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Assessment of Socioeconomic and Psychological Factors Predicting Health-Related Quality of Life among Primary Caregivers of Cancer Patients in Kakamega County

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ABSTRACT

Context: Primary caregivers of cancer patients often suffer from impaired Health-Related Quality of Life (HRQOL) due to stress arising from the responsibility of caregiving. Most studies conducted in Western populations have shown that increased caregiving burden was related to decreased mental and physical health and premature mortality among family caregivers. Therefore, the findings of those studies may not be directly applicable to the Kenyan population, especially Western Kenya, which has a different socio-cultural and ethnic background.

Aim: This study sought to determine socioeconomic and psychological factors predicting the health-related quality of life among primary caregivers of cancer patients in Kakamega County.

Methods: This was an institutional-based cross-sectional analytical study design. Kakamega County Referral Hospital was purposively sampled as it has a hospital with a western region cancer center. The sampling unit was caregivers of cancer patients seen in the hospital. The caregivers were systematically and randomly sampled from a list drawn from the Cancer Centre register of cancer patients, where the caregivers are captured as their treatment supporters, and each cancer patient is expected to have a caregiver. The sample size was 422 primary caregivers after calculation. The data collection tool was contracted from a QOL questionnaire, such as WHOQoL-BREF, developed to measure both objective and subjective dimensions of QOL, Personal Wellbeing scale, Herth Hope Index, and PHQ9/GAD-7 to assess psychological-related factors, which are more sensitive and have wider applicability.

Results: Socioeconomic factors such as gender (p=0.007), type of area of residence (p=0.004), income in KSh (p=0.01), and number of rooms (p=0.0005) are significantly associated with perceived quality of life. Psychological-related factors like depression (p=0.001) and anxiety (p=0.002) are significantly associated with perceived quality of life.

***Conclusion*:** The study concluded that socioeconomic and psychological factors of primary caregivers of cancer patients can predict the health-related quality of life of those caregivers. The study recommends that financial charges for cancer management be subsided as this could relieve caregivers' financial burden. Other family members should support primary caregivers financially and psychologically to ease the burden of the primary caregiver. Psychosocial support group networks should be established for caregivers through multiple communication channels, thereby reducing the mental and psychological burden experienced by caregivers.

Keywords: Health-related quality of life, psychological, socioeconomic, cancer, caregiver

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1. Introduction

Health-Related Quality of Life (HRQoL) has recently become an important aspect of health care. The World Health Organization (WHO) defines HRQoL as "an individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives, and concerning his/her goals, expectations, standards, and concerns relating to wellbeing*" (WHO, 2004),* while predictors are defined as variables such as physical, mental, emotional and social functioning which are used to observe how they affect some other variable which is Health-Related Quality of Life *(Song et al., 2021).*

Traditionally, many HRQoL investigators have focused on individuals diagnosed with an illness or condition; however, more recent research focuses on the caregiver's HRQoL *(Lee et al., 2015).* The ability to measure the HRQoL of caregivers of cancer patients provides insight into the caregivers' challenges *(Ferrans, 2010).* The quality of care provided to a cancer patient by the caregiver is often directly influenced by the caregivers' perceptions of their HRQoL. The caregiver's HRQoL may be determined by the burden of care associated with the patient, such as the amount of physical stress associated with caring for the patient and the amount of time required to care for the patient's medical, physical, and social

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needs. Therefore, the HRQoL of caregivers of cancer patients is influenced by several physiological, psychological, and social factors associated with the care that each patient requires *(Krug et al., 2016)*

The HRQoL of caregivers of cancer patients with chronic conditions is often not the main focus of healthcare providers during the process of care. However, information on the caregiver's HRQoL gives the healthcare provider a better understanding of how attention to caregiver stresses can enhance the treatment. Measures of HRQoL have been used in other areas of healthcare practice, caregivers of cancer patients often are not assessed for their HRQoL. Assessing the primary caregivers' health and wellbeing may lead to better identification and treatment of physical, psychological, and social problems within the family unit *(Gasparrini et al., 2015).* As the advances in treatment for cancer continue and patients live longer, these patients require long-term care from caregivers. The commitment to long-term care for these patients can significantly impact the HRQoL of the caregivers, who often are required to give round-the-clock care to meet the patient's medical, physical, and social needs *(Global Burden of Disease Cancer Collaboration et al., 2017).* Very little research has focused on family caregivers' health-related quality of life (HRQoL) caring for individuals with cancer *(Goldhagen et al., 2016).* However, in general, caring for patients with cancer has been associated with increased burden and poor HRQoL for caregivers. Caregiver stress is increased by the severity of chronic conditions *(Chang et al., 2013).*

WHOQoL-BREF was developed to measure the subjective dimension of QOL to assess the health-related quality of life (HRQoL) of primary caregivers of cancer patients through single-item and multi-item scales. At the same time, generic and disease specific questionnaires have been applied *(Pomeroy et al., 2020).* Socioeconomic and psychological factors are some of the predictors of HRQoL among primary caregivers. Several studies have identified the following sociodemographic factors being associated with HRQoL of cancer patients' caregivers such as age, gender, marital status, and education *(Muliira, 2017; Jalali-Farahani et al., 2017; Duggleby et al., 2016).*

The caregiver burden has been associated with the caregiver's poor health status, decreased health maintenance behaviors, and increased health-risk behaviors and prescription drug use. Economic factors influencing caregiver HRQoL include financial independence, standard of living, and job/unemployment. Psychological responses may be heightened upon receiving a diagnosis of brain metastases. Because cancer caregiving has the features of a chronic stress experience, it can be expected that the most common and severe health effects of caregiving are found within the psychological and emotional domains. The variables under these domains are caregiver stress, depression, anxiety, and emotional support. Social networks and encouraging them to reach out to other sources of support, if available, may thus help reduce one of the factors that increase caregiver burden *(Ullrich et al., 2017).*

2. Significance of the study

Few studies have been carried out in Kenya on the HRQoL of caregivers, thus creating a research gap for this study. In addition, policies and guidelines on cancer management in Kenya only focus on supporting the establishment of accommodation facilities for patients and caregivers receiving cancer treatment services without regard to the caregiver's HRQoL (National Cancer Control Strategy (NCCS,) 2017-2022) *(Ministry of Health (MOH), 2017).*

In Kakamega County, there is a lack of data regarding the quality of life of primary caregivers. It is, therefore, vital to determine the health-related quality of life for family caregivers of cancer patients in Kakamega County. The County General Teaching and Referral Hospital hosts the region's cancer registry, thus a suitable site for this purpose. This study attempted to identify socioeconomic and psychological factors affecting health-related quality of life among primary caregivers of cancer patients in Kakamega County. The findings would be instrumental in educating healthcare providers on the health needs of primary caregivers to improve their HRQoL. The findings can be used as a baseline for developing future interventions to support caregivers in improving their HRQoL.

3. Aim of the study

The study assesses socioeconomic and psychological factors predicting health-related quality of life among primary caregivers of cancer patients in Kakamega County.

3.1. Research Questions

- What socioeconomic factors can predict HRQoL among primary caregivers of cancer patients in Kakamega County?
- What psychological factors can predict HRQoL among primary caregivers of cancer patients in Kakamega County?

4. Subjects & Methods

4.1. Research design

The study used a cross-sectional analytical research design. In a cross-sectional study, the researcher simultaneously assessed the participants' exposures and outcomes *(Setia, 2016).* The pervasiveness of health outcomes and exposure were collected mainly to compare health outcomes. The dependent variable was quality of life, while the independent variables were socioeconomic and psychological factors.

4.2. Study setting

The research was conducted in Kakamega County Referral Hospital Cancer Centre, Kakamega, Kenya. The county has one referral hospital, 12 sub-county hospitals, 34 health centers, 86 dispensaries run by the government, and several health facilities run by faith-based organizations and nongovernmental organizations. The county hospital has the county's cancer center. The cancer registry center serves an estimated 6550 patients from the western region; it has a workforce of one consultant pathologist, one consultant oncologist, one medical officer, one pharmacist, one oncology nurse, two oncologists' master's student nurse, one higher diploma nurse, two palliative nurses, one nutritionist, one research registrar, and one cancer registrar. Averagely, the registry center reports an estimated 120 new cases monthly.

4.3. Subjects

The research was carried out among primary caregivers of cancer patients in Kakamega County Referral Hospital Cancer Center. The center has a patient psychosocial support group, but none is available for primary caregivers. However, the caregivers are the ones who accompany the cancer patients to the hospital, offer daily care to the patients, and even administer their medication; even if they fall sick during the care, they have to cater for their treatment.

The sample size was calculated using Cochran's formula sample size determination. The prevalence of cancer in Kenya has never been estimated nationally or regionally. Therefore, a 50% prevalence is assumed. The assumption made in this formula is that all cancer patients have a primary caretaker as per the sampling frame *(MOH, 2017)*. The sampling unit was caregivers of cancer patients seen in the hospital. The caregivers were systematically and randomly sampled from a list drawn from the Cancer Center register of cancer patients, where the caregivers are captured as their treatment supporters, and every cancer patient is expected to have a caregiver. The sample size was 422 primary caregivers after calculation. The formula for calculating the sample size is

$$n_o = \frac{z^2 pq}{e^2}$$

Where,
p = prevalence of cancer in Kenya, estimated at 50% (proportion of the population)
q = 1-p
e = Margin of error
n= Sample size
z^2- Standard normal distribution curve value for 95% CI, which is 1.96 (where α = 0.05)

$$n_o = \frac{(1.96^2)(0.5)(0.5)}{0.05^2}$$

$$n_o = 384\ + (10\%\ attrition)$$

$$= 422\ primary\ \text{caregivers.}$$

The 10% is the loading population to take care of possible refusals.

Inclusion criteria

- Caregivers who have stayed with the patients for at least one month and are ≥18 years old,
- Caregivers who provided unpaid care to cancer patients.

Exclusion criteria

- Caregivers who irregularly stay with the patient,
- Those who did not give consent to participate in the study.

4.4. Tools of data collection

4.4.1. Structured Interview Questionnaire

The interviewers took note of the patient's age, gender, degree of education, marital status, type of residence, occupation, religion, income, number of household members, and number of rooms, family history of cancer, chronic disease, and comorbidities (such as hypertension, coronary heart disease, diabetes mellitus, and others), other family member help with care and other family members have chronic disease. If a spouse, parent, or child was the primary caregiver and the two of them lived together, information about that connection was also recorded, making it clear that patient information was gathered for each caregiver.

Using the same tool, the interviewers also took note of the caregiver's knowledge of his/her patient’s cancer status, whether they had heard of cancer before the patient was diagnosed with cancer, whether cancer is a serious disease, cancer severity, whether another family member has had cancer, other family members have a chronic illness, caregiver’s understanding of the disease, duration patient has had the disease and treatment options.

4.4.2. World Health Organization Quality of Life Questionnaire (WHOQoL-BREF)

The WHOQOL Group created the WHOQoL-BREF as a condensed version of the WHOQoL-100. The WHOQoL-BREF questionnaire utilized in Kenya has been validated as valid and reliable *(Kondo et al., 2023)*. The 26 items on this questionnaire evaluate general health and overall quality of life. The remaining 24 questions are divided into four categories: social connection, physical, psychological, and environmental, with six questions each.

Scoring system

A scale from 1 to 5 is used to grade each item. The results are then converted into a linear scale from 0 to 100, with 100 being the highest possible quality of life.

Five variables are evaluated by the descriptive system: mobility, self-care, regular activities, pain or discomfort, and anxiety or depressive symptoms. Each component is further split into three severity levels, and the responder is asked to choose the option that best describes their current state of health. A 1-digit number representing the level chosen for that dimension is the consequence of this choice. The respondent's health status is represented as a 5-digit health status profile based on a combination of these responses.

4.4.3. Personal Wellbeing Index (PWI)

The HRQoL domains mentioned above contrasted with a QoL questionnaire, such as the Personal Wellbeing Index (PWI) *(Aujla & Needham-Beck, 2019)*. The PWI scale contains seven items of satisfaction, each one corresponding to a quality-of-life domain as the standard of living, health, achieving in life, relationships, safety, community-connectedness, and future security. These seven domains are theoretically embedded as representing the first-level deconstruction of the global question.

Scoring system

The domain scores were scaled positively; higher scores denote higher quality of life.

4.4.4. Herth Hope Index (HHI)

The 30-item Herth Hope Scale (HHS) served as the foundation for the HHI *(Herth, 1991)*. Based on the multidimensional notion of hope proposed by *Dufault and Martocchio (1985*), the HHI is a 12-item questionnaire to assess hope. According to *Herth (1992)*, there are three dimensions: An internal feeling of time and the future, an internal sense of positivity and expectation, and a sense of connectivity with oneself and others. Using a 4-point Likert scale with questions 3 and 6 reverse-coded.

Scoring system

The HHI assesses different aspects of hope on a scale from 1 (strongly disagree) to 4 (strongly agree). The scale contains a single overall score ranging from 12 to 48 and single-item scores ranging from 1 to 4 *(Ripamonti et al., 2018).* A higher score indicates greater levels of hope.

4.4.5. Patient Health Questionnaire and General Anxiety Disorder (*PHQ9/GAD-7)*

The "PHQ9/GAD-7" was adopted from *Robert et al. (1999)* to assess the caregiver's health and the presence of generalized anxiety disorder. The scale was divided into two main sections. The first section was concerned with assessing the caregiver's depression and included nine statements expressing what the caregiver felt over the last two weeks. The second section assesses generalized anxiety disorder and consists of seven statements.

Scoring system

Each statement in both sections was scored against a four-point Likert scale of not at all (zero score), several days (one score), more than half the days (two scores), and nearly every day (3 scores). Each section was calculated separately to obtain a total for each subscale. Each total subscale was divided into four levels of depression and anxiety (normal, mild, moderate, and severe), which are presented as a number and percentage.

4.5. Procedures

Data collection tools were pre-tested and adjusted where necessary. Cronbach alpha was performed to measure the internal consistency and reliability of the instruments. Cronbach reliability coefficient of 0.70 or higher is considered "acceptable" *(Pourtier-Piotte et al., 2015).* The Cronbach Coefficient Alpha test results were satisfactory for WHOQoL-BREF (α = 0.816), HHI (α = 0.57), PWI (α = 0.810), and PHQ9/GAD-7 (α = 0.815).

The research study was carried out between August 2021 to July 2022 at Kakamega County General and Referral Hospital Cancer Centre. The researcher had the help of two research assistants trained in collecting, handling, and analyzing data. All research assistants who interacted with the study data signed a confidentiality agreement. To strengthen the validity of the data collection tools, the research employed face and content validity to assess the data collection tool's correctness.

Ethical considerations were followed before the data collection process to prevent ethical dilemmas. Clearance was sought from the Institutional Ethical Review Committee of Masinde Muliro University of Science and Technology To ensure the ethical conduct of the study. The researcher obtained a research permit from the National Commission for Science, Technology, and Innovations (NACOSTI), Number NACOSTI/P/21/11895, as this is a requirement by law in Kenya before carrying out any research.

Permission to conduct the study was sought from Kakamega County Referral and Teaching Hospital. Consent from the respondents to participate in the study was sought after informing the respondents of the purpose of the study, the instrument to be used, and the information to be solicited. Only those willing to participate were engaged, and no person was coerced to participate in the study. The study participants were informed of the freedom to withdraw from participation before they undertook the process.

4.7. Data analysis

The four domains of the WHOQoL-BREF, namely, physical, psychological, social relationship, and environmental, were treated as dependent variables. Group comparisons on the QoL scores were made using Kruskal Wallis (for two groups). We tested the associations of the caregivers' QoL (four domains) with the socioeconomic characteristics, patient characteristics, depression, and anxiety to each of the four domains of WHOQoL-BREF.

The variables that showed a significant association (p<0.05) with QoL were included in the multiple regression models, with the four QoL domains serving as dependent variables. All independent variables entered into the multiple regression models were coded or transformed into categorical measurements, except for depression, anxiety, and Hearth Hope Index (HHI), which were included as interval scale variables. A p-value $\leq$0.05 was used to reject the null hypothesis between the independent and outcome variables.

The association between the WHOQoL-BREF domains and Herth Hope Index variables was examined using Pearson correlation analysis to determine the relationship between variables. Statistical significance was defined as p $\leq$0.05 for all processes. For HHI, items 2 and 6 were reversed during analysis to give positive statements in line with the rest of the other ten items.

5. Results

Table 1 shows results on the influence of sociodemographic factors on the health-related quality of life of caregivers of cancer patients. The younger age group (<35 years) was associated with higher scores on the level of satisfaction with their health (mean 40.9; p=0.02). Males enjoyed significantly higher mean scores on the perceived HRQoL (mean 37.7, p=0.007) and in the three sub-domains, social (mean, 21.2, p=0.004), psychological (mean=56.7, p=0.006), and environmental (mean=73.4, p<0.001), except in the physical sub-domain, where the association had borderline statistically significant results (p=0.07). Also, they were more satisfied with their health (mean=41.5; p=0.01).

On the other hand, caregivers with secondary or tertiary education, compared with their counterparts with none or primary education, had significantly lower mean levels of satisfaction with health (mean=34.9, p=0.005), physical (mean=53.3, p=0.0006), social relationship (mean=18.9, p=0.04) and environment (mean=66.4, p=0.003) score.

Caregivers who were single, divorced, or widowed got a significantly lower mean score on HRQoL under the environment sub-scale (mean=67.0, p=0.002) than those who were married. Living in the rural area resulted in significantly higher mean scores on HRQoL on perceived QoL (mean= 36.2, p=0.004) and psychological (mean=55.2, p=0.008) sub-scales but lower scores under physical sub-domain (mean=57.1, p=0.009).

Being employed was statistically significantly associated with higher mean scores on physical (mean 64.2, p<0.0001), psychological (mean=58.7, p=0.0001), social relationship (mean=22.0, p=0.0005), and environment (mean=75.0, *p*<0.0001) HRQoL. Christians had a statistically significant lower mean score of satisfaction with health (mean=38.1, *p*=0.02) compared to non-Christians.

Caregivers earning less than KSh 10,000 per month were significantly associated with poor HRQoL on their perceived QoL (mean=34.2, *p*=0.01), satisfaction with health (mean=37.0, *p*=0.01), and all the four sub-domains of HRQoL (*p*<0.0001). The number of household members did not yield a significant association with HRQOL in all the areas assessed.

However, having fewer rooms (1-2) was statistically related to lower means scores in perceived quality of life (mean=29.2, *p*=0.0005), level of satisfaction with health (mean=33.5, *p* =0.01), physical (mean=52.4, *p*=0.04), psychological (mean=48.3, *p*=0.0002), and environment (mean = 64.3, *p*=0.02) sub-domains of HRQoL.

Table 2 presents predictors of HRQoL. Kruskall Wallis statistics was used to identify variables to include in regression models. Out of the sociodemographic factors entered into the regression model, the caregiver's gender was not significantly associated with any of the four sub-scales of HRQoL after controlling for other confounding factors in the multivariate model.

In this model, caregiver marital status was positively associated with environmental sub-scales of HRQoL (β=3.216, *p*=0.043). The caregiver's residence was positively associated with psychological (β=4.624, *p*=0.005). The occupation, which was classified as employed vs. others, was positively associated with physical (β=4.398, *p*=0.004), psychological (β=2.764, *p*=0.016), and environment (β=4.387, *p*=0.011). Income was negatively associated with physical (β=-2.641, *p*=0.043) and psychological (β=-2.156, *p*=0.027).

Another family member who had cancer was significantly negatively associated with social relationship and environmental subscale (β=-2.084, *p*=0.022, and β=-5.386, *p*=0.004), respectively. Other family members' help with care is significantly positively associated with social relationships (β=1.589, *p*=0.038). Also, the presence of other family members who have chronic illnesses is significantly negatively associated with the physical subscale of HRQoL (β=-5.287, p<0.0001).

Caregiver knowledge of cancer as a serious disease was positively associated with psychological (β=12.162, *p*= 0.0001) and negatively associated with environment (β=-4.397, *p*=0.039).

Table 3 shows the results of descriptive statistics on four instruments used in the study. The mean score for the Hearth Hope Index was 32.8±2.8 (range: 24.0–41.0) out of a maximum score of 48, the higher mean score on the Hope Index. However, means scores for depression (19.1±4.7; range: 3.0–27.0) and anxiety (17.1±3.6; range: 4.0 – 21.0) were more than half the maximum, indicating higher levels of caregivers’ depression and anxiety.

All the four sub-domains of health-related quality of life, namely physical (57.6±14.4; range: 32.0-112.0), psychological (54.9±10.7, range: 32-88), social relationship (20.0±6.2; range: 12.0-48.0), and environment (69.6±13.0; range: 40.0-112.0) had mean score of the less than half the expected maximum score in each sub-scale indicating poor health-related quality of life. The same was true of caregivers' perceived quality of life (35.7±13.5; range: 20.0-80.0) and their level of satisfaction with their health (38.7±15.4; range: 20.0-100.0), both of which had a mean less than half total expected score.

As shown in table 4, depression was highly statistically significantly associated with the caregiver's perceived quality of life (p<0.0001), level of satisfaction with health, p<0.0001), and all four sub-scales (p<0.0001). In all these outcomes, severe depression posted the lowest mean scores, suggesting that caregivers who presented with signs suggestive of severe depression performed poorly on HRQoL.

An assessment of the relationship between anxiety and HRQoL reveals a statistically significant relationship between anxiety and caregiver perceived quality of life (*p*=0.002), level of satisfaction with life, physical and psychological, each having a p<0.0001). Again, among caregivers presenting with signs suggestive of severe anxiety, the mean scores were relatively lower, indicating lower HRQoL. However, it differed with social relationships and environment sub-domains, resulting in non-statistically significant outcomes.

Table 5 reveals that the caregiver's knowledge about cancer status and the caregiver who heard about cancer have a statistically significant relationship with satisfaction (*p*=0.003). At the same time, the psychological subscale was borderline statistically significant (*p*=0.07). Also, the caregiver's knowledge of the seriousness of the cancer had a statistically significant relationship with psychological (*p*<0.0001) and environmental (*p*=0.02) subscales. Besides, the table shows a statistically significant association between other family members who had cancer and quality of life (*p*=0.05) and physical (*p*=0.003) subscales.

Additionally, the table shows a statistically significant relationship between other family members who have chronic illness and satisfaction (*p*<0.0001) and physical (*p*<0.0001) subscales. Caregiver's understanding of the disease shows a statistically significant relationship with quality of life (*p*=0.02), satisfaction (*p*=0.001), and physical (*p*=0.02) subscales. Duration of the patient has had the disease shows a statically significant relationship with quality of life (*p*=0.0002) and satisfaction (*p*=0.003) subscale. The treatment option is statistically significantly related to the quality of life (*p*=0.0009).

Table 6 presents predictors of HRQoL. Kruskall Wallis statistics was used to identify variables to include in regression models. Out of the psychological factors entered into the regression model, hope and anxiety were not significantly associated with any of the four sub-scales of HRQoL after controlling for other confounding factors in the multivariate model.

In this model, depression was negatively associated with physical (β=-1.08, *p*=0.0001), psychological (β=-0.880, *p*<0.0001), social relationship (β=-0.343, p<0.0001), and environment (β=-0.711, *p*=0.0001). Perceived quality of life was positively associated with physical (β=0.121, *p*=0.011), psychological (β =0.169, *p*<0.0001), social relationship (β=-0.077, *p*=0.003), and environment (β=0.218, *p* <0.0001).

Table (1): Socioeconomic factor's influence on health-related quality of life of primary caregivers of cancer patients (n=422).

Variables	n	Perceived HRQoL	Satisfaction with health	Physical	Psychological	Social relationship	Environment
		$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
Age group in years							
< 35	171	36.9	40.9	57.7	55.2	19.9	69.0
≥ 35	251	34.9	37.1	57.5	54.6	20.0	70.1
P-value		0.10	0.02	0.92	0.68	0.54	0.55
Gender							
Male	262	37.7	41.5	60.0	56.7	21.2	73.4
Female	160	34.5	36.9	56.1	53.7	19.2	67.3
P-value		0.007	0.01	0.07	0.006	0.004	<0.0001
Level of education							
Secondary/Tertiary	311	33.5	34.9	53.3	53.7	18.9	66.4
None/Primary	111	36.6	40.0	59.1	55.3	20.4	70.8
P-value		0.07	0.005	0.0006	0.33	0.04	0.003
Marital status							
Single/Divorced/Widowed	141	35.5	38.7	56.7	54.8	19.3	67.0
Married	281	36.4	38.6	58.0	54.9	20.4	71.0
P-value		0.59	0.91	0.78	0.96	0.14	0.002
Type of area of residence							
Rural	394	36.2	38.9	57.1	55.2	19.9	69.6
Urban	28	29.3	35.7	63.3	49.4	21.0	70.0
P value		0.004	0.13	0.009	0.008	0.22	0.65
Occupation							
Employed	108	35.4	39.6	64.2	58.7	22.0	75.0
Others	314	36.8	38.3	55.3	53.6	19.3	67.8
P-value		0.39	0.59	<0.0001	0.0001	0.0005	< 0.0001
Religion							
Christians	398	35.6	38.1	57.3	55.1	20.1	69.8
Others	24	38.3	48.3	62.2	51.5	19.2	67.0
P-value		0.48	0.02	0.07	0.12	0.69	0.44
Income in KSh							
<10,000	233	34.2	37.0	53.5	52.1	18.7	66.3
≥10,000	189	37.7	40.7	62.5	58.2	21.6	73.8
P-value		0.01	0.01	<0.0001	<0.0001	<0.0001	<0.0001
Number of household members							
<4	116	37.9	38.1	58.0	54.7	20.5	69.0
≥4	306	34.9	38.9	57.4	54.9	19.8	69.9
P-value		0.22	0.61	0.96	0.72	0.22	0.59
Number of rooms							
1-2	37	29.2	33.5	52.4	48.3	18.6	64.3
≥3	385	36.4	39.2	58.0	55.5	20.1	70.1
P-value		0.0005	0.01	0.04	0.0002	0.32	0.02

Being satisfied with one's health was positively associated with physical (β=0.200, *p* <0.0001).

6. Discussion

Primary caregivers of cancer patients often suffer from impaired health-related quality of life (HRQoL) due to stress arising from the responsibility of caregiving. Most of the studies conducted in Western populations have shown that increased caregiving burden was related to decreased mental and physical health and premature mortality among family caregivers. Thus, this study sought to determine the socioeconomic and psychological factors predicting the health-related quality of life among primary caregivers of cancer patients in Kakamega County.

Primary caregivers younger than 35 had a significantly better score on overall satisfaction with life than their counterparts. It has been reported in other studies that the caregiver's age influences the burden of care *(Lim et al., 2017)*. The study's finding can be explained by the fact that an increase in age and the physiological changes in the body significantly influence health and the perceived quality of life in old age *(Suszek & Kleinrok, 2022)*. The study established that there were more male than female caregivers, which was not congruent with previous studies *(Stenberg et al., 2010; Waldron & Brody, 2010)* and the report of the National Family Caregivers Association *(Barber, 2013)*.

Table (2): Multiple regression analysis of caregivers' socioeconomic information associated with health-related quality of life (n=422).

Predictors	Physical			Psychological			Social relationship			Environment		
	Adj β	**T**	**P**	**Adj β**	**T**	**P**	**Adj β**	**T**	**p**	**Adj β**	**T**	**P**
Gender of caregiver: Male vs Female	-0.123	-0.10	0.919	1.362	1.51	0.132	0.833	1.24	0.214	2.552	1.88	0.061
Caregiver marital status: Married vs Single and others	1.998	1.42	0.158	-0.434	-0.41	0.681	0.754	0.96	0.336	3.216	2.03	0.043
Residence: Rural vs urban	-4.071	-1.85	0.066	4.624	2.81	0.005	-2.181	-1.79	0.075	-1.603	-0.65	0.518
Occupation: Employed vs Others	4.398	2.89	0.004	2.764	2.43	0.016	1.334	1.58	0.115	4.387	2.56	0.011
Income: <10,000 vs ≥10,000	-2.641	-2.03	0.043	-2.156	-2.22	0.027	-0.946	-1.31	0.191	-2.576	-1.76	0.079
Cancer a serious disease: Yes vs. No	3.037	1.60	0.120	12.162	8.61	<0.0001	-0.375	-0.36	0.721	-4.397	-2.07	0.039
Other family members have cancer: Yes vs No	-1.400	-0.85	0.396	-1.541	-1.26	0.209	-2.084	-2.29	0.022	-5.386	-2.92	0.004
Other family members help with care: Yes vs No	-2.387	-1.73	0.084	-1.391	-1.35	0.177	1.589	2.08	0.038	2.618	1.69	0.092
Other family members have chronic illness: Yes vs No	-5.287	-4.49	<0.0001	-1.352	-1.54	0.124	0.279	0.43	0.668	-0.339	-0.26	0.798

Table (3): Psychological factors affecting caregivers of cancer patients (n=422).

Variables	$\bar{X}$	SD	Minimum	Maximum	Expected Maximum
Hearth Hope Index					
Hope	32.8	2.8	24.0	41.0	48.0
Depression and Anxiety					
Depression	19.1	4.7	3.0	27.0	27.0
Generalized Anxiety Disorder	17.1	3.6	4.0	21.0	21.0
Health-related quality of life					
Perceived quality of life	35.7	13.5	20.0	80.0	100.0
Level of satisfaction with health	38.7	15.4	20.0	100.0	100.0
Physical	57.6	14.4	32.0	112	140
Psychological	54.9	10.7	32	88.0	120
Social relationship	20.0	6.2	12.0	48.0	60
Environment	69.6	13.0	40.0	112.0	160

Table (4): Relationship between depression, anxiety, and health-related quality of life (n=422).

Variable	N	QoL	Satisfaction	Physical	Psychological	Social relationship	Environment
		$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$
Depression							
Normal	2	50.0	50.0	82.0	74.0	32.0	98.0
Mild	18	51.1	66.7	86.0	74.7	30.0	82.7
Moderate	46	40.9	49.6	70.3	63.2	21.7	75.0
Severe	356	34.2	35.8	54.3	52.7	19.2	68.1
Pearson Chi-Square (X^2)		126.934	100.511	111.836	169.045	118.636	129.576
***P*-value**		<0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Anxiety							
Normal	2	50.0	60.0	92.0	68.0	24.0	82.0
Mild	17	41.2	50.6	70.6	62.8	25.4	75.5
Moderate	76	40.5	48.1	66.7	61.3	21.3	73.5
Severe	327	34.2	35.7	54.5	52.9	19.4	68.4
Pearson Chi-Square (X^2)		79.944	178.791	102.326	106.373	51.773	57.559
***P*-value**		0.002	< 0.0001	<0.0001	< 0.0001	0.09	0.07

Table (1): Primary caregiver's knowledge of cancer and its influence on their health-related quality of life (n=422).

Variables	N	QoL	Satisfaction	Physical	Psychological	Social relationship	Environment
		$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$
Heard of cancer before the patient was diagnosed with cancer							
Yes	406	35.6	39.1	57.5	55.1	19.0	69.6
No	16	40.0	28.7	58.0	50.0	21.7	69.5
***P*-value**		0.58	0.003	0.94	0.07	0.61	0.82
Cancer is a serious disease.							
Yes	386	35.7	38.5	57.8	55.9	19.9	69.2
No	36	35.6	40.0	55.1	44.0	21.1	73.7
***P*-value**		0.95	0.98	0.29	<0.0001	0.24	0.02
Cancer severity							
Severe	411	35.8	38.6	57.6	55.0	20.0	69.6
Mild, Moderate	11	34.5	41.8	54.9	50.5	20.0	71.3
***P*-value**		0.93	0.91	0.63	0.26	0.78	0.67
Another family member has had cancer.							
Yes	58	32.4	40.0	60.6	54.2	18.9	65.7
No	364	36.3	38.5	57.1	55.0	20.2	70.3
***P*-value**		0.05	0.99	0.03	0.54	0.28	0.02
Caregiver’s understanding of the disease							
Fully	69	33.6	34.2	60.8	53.9	19.3	68.3
Partially	353	36.1	39.5	56.9	55.1	20.1	69.9
***P*-value**		0.02	0.001	0.02	0.26	0.25	0.36
Duration patient has had the disease.							
0 -2 years	246	37.7	40.0	57.7	55.1	20.2	70.6
> 2 years	176	32.9	36.8	57.3	54.5	19.7	68.3
***P*-value**		0.0002	0.003	0.56	0.31	0.40	0.13
Treatment options							
Still on treatment	406	35.1	38.7	57.6	54.9	20.0	69.5
Untreated	16	52.5	37.5	57.8	53.7	19.5	72.0
***P*-value**		0.0009	0.99	0.71	0.78	0.97	0.35

Table (6): Multiple regression analysis on psychological factors associated with health-related quality of life (n=422).

Psychological factors	Physical			Psychological			Social relationship			Environment		
	Adj B	T	P	Adj β	T	P	Adj β	T	P	Adj β	t	P
Hope	-0.127	-0.66	0.508	0.267	1.86	0.063	-0.042	-0.40	0.690	0.358	1.66	0.098
Depression	-1.08	-7.00	<0.0001	-0.880	-7.65	<0.0001	-0.343	-4.02	<0.0001	-0.711	-4.11	<0.0001
Anxiety	-0.358	-1.85	0.065	-0.189	-1.31	0.192	0.017	0.16	0.873	0.238	1.10	0.274
Perceived quality of life	0.121	2.57	0.011	0.169	4.79	<0.0001	0.077	2.95	0.003	0.218	4.11	<0.0001
Being satisfied with one’s health	0.200	4.46	<0.0001	0.018	0.54	0.588	0.013	0.51	0.610	-0.048	-0.96	0.337

In the current study, males enjoyed higher mean scores on HRQoL in the three sub-domains: psychological, social, and environmental, except on the physical sub-domain, where the association had borderline statistically significant results. This finding can be explained by women's traditional roles that include caregiving, which may add to the burden of caring for cancer patients. They also care for other dependents, such as young children and elderly parents.

Results from cross cross-sectional study done on HRQoL of primary caregivers of gastrointestinal cancer patients in Malaysia showed that male caregivers had higher QoL than females in all four domains *(Pinquart & Sorensen, 2006).* Other studies have reported lower QoL among women due to their traditional gender roles, which is similar to the current study findings. However, a study done in Singapore on the health-related quality of life of primary caregivers of cancer patients had a conflicting result. The study found that the HRQoL of male caregivers had more impaired HRQoL than their female peers in the physical domain *(Lim et al., 2017).*

Primary caregivers with higher levels of education (Secondary and tertiary) reported significantly lower mean scores on satisfaction with their health and physical, social relationship, and environmental domains of health-related quality of life. Perhaps this could be attributed to their ability to understand the impact and prognosis of cancer compared to their counterparts with low levels of education *(Song et al., 2021).*

The above results are in line with the findings in an article published by *Dipasquale et al. (2021),* where they reported that the higher the level of education of the primary caregiver, the more increase in awareness of the patient's chronic condition, which lowers their overall mean score on HRQoL. However, in contrast, the result of a study done in Malaysia on parenting stress among mothers of children with cerebral palsy reported a positive correlation between caregiver's education level and their HQoL. Educated caregivers have a better chance of accessing social and medical resources that contribute to improving HRQoL *(Hashem et al., 2018).*

Most of the respondents were from rural set-up, partly explained by the fact that Kakamega County is majorly a rural county with less than 10% of its population living in urban areas *(Kenya National Bureau of Statistics, (2010).* Living in a rural area resulted in higher mean scores on the perceived quality of life and psychological sub-scale but lower scores under the physical sub-domain. A similar finding was reported in a cross-sectional study conducted in Shanghai on HRQoL and related factors among primary caregivers of children with disabilities. High living expense in the cities often puts financial pressure on caregivers, lowering their mean score in the psychological domain *(Xia et al., 2020).*

Being employed was statistically significantly associated with higher mean scores in all four domains: Physical, psychological, social relationship, and environmental. Higher-income could improve caregivers' physical environment and increase access to health services. Providing the necessities and medication for these patients is costly. Frequently, caregivers have to quit their jobs to take care of the patient full time, reducing their source of income and affecting their HRQoL in the four sub-domains. From the current study, caregivers who were single, divorced, or widowed had lower mean scores on HRQoL under the environment sub-scale than those who were married. This finding was also confirmed in a study by *Steele et al. (2010).* It revealed that married caregivers had a better score due to the support they received from their partners and family members.

Christians had lower mean scores in satisfaction with health compared to non-Christians. Islamic religion helped primary caregivers cope with their physical and psychological health while caring for their family members with disabilities or health issues, unlike Christians. The holistic teaching of Islam in all areas of life includes the caregiving role by family members, which has positively impacted the believers' family-relative relationships. The Islamic religious beliefs also helped primary caregivers to accept their sick relatives by viewing them as a gift from God and offering them a sense of purpose. Similarly, a study conducted by *Vitorino et al. (2018)* revealed that Christian caregivers who viewed their situation as unjust, unfair, punishment from God, or abandonment from God had worse mental and spiritual outcomes and lower mean scores on their overall HRQoL.

Several household members did not yield a significant association with HRQOL in all the areas assessed. This finding suggests that the influence of these household members on caregiver HRQOL may be limited or vary depending on specific factors and circumstances. The effects of household members on caregiver HRQOL may vary depending on the individual caregiver's personality, coping mechanisms, and social support network. However, having fewer rooms (one to two) was statistically related to lower mean scores in perceived quality of life, satisfaction with health, physical, psychological, and environment sub-domains of HRQOL. In the current study, those living in houses with more than three rooms performed better than their counterparts. Having more rooms can provide more personal space for caregivers, which can be important for reducing stress and improving mental health. This finding is especially important for caregivers providing round-the-clock care for their loved ones.

The caregiver's gender was not significantly associated with any of the four sub-scales of HRQOL after controlling for other confounding factors in the multivariate model. In this model, caregiver marital status was positively associated with environmental sub-scales of HRQOL. Residence of the caregiver was positively associated with psychological. Occupation, classified as employed vs others, was positively associated with physical, psychological, and environment. Income was negatively associated with physical, psychological, and environmental. Caregiver knowledge of cancer as a serious disease was positively associated with psychological and negatively associated with the environment. Other family members who have cancer were negatively associated with social relationships and negatively associated with the environment. Other family members' help with care was positively associated with social relationships. Other family members have chronic illness was negatively associated with physical sub-scales of HRQoL as it included an increase in the caring load on the caregivers of cancer patients. Several studies have given similar findings (*McCarthy, 2011; Stavas et al., 2018; Song et al., 2011).*

Depression was highly statistically significantly associated with caregiver perceived quality of life, level of satisfaction with health, and all the other four sub-scales. In all these outcomes, severe depression posted the lowest mean scores, suggesting that caregivers who presented with signs suggestive of severe depression performed poorly on HRQoL. An assessment of the relationship between anxiety and HRQoL reveals a statistically significant relationship between anxiety and caregiver-perceived quality of life, satisfaction with life health, and physical and psychological sub-domains. Again, among caregivers presenting with signs suggestive of severe anxiety, the mean scores were relatively lower, indicating lower HRQoL. This finding was, however, not the case with social relationships and environment. There is no significant relationship, but the caregiver with severe anxiety had a poorer quality of life in social and environmental subscales. Studies have reported that caregivers presented with higher levels of anxiety symptoms if they were heavily burdened by caregiving. This finding is because they experienced more schedule disruptions, greater health deterioration, a stronger sense of family abandonment, and lower caregivers' esteem *(Papastavrou et al., 2012).*

Caregivers who heard about cancer were associated with satisfaction; the psychological subscale did not reach a significant level. Knowing about the cancer diagnosis early on can reduce the uncertainty and anxiety that caregivers often experience. This finding can help them manage their emotions more effectively and maintain stability. *McSherry and Holm (1994)* suggested that a sense of coherence may be an important protective factor for caregivers of cancer patients.

Further, the caregiver's knowledge of the seriousness of the cancer was associated with psychological and environmental subscales. A comprehensive understanding of the cancer diagnosis and treatment plan can alleviate anxiety and uncertainty among caregivers. This increased knowledge empowers caregivers to anticipate potential challenges and prepare themselves emotionally, fostering a sense of control over the situation. Further, Caregivers with a strong understanding of the disease can optimize their home environment to support their loved one's comfort and wellbeing. This finding includes creating a safe and comfortable space, providing necessary equipment, and adapting daily routines to accommodate the patient's needs. *Kim and Park (2006)* indicated that caregivers with more knowledge about cancer reported better quality of life.

Another family member who had cancer was associated with quality of life, physical, and environmental subscales. Caregivers with prior experience may have developed effective coping mechanisms for managing stress and emotional strain. Understanding the challenges and rewards of caregiving can help them anticipate and address potential difficulties, reducing the impact of stress on their physical and emotional wellbeing. *Soderstrom and Horn (2009)* indicated that having a family member with cancer can have a negative impact on quality of life, particularly in the areas of physical and emotional wellbeing. Caregiver’s understanding of the disease was associated with quality of life, satisfaction, and physical subscales. Caregivers who better understand cancer are more likely to be satisfied with their role. This finding is likely because they feel more confident in their ability to provide care and feel they are making a positive difference in their loved one's life. *Guerra-Martín et al. (2023)* found that caregivers of patients with cancer had better quality of life, satisfaction, and physical functioning if they had a better understanding of the disease.

The duration of the patient's disease was associated with the quality of life and satisfaction subscale. Evidence suggests that knowledge of the duration of the patient's disease can be associated with their quality of life and satisfaction. This finding is likely because caregivers who better understand the disease and its prognosis can better cope with the challenges of caregiving and feel more prepared to support their loved ones. *Awadalla et al. (2007)* found that caregivers of patients with cancer had lower levels of quality of life and satisfaction as the duration of the patient's illness increased.

Treatment option was associated with quality of life. Caregivers with a better understanding of cancer and its treatment can better anticipate and manage the challenges their loved ones will face. This finding can help them provide more effective support and reduce feelings of anxiety and uncertainty. *Spatuzzi et al. (2017)* found that caregivers of cancer patients had higher quality of life if the patient was receiving active treatment.

Kruskall Wallis statistics was used to identify variables to include in regression models. Out of the psychological factors entered into the regression model, hope and anxiety were not significantly associated with any of the four sub-scales of HRQoL after controlling for other confounding factors in the multivariate model. Hope and anxiety are two important psychological factors that can affect the quality of life of cancer caregivers. However, these two factors were not significantly associated with any of the four sub-scales in this study. This finding means that the effects of hope and anxiety on HRQoL were likely due to other factors, such as the caregiver's physical health, social support, and coping skills.

In this model, depression was negatively associated with physical, psychological, and social relationships and environment. The negative association between depression and physical, psychological, and social relationships and environment is likely due to many factors. One factor is that depression can lead to a decrease in energy and motivation, which can make it difficult for caregivers to care for their loved ones and maintain their social relationships. Another factor is that depression can lead to a decrease in self-esteem and confidence, which can make it difficult for caregivers to cope with the challenges of caregiving.

Perceived quality of life was positively associated with physical, psychological, social relationships, and environment. The positive association between perceived QoL and these domains highlights the importance of a holistic approach to supporting cancer caregivers. Addressing physical health concerns, providing emotional support, fostering social connections, and creating a supportive environment can significantly contribute to caregivers' overall wellbeing and perceived QoL. Good physical health allows caregivers to maintain energy levels, engage in activities of daily living, and manage the physical demands of caregiving. This finding contributes to a sense of wellbeing and overall QoL. Emotional stability, resilience, and coping mechanisms help caregivers manage stress, maintain positive emotions, and cope with the challenges of caregiving. This finding contributes to a sense of emotional wellbeing and overall QoL.

Being satisfied with one’s health was positively associated with physical factors. Satisfying one's health is positively associated with physical factors in cancer caregiving because it promotes healthy lifestyle habits, encourages self-care practices, fosters a positive attitude towards physical limitations, and enhances self-efficacy, all contributing to better physical health outcomes. When cancer caregivers are satisfied with their health, they are more likely to be able to physically manage the demands of caregiving. This finding is because they are more likely to have the energy and stamina to provide care and less likely to experience pain or other physical limitations that could interfere with their caregiving duties. Several studies have revealed that caregiver burden is linked to depressive disorder symptoms. Caregiving stress can worsen caregivers' existing depressive situations *(Global Burden of Disease Cancer Collaboration et al., 2017; Geng et al., 2018)*

7. Conclusion

The study concluded that socioeconomic factors of the primary caregivers of cancer patients in Kakamega County, like age, gender, level of education, marital status, residence, occupation, religion, number of rooms, and income, were significantly associated with their HRQoL. The younger caregivers had a higher score on the level of satisfaction with health. Males enjoyed higher mean scores on HRQoL in three sub-domains: Social, psychological, and environment, except the physical sub-domain. Being employed was associated with a higher mean physical, psychological, social relation, and environmental score. Married caregivers exhibit better environmental health-related quality of life. Caregivers in rural areas exhibit better psychological health-related quality of life.

On the other hand, caregivers with secondary or tertiary education had a lower mean level of satisfaction with health as well as Christians. Low-income earners (Less than Ksh. 10,000) exhibit low physical, psychological, social, and environmental health-related quality of life, lower perceived life quality, and lower satisfaction with health. Having fewer numbers of rooms was related to a lower mean score on HRQoL across the four domains and overall satisfaction with health. The study also concluded that psychological-related factors like depression and anxiety were significantly associated with HRQoL among primary caregivers of cancer patients in Kakamega County. Caregivers who were depressed exhibited low psychological, physical, social relationship, and environmental health-related quality of life plus low perceived quality of life and satisfaction with health.

8. Recommendations

Low income negatively affected caregiver health-related quality of life among primary caregivers of cancer patients in Kakamega County. Therefore, the study recommended that the national and county governments develop a financial scheme to help subsidize the financial charges for cancer management as this could relieve caregivers' financial burden.

The study recommended that the cancer regulatory body come up with a policy that allows the health care providers to create some time to educate caregivers on various types of cancer and their management, the side effect of the drugs, and how to assist their patients at home, thereby easing the burden of cancer, as a serious disease.

Nurses should endeavor to identify primary caregivers at risk in order to institute tailored health information about cancer and teach them ways and techniques of promoting the HRQol. Nurses should deploy the HRQol scale- family version as a tool to identify primary caregivers at risk in order to offer training that may include modern ways of digital networking through social groups and organizations that support cancer patients and their caregivers, for example, Kenya Network of Cancer Organisations (KENCO).

Regarding policy, there is a need for the government and other state actors to initiate psychosocial counseling services for cancer caregivers. The study recommended that the hospital management, in collaboration with the cancer governing body, establish a psychosocial support group network for caregivers through multiple communication channels, thereby reducing the mental and psychological burden experienced by caregivers.

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