



www.bioinformation.net
Volume 22(8)



Research Article

Received August 1, 2026; Revised August 31, 2026; Accepted August 31, 2026, Published August 31, 2026

DOI: 10.6026/973206300224721

SJIF 2026 (Scientific Journal Impact Factor for 2026) = 8.478

2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

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Citation: Aggarwal *et al.* Bioinformation 22(8): 4721-4726 (2026)

Cancer prevention and screening awareness among informal caregivers in India: A cross-sectional survey

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Abstract:

Informal caregivers of cancer patients often have inadequate awareness and uptake of cancer prevention and early detection practices despite their important role in health promotion. Therefore, it is of interest to assess the knowledge, attitudes and practices related to cancer prevention and screening among caregivers attending a tertiary cancer center in Delhi, India. Moderate awareness of cancer risk factors was observed, but participation in recommended screening programs remained low, particularly among non-healthcare professionals. Lack of awareness and fear of diagnosis were identified as the major barriers to screening uptake. Thus, data shows that identifying specific educational gaps and behavioral barriers that can guide targeted interventions to improve preventive health practices and early cancer detection among caregivers.

Keywords: Awareness, attitude, cancer, caregivers, detection, knowledge, practice, prevention, screening

Background:

Cancer ranks as a leading cause of worldwide morbidity and mortality, a burden that is projected to rise substantially over the coming decades [1]. In low- and middle-income countries (LMICs) such as India, late-stage presentation continues to be a major barrier to reducing cancer-related mortality, highlighting the crucial role of prevention and early detection [2]. Prevention and early detection are pillars of effective cancer control. Persistent infection with high-risk strains of human papillomavirus (HPV) accounts for almost all cases of cervical cancer and universal HPV vaccination, combined with systematic screening programmes, offers a realistic pathway to eliminating cervical cancer as a public health problem [3]. Similarly, breast cancer screening through regular mammography and clinical examination and colorectal cancer screening through colonoscopy or stool-based tests, are associated with significant reductions in cancer-specific mortality when implemented properly at population level [4, 5]. Informal caregivers, predominantly family members (first degree relatives, in this instance) or close friends, provide the backbone of cancer care. In LMICs, many individuals take on caregiving roles without prior mental or emotional preparation. They lack formal training, required psychosocial support and access to health information [6]. Their close day-to-day involvement to the cancer care environment positions them as a priority population with unmet needs for health education and primary prevention. Having personally seen the effects of late diagnosis, they may be more motivated to adopt preventive behaviors [7]. Despite this potential, the KAP of informal caregivers regarding cancer prevention and screening remains barely explored in the Indian subcontinent. The few available literatures suggest that gaps in understanding of cancer etiology, lack of awareness of screening protocols and prevailing socio-cultural barriers significantly hinder preventive health-seeking practices among this population [8]. Cancer hospitals, as critical points of contact for caregivers, represent an ideal, yet underutilized, setting for opportunistic health education [9]. Therefore, it is of interest to assess the knowledge, attitudes and practices regarding cancer prevention and early detection screening among informal caregivers of cancer patients attending a tertiary cancer center in Delhi, India.

Methodology:

This Knowledge, Attitude and Practice study was conducted at Rajiv Gandhi Cancer Institute & Research Centre (RGCIRC), a tertiary care oncology facility situated in Rohini, Delhi, India. Data was collected over the period of July 2024 - January 2025. The aim of the study was to focus on informal caregivers, primarily first-degree relatives, spouses, other family members and close friends of cancer patients, aged 18 years and above, attending the Preventive Oncology outpatient department (OPD) or its waiting areas. Inclusion criteria were: (i) age 18 years and above, (ii) serving as an informal caregiver to a cancer patient, (iii) willingness to provide written informed consent and (iv) ability to engage and respond to the questionnaire in either Hindi or English. Exclusion criteria included: (i) individuals providing paid caregiving services, (ii) personal history of cancer, (iii) those unable to provide informed written consent and (iv) doctors and nurses. A total of 500 informal caregivers were recruited using convenience sampling over the study period. Participants were approached in the outpatient waiting areas or during visits to the Preventive OPD. A structured, validated, bilingual (Hindi and English) questionnaire was designed based on existing studies conducted by oncologists and public health professionals. The questionnaire covered the following domains: (i) socio-demographic characteristics (age, gender, education, occupation, relationship to patient, duration of caregiving, tobacco use), (ii) cancer knowledge (risk factors, signs and symptoms, lifestyle modifications), (iii) knowledge of screening methods (breast, cervical, prostate and oral cancer), (iv) attitudes towards cancer prevention and screening (misconceptions regarding cancer spread and biopsy) and (v) preventive practices and barriers (HPV vaccination awareness, history of screening, perceived barriers). A written consent was obtained and the questionnaire was administered to the participant in person, with responses recorded in accordance with confidentiality and anonymity. Descriptive statistics were used to summarize demographic characteristics and KAP responses. Categorical variables were presented as frequencies and percentages. Associations between demographic variables and knowledge, attitude, or practice scores were assessed using chi-square tests/Fisher's exact test, as appropriate. A p-value of <0.05 was considered statistically significant. Data analysis was done in SPSS version 24. Ethical considerations were addressed,

as the study protocol was reviewed and approved by the Institutional Ethics Committee (IEC) of RGCIRC (RGCIRC/IRB-BHR/44/2024). Participants were informed about the study objectives, the voluntary nature of participation, their right to withdraw at any stage without consequence and the measures adopted to ensure confidentiality. Written informed consent was obtained from each participant before proceeding and participant anonymity was maintained throughout. Participation was entirely voluntary, with no financial incentives offered. Responders who had knowledge gaps regarding cancer prevention or screening were provided with brief health education and directed to the Preventive Oncology OPD for further counseling, in line with the study's commitment to participant welfare.

Results:

A total of 500 informal caregivers participated in the study. Their socio-demographic profiles are summarised in **Table 1**. The sample was predominantly male, with 286 male participants (57%) compared to 214 female participants (43%). The age distribution revealed that the largest proportion of caregivers were aged 50 years and above (n=222, 44%), suggesting that caregiving responsibilities in cancer settings tend to fall more heavily on older adults. This was followed by those in the 40–49 year age group (n=105, 21%), the 30–39 year group (n=89, 18%) and the youngest cohort aged 18–29 years (n=84, 17%). In terms of educational qualifications, the majority of caregivers had completed graduation (n=237, 48%), followed by those with postgraduate qualifications (n=146, 29%). A smaller but notable proportion had completed schooling up to the 8th–12th standard (n=91, 18%), while only 26 participants (5%) had received less than an 8th standard education. This relatively high educational profile of the sample may reflect the urban, tertiary care setting in which the study was conducted. Notably, the vast majority of caregivers were non-healthcare professionals (n=429, 86%), with healthcare professionals constituting the remaining 14% (n=71). With respect to the caregiver's relationship with the patient, first-degree relatives formed the largest group (n=279, 56%). Spouses accounted for 19% (n=97) of the sample, while friends and others comprised 18% (n=49) and second-degree relatives represented the smallest relational category at 7% (n=37). The duration of caregiving varied considerably across the sample. While 43% of caregivers (n=213) had been in their caregiving role for less than six months, a substantial proportion had been providing care for six to twelve months (n=119, 24%) or for more than twelve months (n=167, 33%). Taken together, over half the sample (57%) had been caregiving for six months or longer, reflecting the prolonged and often open-ended demands placed on informal caregivers in oncology settings. Regarding tobacco use, the majority of participants reported never having used tobacco (n=381, 77%). Current tobacco users accounted for 12% of the

sample (n=62), while 11% (n=57) were former users who had since quit. Gender-stratified analysis revealed a statistically significant difference in tobacco use patterns between male and female caregivers (p<0.001), with a higher proportion of current users observed among males compared to females. Knowledge data are summarized in **Table 2**. Approximately 64% of participants (n=319) believed that cancer is a preventable disease. Awareness of key lifestyle modifications was high: 90% recognized tobacco cessation, 88% cited increased fruit and vegetable intake and 86% were aware of the importance of maintaining a healthy weight as protective measures against cancer. Knowledge of oral cancer risk factors was more variable: while 84% correctly identified tobacco and alcohol consumption as risk factors, only 16% recognized processed food, 11% identified lack of physical activity and a mere 5% mentioned excessive sun exposure in the context of oral cavity cancer. Regarding screening-specific knowledge, only 25% of female participants correctly identified the recommended frequency of self-breast examination (monthly). Sixty-eight percent identified mammography as the correct test for early detection of breast cancer and 67% knew the recommended frequency of mammography for women over 40 years of age. Approximately 62% correctly identified Pap smear as a cervical cancer screening test and 60% correctly attributed cervical cancer to HPV infection. Knowledge of prostate cancer screening was notably poor: only 17% of male caregivers correctly identified PSA (prostate-specific antigen) testing as the primary prostate cancer screening tool. Higher educational attainment was significantly associated with better knowledge of cancer screening tests in both male and female subgroups (p<0.001). Attitudes and practices data are presented in **Table 3**. While 64% of participants expressed belief in the preventability of cancer, gaps in attitudes and practices were considerable. Twenty-two percent were unsure whether cancer can spread from person to person and 20% incorrectly believed that biopsy causes cancer to spread. Only 40% of participants were aware of the HPV vaccine and a mere 13% reported that a family member had received it. Actual preventive practice was strikingly low. Only 20% of participants reported having ever been recommended cancer screening by a physician and only 18% had ever undergone any form of cancer screening. Among female participants specifically, 80% had never undergone cancer screening and qualification level and age were not found to be significantly associated with lack of engagement in HPV vaccination or cancer screening. The most commonly reported barriers to cancer screening were lack of awareness or information (72%), fear of receiving a cancer diagnosis (47%), financial constraints (39%), cultural beliefs (18%) and time constraints (13%). Limited geographical access was reported by only 1% of participants. Five percent reported all barriers simultaneously.

Table 1: Socio-Demographic characteristics of caregivers (n=500)

Category	Sub-Category	n (%)
Age Group (Years)	18–29	84 (17)
	30–39	89 (18)
	40–49	105 (21)

Gender	≥50	222 (44)
	Male	286 (57)
Education	Female	214 (43)
	Less than 8th Standard	26 (5)
	8-12 Standard	91 (18)
Occupation	Graduate	237 (48)
	Post-Graduate	146 (29)
	Allied Healthcare Professional/Paramedical Staff	71 (14)
	Non-Healthcare Professional	429 (86)
Relationship with Patient	First Degree Relative	279 (56)
	Spouse	97 (19)
	Second Degree Relative	37 (7)
Duration of Caregiving	Friends and Others	49 (18)
	<6 Months	213 (43)
	6-12 Months	119 (24)
Tobacco Use	>12 Months	167 (33)
	Current User	62 (12)
	Never Used	381 (77)
	Quit	57 (11)

Table 2: Knowledge of cancer risk factors and screening (n=500)

Knowledge Question / Parameter	Correct / Yes n (%)	Incorrect / No / Unsure n (%)
Lifestyle changes - Quitting Tobacco	452 (90)	48 (10)
Lifestyle changes - Increasing Fruits & Vegetables	442 (88)	58 (12)
Lifestyle changes - Maintaining Healthy Weight	430 (86)	70 (14)
Lifestyle changes - All of the Above	410 (82)	90 (18)
Oral Cancer Risk - Tobacco & Alcohol Consumption	419 (84)	81 (16)
Oral Cancer Risk - Eating Processed Food	78 (16)	422 (84)
Oral Cancer Risk - Lack of Physical Activity	53 (11)	447 (89)
Oral Cancer Risk - Excessive Sun Exposure	30 (5)	468 (94)
Correct Frequency of Self Breast Examination	124 (25)	376 (75)
Correct Test for Early Detection of Breast Cancer	339 (68)	161 (32)
Correct Frequency of Mammogram (Women >40 yrs)	337 (67)	163 (33)
Pap Smear - Correct Identification as Cervical Cancer Screen	310 (62)	190 (38)
Correct Screening Test for Prostate Cancer (PSA)	86 (17)	414 (83)
Cervical Cancer Caused by HPV - Correct Response	301 (60)	199 (40)

Table 3: Attitudes and practices toward cancer prevention and screening (n=500)

Statement / Parameter	Yes n (%)	No n (%)
Cancer can be prevented	319 (64)	181 (36)
Aware of HPV Vaccine	198 (40)	302 (60)
Family member has taken HPV Vaccine	64 (13)	436 (87)
Cancer can spread from person to person	Yes: 34 (7)	354 (71)
	Not Sure: 112 (22)	
Biopsy causes cancer to spread	100 (20)	255 (51)
Doctor ever recommended cancer screening	99 (20)	401 (80)
Ever undergone cancer screening	90 (18)	410 (82)
Common Barriers to Cancer Screening	n (%)	—
Lack of Information / Awareness	360 (72)	140 (28)
Fear of Diagnosis	234 (47)	266 (53)
Financial Constraints (Cost)	196 (39)	304 (61)
Cultural Beliefs / Constraints	91 (18)	409 (82)
Time Constraints	65 (13)	435 (87)
Location / Access Issues	7 (1)	493 (99)
All Barriers Combined	27 (5)	473 (95)

Discussion:

The results from this study show that informal caregivers of cancer patients in a tertiary oncology setting possess moderate awareness about cancer risk factors, but significant gaps exist in their understanding of cancer biology and screening practices. This is consistent with findings from several other studies that have explored the Knowledge, Attitude and Practice (KAP) of caregivers in the context of cancer prevention and screening. For example, in a study by Bodhare *et al.* (2026) [10], it was found that caregivers exhibited substantial knowledge about the risk factors for cancer but were less informed about preventive measures such as screening and vaccination. Similarly Gurayah

et al. (2022) [11] observed that caregivers’ attitudes towards cancer prevention were generally positive, but practical barriers, such as lack of time and financial constraints, significantly limited the uptake of cancer screening. This pattern aligns with the present study, where 72% of caregivers reported a lack of awareness or information as a major barrier to cancer screening and 47% expressed fear of receiving a cancer diagnosis. Moreover Ajith *et al.* (2022) [12] highlighted in their research that, while caregivers showed awareness of cancer as a preventable disease, misconceptions about cancer spread, such as the belief that biopsy can cause cancer to spread, were prevalent. This is echoed in our study, where 20% of caregivers

incorrectly believed that biopsy caused cancer to spread. These misconceptions underscore the need for targeted educational interventions to address misunderstandings and to provide caregivers with accurate, evidence-based information about cancer biology. Alhassan *et al.* (2025) [13] reported that despite high awareness of cancer prevention, individuals in their study were less likely to engage in routine screening due to various barriers, including lack of physician recommendations. In our study, only 20% of participants had ever been recommended cancer screening by a doctor and only 18% had undergone any form of cancer screening. This highlights the importance of incorporating caregivers into the cancer care continuum not only as supporters of patients but also as participants in their own preventive care. Furthermore, the study by Molassiotis and Wang (2022) [14] on caregivers' involvement in cancer prevention emphasized the importance of caregiver education in improving health behaviors within families. Their research suggested that caregivers who received targeted health education were more likely to promote cancer prevention within their families. This aligns with our findings, which suggest that caregivers with higher educational levels exhibited better knowledge of screening tests, highlighting the potential benefits of integrating health education into routine oncology care. The study also found that cultural beliefs, as observed by Akin-Odanye and Husman (2021) [15] could impact caregivers' willingness to participate in cancer prevention activities. Further supporting these observations, Rademaker *et al.* [16] reported that health literacy and educational attainment significantly influence knowledge, attitudes and participation in cancer prevention programs. Individuals with better health literacy were more likely to recognize cancer warning signs, understand the benefits of screening and engage in preventive health behaviors. This finding is consistent with the present study, where caregivers with higher educational qualifications showed significantly better knowledge regarding available cancer screening tests than those with lower educational levels. Similarly, Wang *et al.* [17] showed that awareness alone is insufficient to improve screening uptake unless accompanied by accessible healthcare services, physician guidance and supportive public health initiatives. Their study highlighted that healthcare provider recommendations remain one of the strongest predictors of participation in cancer screening. In the present study, only one-fifth of caregivers reported ever receiving a physician's recommendation for cancer screening, suggesting missed opportunities for preventive counseling during routine oncology visits. Comparable findings were reported by Aggarwal *et al.* [18], who observed that inadequate knowledge, fear of diagnosis, financial limitations and poor physician counseling collectively contributed to the low utilization of cancer screening services among adults. They emphasized that structured awareness campaigns and regular counseling by healthcare professionals could substantially improve screening participation. These observations closely parallel the present findings, where lack of awareness, fear of diagnosis and limited medical recommendations emerged as the principal barriers preventing caregivers from undergoing

screening. More recently, Sundar *et al.* [19] showed that educational interventions targeting caregivers and the general population significantly improved knowledge, attitudes and willingness to participate in cancer screening programs. Their findings suggested that integrating cancer education into routine healthcare encounters can effectively reduce misconceptions and encourage early detection practices. This supports the present study's recommendation that caregiver-focused education should become an integral component of oncology services. Since informal caregivers frequently influence healthcare decisions within their families and communities, improving their knowledge may have broader public health benefits by increasing cancer awareness, promoting timely screening and facilitating earlier diagnosis beyond the individual caregiver population.

Conclusion:

Informal caregivers of cancer patients have moderate awareness of cancer risk factors but lack understanding of cancer biology and proper screening practices. Health education and prevention strategies for caregivers can empower them as informed health advocates, positively impacting community awareness and health literacy. Thus, integrating evidence-based interventions into routine oncology care can bridge gaps, reduce fears and promote early detection, contributing to a reduction in cancer burden in India.

References:

- [1] <https://www.who.int/news/item/01-02-2024-global-cancer-burden-growing--amidst-mounting-need-for-services>
- [2] Mangayarkarasi V *et al.* *Cureus*. 2025 **17**:e78808. [PMID: 40078237]
- [3] Basoya S & Anjankar A. *Cureus*. 2022 **14**:e31312. [PMID: 36514565]
- [4] Shete S *et al.* *JAMA Netw Open*. 2021 **4**:e2128000. [PMID: 34605915]
- [5] Champion VL *et al.* *Am J Prev Med*. 2020 **59**:e69. [PMID: 32690203]
- [6] Saini SK *et al.* *Asian Pac J Cancer Prev*. 2026 **27**:1287. [PMID: 41945946]
- [7] Evans Webb M *et al.* *J Cancer Educ*. 2021 **36**:899. [PMID: 33492650]
- [8] Sahu DP *et al.* *J Family Med Prim Care*. 2020 **9**:2214. [PMID: 32754476]
- [9] Reblin M *et al.* *J Cancer Educ*. 2022 **37**:1634. [PMID: 33783762]
- [10] Bodhare T *et al.* *Cureus*. 2026 **18**:e103131. [PMID: 41809310]
- [11] Gurayah AA *et al.* *JAMA Netw Open*. 2026 **9**:e267024. [PMID: 41979877]
- [12] Ajith K *et al.* *J Family Med Prim Care*. 2023 **12**:282. [PMID: 37091005]
- [13] Alhassan NS *et al.* *J Multidiscip Healthc*. 2025 **18**:1335. [PMID: 40060990]
- [14] Molassiotis A & Wang M. *Curr Treat Options Oncol*. 2022 **23**:494. [PMID: 35286571]

- [15] Akin-Odanye EO & Husman AJ. *Ecancermedicalscience*. 2021 **15**:1308. [PMID: 34824631]
- [16] Rademaker C et al. *J Public Health (Berl.)*. 2022 **30**:1995. [DOI: 10.1007/s10389-021-01688-7]
- [17] Wang C et al. *Sci Rep*. 2025 **16**:14. [PMID: 41326503]
- [18] Aggarwal R et al. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2023 **12**:3484. [DOI: 10.18203/2320-1770.ijrcog20233622]
- [19] Sundar JS et al. *Asian Pac J Cancer Biol*. 2025 **10**:799. [DOI: 10.31557/apjcb.2025.10.4.799-804]
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