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Socioeconomic and Cultural Determinants of Health-Related Quality of Life in Advanced Cancer Patients: Findings from the APPROACH Survey, Hyderabad, India

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Abstract

Patients with advanced cancer frequently face substantial declines in health-related quality of life (HRQoL) due to both the disease and its treatments. In India, where palliative care services are still limited, individuals from socially or economically disadvantaged groups may be at higher risk of poor HRQoL outcomes. This study examined multiple dimensions of HRQoL—including physical, functional, emotional, social/family, pain, psychological, and spiritual well-being—among advanced cancer patients and explored how socioeconomic and cultural factors influence these outcomes. It was hypothesized that financial hardship, female gender, lower education, reduced social/family support, minority religion, and non-general caste status would be associated with lower HRQoL. A cross-sectional survey was conducted among 210 advanced cancer patients attending a regional cancer center in Hyderabad, India. Standardized tools were used to assess general well-being (FACT-G), pain severity and interference (BPI), psychological distress (HADS), and spiritual well-being (FACT-SP), alongside socio-demographic and economic data. Participants demonstrated lower overall well-being (FACT-G = 62.4 ± 10.0) and spiritual well-being (FACT-SP = 32.7 ± 5.5) compared with reference U.S. cancer populations. Pain levels were generally mild to moderate (severity 3.2 ± 1.8; interference 4.0 ± 1.6), anxiety scores were within normal limits (5.6 ± 3.1), and depressive symptoms were borderline (9.7 ± 3.3). Financial distress was a strong predictor of poorer outcomes across most HRQoL domains ($p \leq 0.01$). Belonging to a minority religion was associated with reduced physical well-being ($p \leq 0.05$) and higher pain severity ($p \leq 0.05$), while married women reported lower social/family well-being ($p \leq 0.05$). Pain severity and interference were consistently linked with diminished HRQoL. Advanced cancer patients in India, particularly those facing financial challenges or from minority religious groups, experience reduced well-being across multiple domains and exhibit borderline depressive symptoms. These findings highlight the need for targeted interventions to support vulnerable groups and improve HRQoL outcomes in this population.

Keywords: Advanced cancer, Health-related quality of life, Palliative care, Sociocultural factors, India, Vulnerable populations

Introduction

Cancer remains a leading cause of mortality in India, accounting for over 813,000 deaths in 2016, representing more than 8% of total deaths in the country [1]. While the incidence of cancer in India is approximately one-fourth that observed in Europe, mortality rates are comparable to those in high-income countries [2]. Contributing factors to high cancer mortality include limited awareness of cancer symptoms and risk factors [3, 4], social stigma surrounding the disease [5], restricted access to healthcare [6], and substantial out-of-pocket costs [7, 8]. Consequently, a significant proportion of patients—estimated between 50% and 70%—present with advanced-stage disease at their initial consultation [9–11].

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Patients with advanced cancer frequently experience a decline in quality of life (QoL) due to both the disease and its treatment-related effects [12]. Palliative care, as recommended by both international and local guidelines, aims to address these challenges by integrating supportive care into standard oncology treatment, with the primary goal of improving patients' QoL [13, 14]. Health-related quality of life (HRQoL) encompasses multiple dimensions, including physical, functional, emotional, social/family, psychological, and spiritual well-being. While managing physical symptoms and pain is central to oncology and palliative care, psychosocial and emotional health also critically influence patient outcomes [15–17]. Spiritual well-being, though often neglected, is particularly important, as low levels are associated with increased hopelessness, suicidal ideation, and desire for death [18–21]. Comprehensive HRQoL assessments are therefore essential for identifying unmet needs and guiding supportive care for patients with advanced disease [22, 23].

Despite nearly three decades of palliative care presence in India, its development remains limited due to factors such as population density, restrictive opioid regulations, insufficient training of healthcare professionals, and low public awareness [24, 25]. This is especially concerning for socially and economically disadvantaged groups, who may be at heightened risk of poor HRQoL. In the Indian context, socially disadvantaged populations include Scheduled Tribes, Backward Castes, and minority religious groups such as Muslims, Christians, Sikhs, Buddhists, and Zoroastrians [26]. Economically disadvantaged individuals, women, those with lower education, individuals with limited social/family support, and married women—who often experience compounded household and societal pressures—also face additional barriers [27–29].

The present study aims to evaluate HRQoL among advanced cancer patients in a regional cancer center in Hyderabad, India, covering domains of general well-being (physical, functional, emotional, social/family), pain, psychological health, and spiritual well-being. We anticipate that HRQoL in this population will be lower than that reported in high-income countries, and we compared our findings to U.S. reference populations (FACT-G for general well-being [30] and FACIT-SP for spiritual well-being [31]) to facilitate interpretation.

Additionally, this study investigates whether belonging to a disadvantaged group—defined as financial hardship, female gender, married women, lower education, minority religions, or non-general caste status—is associated with poorer HRQoL outcomes. While pain is a well-known factor affecting daily functioning and QoL, there is limited evidence on its association with specific HRQoL domains in India, particularly after accounting for sociodemographic characteristics. Cultural and religious beliefs may influence perceptions of pain; for example, Hindu philosophy often frames suffering as a result of past actions (karma) and a path toward spiritual growth [32]. Accordingly, we examine the relationship between pain and HRQoL, hypothesizing that higher pain severity will be linked to lower physical, functional, emotional, and social/family well-being, as well as increased anxiety and depression.

We expect the findings to provide insights into which patient groups are at risk for poorer HRQoL and to identify gaps in care delivery in regional cancer centers in India. These results may also inform strategies for improving supportive care for advanced cancer patients in other Indian centers and similar developing country contexts.

Participants and setting

This study was conducted as part of the multi-country cross-sectional survey, "Asian Patient Perspectives Regarding Oncology Awareness, Care and Health (APPROACH)," which aims to identify gaps in care for advanced cancer patients in major public hospitals across low- and middle-income countries (LMICs) in Asia. The Indian site for this study was the Mehdi Nawab Jung Institute of Oncology and Regional Cancer Center (MNJIORCC) in Hyderabad. As the sole government-funded cancer hospital serving the states of Telangana and Andhra Pradesh, MNJIORCC provides free oncology and palliative care services to a catchment population of approximately 85 million. The oncology department manages around 12,000 new cancer cases annually, with over half of patients presenting at advanced stages.

Eligible participants were adults aged 21 years or older, diagnosed with stage 4 solid tumors, and aware of their diagnosis. Patients with hematological malignancies were excluded due to their distinct disease trajectory and prognosis compared to solid tumors [33]. To maintain sample homogeneity, individuals receiving hospice or home-based care, or those who had been on palliative treatment for more than two weeks, were also excluded. Recruitment took place between September and December 2017, targeting both inpatient wards and outpatient clinics within the medical and radiation oncology departments of MNJIORCC. Ethical approval for the study was granted by the Institutional Ethics Committee of MNJIORCC and the National University of Singapore.

A target sample of 200 patients was set. Out of 253 medical records screened, 234 patients met the eligibility criteria **(Figure 1)**. Trained interviewers approached these patients, of whom 10 were deemed ineligible due to lack of awareness of their cancer diagnosis, cognitive impairment, or inability to complete the survey (as observed by interviewers or reported by family caregivers). Of the remaining 224 patients, four declined participation, citing disinterest, and an additional ten withdrew during the survey due to fatigue. This resulted in a final sample of 210 participants and an effective response rate of 83% (210/234).

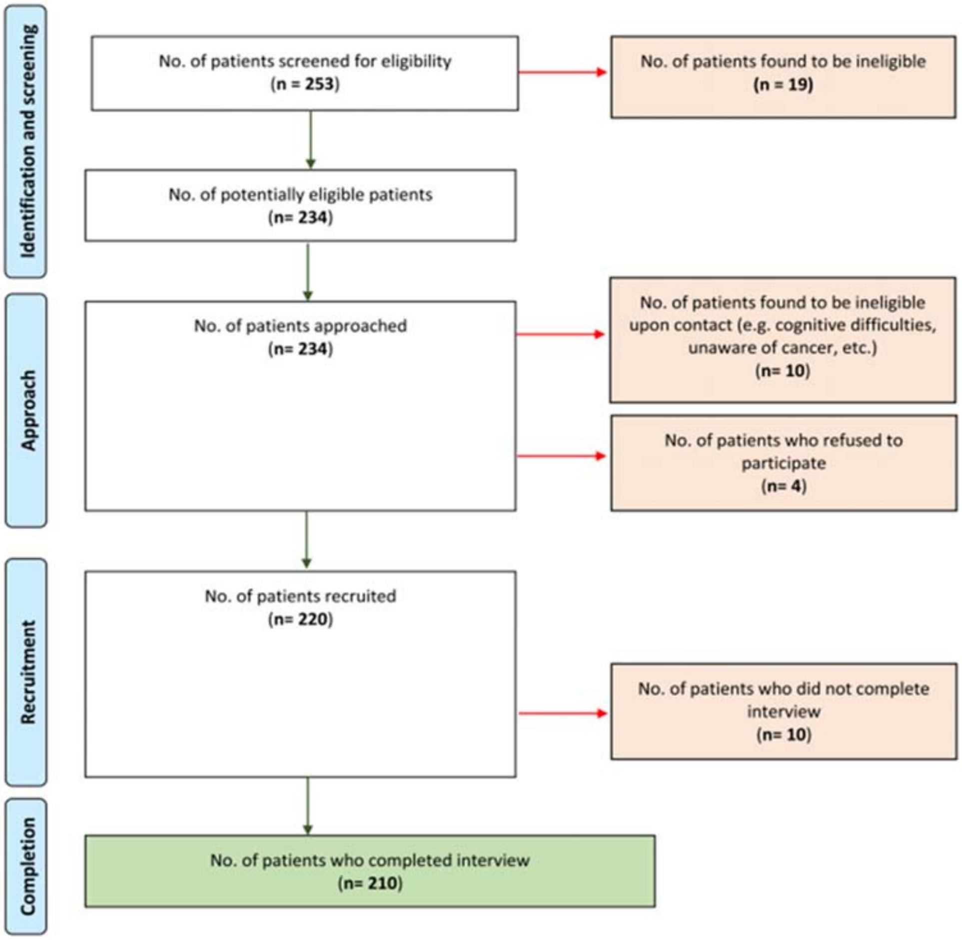

Figure 1. Patient recruitment log

Survey development

The questionnaire was designed in collaboration with oncologists and included items created by the study team alongside standardized, validated instruments **(Table 1)**.

Table 1. List of HRQoL instruments used in the study.

Survey Instrument	Total Range	Sub-Domains	Sub-Domain Description	Sub-Range
FACT-G	0 to 108	FACT-GP	Physical well-being	0 to 28
(Functional Assessment of Cancer Therapy - General questionnaire)		FACT-GS	Social well-being	0 to 28
		FACT-GE	Emotional well-being	0 to 24
		FACT-GF	Functional well-being	0 to 28
BPI	0 to 10	BPI-S	Pain severity	0 to 10
(Brief Pain Inventory questionnaire)		BPI-I	Pain interference	0 to 10
HADS	0 to 42	HADS-A	Anxiety	0 to 21
(Hospital Anxiety and Depression Scale)		HADS-D	Depression	0 to 21
FACIT-SP	0 to 48	FACIT-SPMP	Spiritual meaning/peace	0 to 32
(Functional Assessment of Chronic Illness Therapy - Spiritual Well-being questionnaire)		FACIT-SPF	Faith	0 to 16

HRQoL outcomes

The study assessed general well-being using the 27-item Functional Assessment of Cancer Therapy-General (FACT-G) questionnaire, which measures physical (FACT-GP), functional (FACT-GF), emotional (FACT-GE), and social/family (FACT-GS) well-being. The questionnaire had been linguistically validated in the local language [34]. Negatively worded items were reverse-scored, and item responses were summed so that higher scores reflected greater well-being [35]. Domain scores were combined to create a total score ranging from 0 to 108.

Pain severity and interference were evaluated using the Brief Pain Inventory (BPI). Pain severity (BPI-S) was calculated as the average of four questions assessing worst, least, average, and current pain in the past 24 hours, rated from 0 (no pain) to 10 (worst imaginable pain). Pain interference (BPI-I) was rated from 0 (does not interfere) to 10 (completely interferes) across seven items measuring how pain affected general activity, mood, walking, work, relationships, sleep, and enjoyment of life [36].

Psychological well-being was measured using the Hospital Anxiety and Depression Scale (HADS), which includes seven items for anxiety (HADS-A) and seven for depression (HADS-D) [37]. Positively phrased statements were reverse scored so that higher scores indicated greater psychological distress. Scores ranged from 0 to 21 for each subscale and 0 to 42 for the total score. Scores of 0–7 indicated normal range, 8–10 suggested possible anxiety or depression, and ≥11 indicated probable presence of a mood disorder [38].

Spiritual well-being was assessed using the Functional Assessment of Chronic Illness Therapy–Spiritual Well-Being (FACIT-SP) questionnaire, which has two domains: meaning/peace (FACIT-SPMP) and faith (FACIT-SPF) [39]. The first domain emphasizes a sense of purpose, harmony, and peace, while the second reflects strength and comfort derived from spiritual beliefs. Scoring was similar to FACT-G, with total scores ranging from 0 to 48.

For all instruments, respondents who answered fewer than 50% of items on a scale were excluded. If more than 50% of items were completed, missing responses were prorated using the average of answered items. **Table 1** details the sub-domains and scoring. These instruments were selected due to their widespread use in cancer populations internationally [40–42].

Socio-demographic characteristics

Financial difficulty was measured using three questions: (i) ability to pay for treatment, (ii) ability to meet daily needs, and (iii) ability to afford small luxuries. The latter two were adapted from the economic well-being section of the Older American Resources and Services survey [43], and the first was added by the study team. Responses were coded as 1 = "Very well," 2 = "Fairly well," and 3 = "Poorly," with total scores ranging from 3 (lowest financial difficulty) to 9 (highest). Additional demographic variables included age, years of education, marital status, religion, and caste.

Translation process

Investigator-developed items were initially written in English and professionally translated into Telugu, the dominant language at the study site. The translated items were then back-translated into English, and discrepancies were resolved. Further refinements were made based on physician feedback and cognitive interviews with 10 eligible patients. Licensed Telugu versions of BPI and HADS were obtained from the respective owners. FACT-G and FACIT-SP were translated following the license holders' protocols, including forward and backward translations, reconciliation, and testing with 10 patients. After completing the main survey (excluding FACT-G and FACIT-SP), patients were asked to complete these instruments and provide feedback on clarity and comprehension. Final versions were approved by the FACIT license holder.

Statistical analysis

We assessed the reliability of the FACT-G, BPI, FACIT-SP, and HADS instruments using Cronbach's alpha. To contextualize FACT-G and FACIT-SP scores relative to U.S. cancer populations, Cohen's d effect sizes were computed, with values of 0.8 or higher considered large.

Associations between HRQoL outcomes and predictor variables were explored using ordinary least squares (OLS) regression. Separate models were fitted for each outcome: general well-being (FACT-G total and subdomains: physical, functional, emotional, social/family), pain severity and interference (BPI-S, BPI-I), anxiety and depression (HADS total and subscales), and spiritual well-being (FACIT-SP total and subdomains). In total, 16 regression models were estimated. Predictor variables included financial difficulty score, gender (female = 1), education (years), marital status (unmarried = 1), religion (non-Hindu = 1), and caste (non-General Caste = 1), with age included as a covariate.

Marital status was used to approximate social and family support, with married individuals assumed to have higher support. Recognizing the potential for lower household status among married women from disadvantaged backgrounds, an interaction term between gender and marital status was included to examine its impact on social/family well-being.

We also investigated how pain (BPI-S and BPI-I) predicted HRQoL outcomes, adjusting for socio-demographic variables. Statistical significance was considered at the 5% level. All analyses were conducted using STATA version 14.

Results and Discussion

Patient characteristics

The demographic characteristics of the 210 respondents are summarized in **Table 2**. Participants had a mean age of 49 years and an average of 2.8 years of formal education. Females accounted for 52% of the sample (95% CI: 46–59%). Most participants belonged to disadvantaged castes or tribes (84%; CI: 79–89%), were Hindu (83%; CI: 78–88%), and married (75%; CI: 69–81%). Lung (23%; CI: 18–29%), breast (23%; CI: 17–29%), cervical (15%; CI: 10–20%), and oral (11%; CI: 7–15%) cancers were the most common types. The majority of patients (88%; CI: 83–92%) were recruited from inpatient clinics. Financial difficulty scores averaged 7.9 (SD = 1.4), with higher scores reflecting greater economic strain (scale 3–9).

Table 2. Patient Characteristics (N = 210).

Characteristics	Statistics
Age in years, mean (S.D.), range	49.1 (11.9), 20–84
Years of education, mean(S.D.), range	2.8 (4.5), 0–18
Gender, N (%)	
Male	100 (47.6%)
Female	110 (52.4%)
Marital status, N (%)	
Married	158 (75.2%)
Unmarried	52 (24.8%)
Religion, N (%)	
Hindu	174 (82.9%)
Others	36 (17.1%)
Caste, N (%)	
General	34 (16.2%)
Non-general Caste (Scheduled Caste, Scheduled Tribe, Other Backward Class, Don't know)	176 (83.8%)
Financial difficulty score [a], mean (S.D.), range	7.9 (1.4), 3–9
Patient type, N (%)	
Outpatient	26 (12.4%)
Inpatient	184 (87.6%)
Type of cancer, N (%)	
Lung	49 (23.3%)
Breast	48 (22.9%)
Cervical	32 (15.2%)
Oral	23 (11%)
Colorectal	6 (2.9%)
Gastric	14 (6.7%)
Head and Neck	10 (4.8%)
Other	28 (13.3%)

[a] Financial difficulties score ranges from 3 to 9, where 3 is the lowest financial difficulty and 9 is the highest financial difficulty score

Internal consistency

All instruments demonstrated satisfactory internal reliability, except for the FACIT-SP faith subscale, which had a Cronbach's alpha of 0.48. Specifically, FACT-G total and subscale scores were reliable (total = 0.79; physical = 0.64; social/family = 0.66; emotional = 0.72; functional = 0.71). The BPI total and subscales also showed high reliability (total = 0.89; severity = 0.88; interference = 0.90). HADS demonstrated adequate consistency (total = 0.79; anxiety = 0.77; depression = 0.65), while FACIT-SP total and meaning subscale scores were strong (total = 0.80; meaning = 0.83).

HRQoL outcomes

Participants reported an average FACT-G total score of 62 (SD = 10), with subscale scores lower than those observed in U.S. cancer populations **(Table 3)**. Functional well-being (ES = 1.5; 95% CI: 1.3–1.6) and social/family well-being (ES = 1.1; 95% CI: 1.0–1.3) were particularly lower, indicating poorer overall HRQoL. Mean BPI scores suggested mild to moderate pain, with severity averaging 3.2 (SD = 1.8) and interference averaging 4.0 (SD = 1.6) on a 0–10 scale. HADS scores revealed normal levels of anxiety (mean = 5.6, SD = 3.1) but borderline depressive symptoms (mean = 9.7, SD = 3.3). Spiritual well-being scores averaged 33 (SD = 5.5), which was lower than those reported for advanced cancer patients in the U.S. (ES = 1.1; 95% CI: 0.9–1.3), highlighting reduced spiritual quality of life in this cohort.

Table 3. Patient-reported HRQoL outcomes.

Instrument	**Sub-Domain**	**Hyderabad Patients (N = 210)**	**U.S. Cancer Sample (N = 2236)[a], (N = 156)[b]**	**Cohen's D (95% CI)**
General Well-Being				
FACT-G Total Score (0–108)		62.4 (10.0)	80.9 (17.0)	−1.1 (−1.3, −1.0)
FACT-GP	Physical Well-Being (0–28)	17.0 (4.5)	21.3 (6.0)	−0.7 (−0.9, −0.6)
FACT-GS	Social/Family Well-Being (0–28)	16.2 (3.3)	22.1 (5.3)	−1.1 (−1.3, −1.0)
FACT-GE	Emotional Well-Being (0–24)	20.0 (3.7)	18.7 (4.5)	0.29 (0.2, 0.4)
FACT-GF	Functional Well-Being (0–28)	9.2 (3.8)	18.9 (6.8)	−1.5 (−1.6, −1.3)
Pain Experiences				
BPI-S	Pain Severity (0–10)	3.2 (1.8)	-	-
BPI-I	Pain Interference (0–10)	4.0 (1.6)	-	-
Anxiety/Depression				
HADS Total Score (0–42)[c]		15.3 (5.6)	-	-
HADS-A	Anxiety Sub-Scale (0–21)	5.6 (3.1)	-	-
HADS-D	Depression Sub-Scale (0–21)	9.7 (3.3)	-	-
Spiritual Well-Being				
FACIT-SP Total Score (0–48)		32.7 (5.5)	39.7 (7.2)	−1.1 (−1.3, −0.9)
FACIT-SPMP	Meaning/Peace Sub-Scale (0–32)	20.1 (4.3)	-	-
FACIT-SPF	Faith Sub-Scale (0–16)	12.5 (2.7)	-	-

[a] FACT-G is referenced from Brucker PS, Yost K, Cashy J, Webster K, Cella D. General Population and Cancer Patient Norms for the Functional Assessment of Cancer Therapy-General (FACT-G). Evaluation & the Health Professions. 2005;28(2):192–211

[b] FACIT SP is referenced from Daugherty, C. K., Fitchett, G., Murphy, P. E., Peterman, A. H., Banik, D. M., Hlubocky, F., & Tartaro, J. (2005). Trusting God and medicine:
Spirituality in advanced cancer patients volunteering for clinical trials of experimental agents. Psycho-Oncology, 14(2), 135–146

[c] HADS sub-scales: Normal = 0–7; Borderline abnormal = 8–10; Abnormal = 11–2

Predictors of HRQoL outcomes

Table 4 shows the results from the OLS regression analyses. As expected, greater financial difficulties were associated with poorer functional well-being (FACT-GF), reduced emotional well-being (FACT-GE), lower scores on the meaning/peace domain of spiritual well-being (FACIT-SPMP), and elevated levels of anxiety and depression (HADS, HADS-A, HADS-D). Additionally, consistent with our predictions, patients who were non-Hindu experienced lower physical well-being (FACT-GP) and reported higher pain severity than their Hindu counterparts.

Table 4. Linear regressions of HRQoL outcomes on patient characteristics.

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Instrument	**FACT-G**	**FACT-GP**	**FACT-GF**	**FACT-GE**	**FACT-GS**	**BPI-S**	**BPI-I**	**HADS**	**HADS-A**	**HADS-D**	**FACIT-SP**	**FACIT-SPMP**	**FACIT-SPF**
Description	Total (0–108)	Physical (0–28)	Functional (0–28)	Emotional (0–24)	Social (0–28)	Pain Severity (0–10)	Pain Interference (0–10)	Total (0–42)	Anxiety (0–21)	Depression (0–21)	Total (0–48)	Meaning/Peace (0–32)	Faith (0–16)
Financial Difficulty Score (3–9)	−0.641	0.311	0.438***	0.627***	0.113	0.0831	0.109	1.185***	0.396***	0.789***	−1.312***	−1.238***	−0.0738

	(−0.435)	(−0.205)	(−0.163)	(−0.162)	(−0.159)	(−0.0881)	(−0.0781)	(−0.245)	(−0.137)	(−0.142)	(−0.256)	(−0.196)	(−0.127)
Female	−2.018	−1.228	−0.802	−0.125	0.137	0.129	0.0395	−0.0242	0.287	−0.312	0.272	−0.195	0.467
	(−1.581)	(−0.648)	(−0.587)	(−0.566)	(−0.520)	(−0.290)	(−0.268)	(−0.844)	(−0.459)	(−0.479)	(−0.824)	(−0.582)	(−0.425)
Years of Education	−0.127	0.0343	−0.0633	−0.0404	−0.0577	−0.0107	−0.0129	0.0209	0.0676	−0.0466	−0.0745	−0.0845	0.0101
	(−0.186)	(−0.0827)	(−0.0658)	(−0.0645)	(−0.0572)	(−0.0326)	(−0.0325)	(−0.0835)	(−0.0501)	(−0.0449)	(−0.103)	(−0.0676)	(−0.0552)
Unmarried	0.473	0.0617	−0.0274	−0.860	1.299**	−0.180	−0.268	−1.011	−0.332	−0.679	−1.492	−1.267	−0.225
	(−1.808)	(−0.728)	(−0.649)	(−0.669)	(−0.604)	(−0.319)	(−0.270)	(−1.029)	(−0.585)	(−0.540)	(−0.886)	(−0.651)	(−0.430)
Non-Hindu	−4.522	−2.050**	−0.580	−0.680	−1.212	0.891**	0.447	1.628	1.246	0.382	1.545	0.461	1.084
	(−2.342)	(−0.996)	(−0.861)	(−1.124)	(−0.797)	(−0.381)	(−0.413)	(−1.235)	(−0.782)	(−0.700)	(−1.629)	(−1.155)	(−0.814)
Non-General Caste	−3.546	−1.554	−0.150	−0.479	−1.363	0.745	0.383	0.479	0.643	−0.164	1.784	0.804	0.980
	(−2.345)	(−1.058)	(−0.933)	(−0.997)	(−0.816)	(−0.424)	(−0.461)	(−1.296)	(−0.883)	(−0.692)	(−1.626)	(−1.145)	(−0.890)
Age	0.0192	0.0380	−0.0238	0.0220	−0.0171	−0.0168	−0.00566	0.0427	0.0179	0.0248	−0.0126	−0.0180	0.00536
	(−0.0663)	(−0.0280)	(−0.0238)	(−0.0234)	(−0.0227)	(−0.0122)	(−0.0115)	(−0.0371)	(−0.0200)	(−0.0213)	(−0.0342)	(−0.0266)	(−0.0144)
Constant	71.54***	14.85***	14.62***	24.81***	17.26***	2.597**	3.062***	3.334	0.565	2.769	42.34***	30.71***	11.63***

	(−5.774)	(−2.445)	(−2.132)	(−2.423)	(−2.110)	(−1.101)	(−1.022)	(−3.319)	(−1.801)	(−1.939)	(−3.721)	(−2.694)	(−1.746)
Observations	210	210	210	210	210	210	186	210	210	210	210	210	210

In contrast to our initial expectations, patients who were unmarried exhibited greater social and family well-being compared with their married counterparts. When an expanded regression model was tested—one that included an interaction term between gender and marital status—neither marital status nor its interaction with gender served as significant predictors of social/family well-being. Nevertheless, unadjusted mean comparisons using independent *t*-tests indicated that married women demonstrated significantly lower levels of social/family well-being than unmarried women (mean score: married women = 15.84; unmarried women = 17.79; $p = 0.0077$). Variables such as years of education, gender, and caste showed no statistically significant relationship with any of the measured outcomes.

Relationship between pain and HRQoL indicators

Table 5 displays the findings from sixteen separate regression analyses that examined whether scores on the BPI-S and BPI-I scales predicted various aspects of general well-being (FACT-G, FACT-GP, FACT-GF, FACT-GE, FACT-GS), as well as levels of anxiety and depression (HADS), after controlling for relevant covariates. Supporting our hypotheses, both greater pain severity and greater pain interference were strongly linked to poorer outcomes across nearly all domains of general well-being, anxiety, and depression ($p \leq 0.01$ for all comparisons). The only exceptions were the associations between BPI-S and FACT-GE ($p > 0.10$) and between BPI-I and FACT-GS ($p \leq 0.05$), which did not reach strong statistical significance.

Table 5. Association between HRQoL outcomes and pain experience.

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Instrument	**FACT-G**	**FACT-GP**	**FACT-GF**	**FACT-GE**	**FACT-GS**	**HADS**	**HADS-A**	**HADS-D**
Description	Total (0–108)	Physical (0–28)	Functional (0–28)	Emotional (0–24)	Social (0–28)	Total (0–42)	Anxiety (0–21)	Depression (0–21)
BPI-S	−2.545***	−1.322***	−0.632***	−0.236	−0.355***	0.709***	0.380***	0.329***
	(0.331)	(0.137)	(0.138)	(0.122)	(0.131)	(0.205)	(0.114)	(0.116)
BPI-I	−3.596***	−1.354***	−0.986***	−0.984***	−0.272**	1.297***	0.679***	0.618***
	(0.361)	(0.160)	(0.175)	(0.175)	(0.136)	(0.198)	(0.122)	(0.114)
Observations	210	210	210	210	210	210	210	210

Coefficients (Robust standard errors)
BPI-S: 0–10 where 10 is highest pain severity; BPI-I: 0–10 where 10 is highest pain interference; HADS-A and HADS-D: 0 to 21 where 21 is the highest anxiety/ depression score
Each cell represents the beta coefficient for BPI-S/BPI-I, adjusted for financial difficulty, female, years of education, unmarried, non-Hindu, non-General caste, and age
*** $p < 0.01$, ** $p < 0.05$

This research utilized data from a cross-sectional survey conducted among advanced cancer patients attending a regional cancer center in India, with the primary objective of assessing HRQoL and its sociodemographic correlates. The results revealed that participants in this study demonstrated lower levels of overall and spiritual well-being compared with a reference sample of cancer patients from the United States. Patients generally experienced mild to moderate levels of pain and showed normal anxiety scores but symptoms indicative of borderline depression. Elevated financial difficulty was a strong negative predictor across most HRQoL domains, while belonging to a minority religion was associated with poorer physical well-being and increased pain intensity. In contrast, variables such as years of education, gender, and caste were not statistically significant predictors in this sample. Interestingly, married women displayed lower social and family well-being compared to unmarried women. Furthermore, both pain severity and pain interference were found to significantly predict HRQoL outcomes.

General well-being

Relative to U.S. cancer patients, individuals in this cohort reported markedly reduced functional, physical, emotional, and social/family well-being, with the largest differences observed in the functional and social/family domains. The low average education level (mean = 2.8 years) suggests that many patients and their families may have limited understanding of the illness, its trajectory, and supportive care options, potentially contributing to diminished social and family support. Cultural stigma surrounding advanced cancer in India may further compound these challenges, limiting open communication and emotional exchange within families. From a systemic perspective, this disparity could also be attributed to the limited presence of allied healthcare services—such as physiotherapy, counseling, and social work—in Indian public health institutions, compared to the more comprehensive support structures available in high-income countries [44].

Pain severity and interference

Although the study site offered palliative care services with access to opioid prescriptions for severe pain, most participants reported only mild to moderate pain severity and interference. This contrasts with the broader national context, where less than 3% of cancer patients have access to adequate pain relief, primarily due to regulatory barriers that restrict the distribution of oral morphine in India [24]. Consequently, it is likely that patients in regions without dedicated palliative services experience even greater pain-related distress. In our analysis, pain interference was strongly associated with physical well-being as well as anxiety and depression, while pain severity predicted nearly all domains except emotional well-being. The observed relationships between pain interference and both emotional and social/family dimensions underscore the multidimensional nature of pain's impact. Although similar findings have been reported elsewhere [45, 46], these results reinforce the critical need for healthcare professionals to adopt comprehensive pain management strategies that address not only physical symptoms but also psychosocial consequences.

Anxiety, depression, and spiritual well-being

Participants in this study exhibited depressive symptoms consistent with borderline depression and reported lower spiritual well-being compared to U.S. cancer patients. These outcomes suggest that individuals with advanced cancer in this context receive minimal psychosocial or spiritual care—either from healthcare institutions or religious networks. This lack of holistic support reflects a broader pattern documented across many low- and middle-income countries, where such services remain underdeveloped [47].

Predictors of HRQoL

Among all predictors examined, financial strain emerged as the most significant factor associated with diminished HRQoL. This observation aligns with prior evidence indicating that socioeconomic disadvantage correlates with poorer physical, psychological, and social outcomes [26, 48–50]. Notably, even though cancer treatment at the study site was provided free of charge, patients reporting higher financial difficulty scores still experienced worse quality-of-life indicators. This may reflect the indirect economic consequences of illness, such as the loss of income among patients and caregivers [51], which exacerbates financial stress and household burdens. These findings highlight the importance of incorporating **financial screening and targeted assistance programs** into cancer care services—even in publicly funded healthcare settings—to mitigate the broader social and economic impacts of cancer.

Religion, pain, and health inequities

In our sample, patients belonging to minority religions reported poorer physical well-being and experienced higher pain levels. This pattern may reflect underlying health disparities among religious groups that are socially disadvantaged in India [52, 53]. Insights from the U.S. context suggest that unrelieved pain in marginalized racial groups often arises from restricted access to healthcare, insufficient availability of pain medications, and limited engagement with pain specialists [54]. Cultural factors may also play a role: it is possible that patients practicing Hinduism tolerate or interpret pain differently than those from other religions [32]. While direct comparisons of pain perception between religious groups are lacking, prior studies indicate that greater acceptance of pain is linked to lower self-reported pain and better functional outcomes [55]. Future investigations should focus on religious disparities in healthcare access, health status, and pain management among advanced cancer patients, to clarify whether tailored interventions are needed.

Marital status and social/family well-being

Another noteworthy finding concerns the complex relationship between marital status and social/family support. Contrary to prior research [48] and our expectations, marriage did not consistently correspond to higher social well-being. In fact, unmarried women had higher social/family well-being scores than married women. In the Indian context, married women—who often hold relatively lower social status—may lose informal social support when they become seriously ill [56, 57]. Further research is warranted to explore how advanced cancer impacts marital and familial relationships, and to evaluate psychosocial strategies that could strengthen support networks throughout the disease course.

Study limitations

This study has several limitations that should be noted. First, participants were recruited from a single cancer hospital in Hyderabad, which may limit the applicability of results to other regions. Nevertheless, this hospital is the only government cancer center in Telangana and Andhra Pradesh, serving a population of roughly 85 million. Second, the sample was non-random, and patients unaware of their cancer diagnosis or unable to complete the survey due to cognitive impairment were excluded. In India, it is common for families to request that physicians withhold cancer diagnoses from patients, meaning a substantial proportion of advanced cancer patients may be uninformed [58, 59]. As a result, our sample may not fully reflect the broader advanced cancer population in the region. Third, comparisons with U.S. patients did not account for demographic or disease severity differences. Nonetheless, this is the first study in India to examine sociodemographic predictors across all HRQoL domains using standardized instruments. Finally, social desirability bias may have affected responses, given the stigma associated with cancer in India [60].

Conclusion

Our study examined HRQoL outcomes among stage 4 cancer patients in a regional Indian hospital and explored their sociodemographic determinants. Participants reported low well-being across physical, functional, emotional, social/family, and spiritual domains, alongside borderline depressive symptoms. Vulnerable groups included those experiencing financial hardship, individuals from minority religions, and married women, who reported lower social/family well-being. Additionally, pain severity and interference were strongly linked to nearly all aspects of HRQoL. These findings highlight the need for targeted interventions for at-risk groups and emphasize the importance of addressing both pain management and psychosocial support. Future studies should also include patients who are unaware of their diagnosis or cognitively impaired, to capture a more comprehensive picture of HRQoL among advanced cancer patients.

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