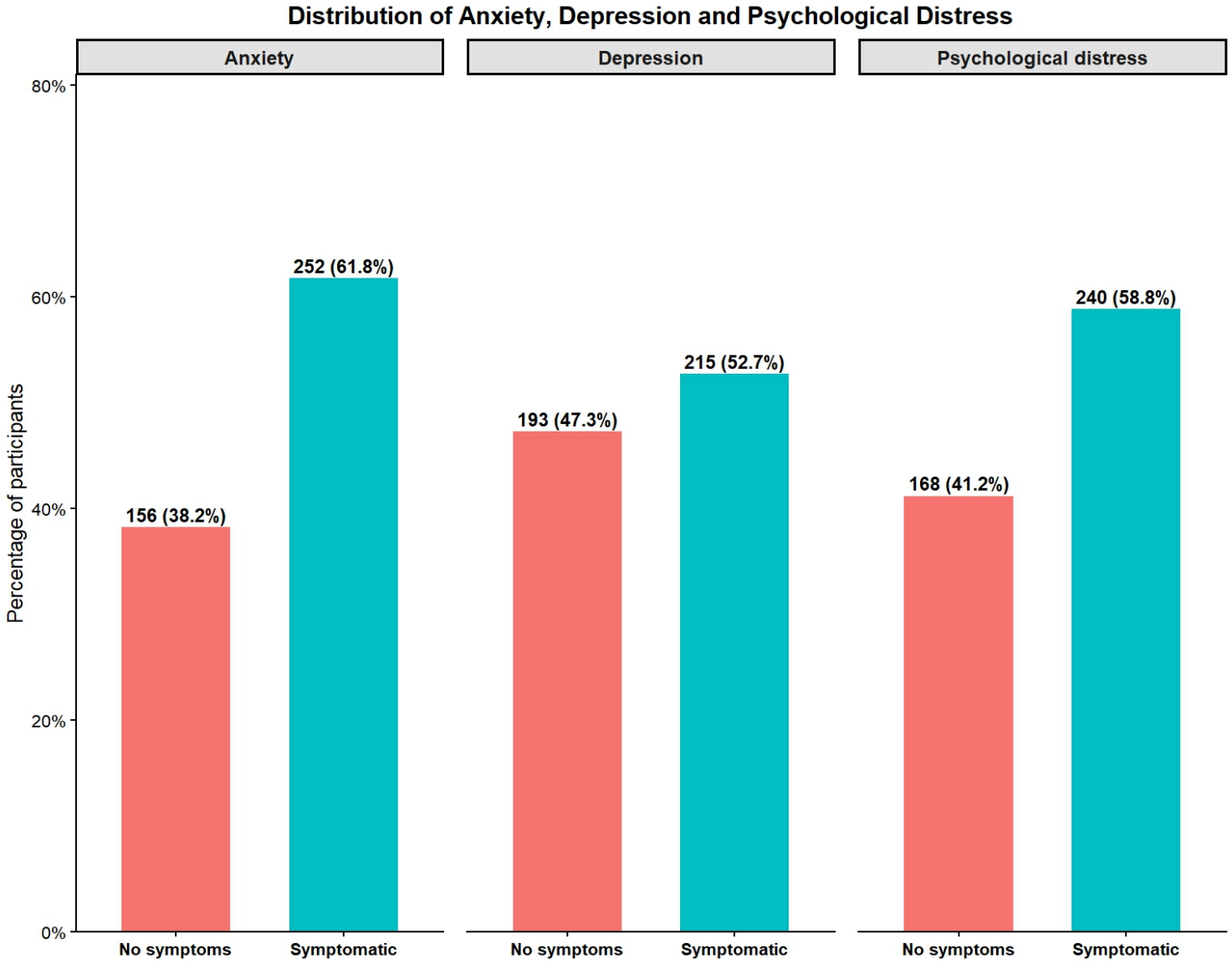


Figure 2

Anxiety, Depression, and Psychological Distress among Informal Caregivers

Supplementary Files

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