REVIEW ARTICLE

Public Health Awareness of Breast Cancer in Rural India: A Comprehensive Review

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ABSTRACT

Objective: This comprehensive review endeavours to evaluate the degree of breast cancer awareness among rural Indian women.

Methods: The PRISMA guideline was followed in this systematic review. Qualitative and quantitative literature from 2000-2023 was searched in PubMed, Science Direct, Medline and Google Scholar. Individuals in India were targeted, with a cross-sectional or prevalence-based approach in healthcare settings. Studies stating health awareness values were gathered from adult breast cancer patients or those without cancer were included. Papers were limited to English, 2012-2022. Duplicate, meta-analyses, non-human, inadequate data and non-English publications were excluded. Grey literature was searched, but access limitations were faced.

Result: Widespread lack of awareness about breast cancer, coupled with limited access to screening, contributes to late diagnoses and increased mortality. Cultural stigma surrounding breast health impedes early detection and intervention. Inadequate healthcare, especially in rural areas, poses challenges to effective cancer care. Financial constraints hinder access to necessary medical services.

Conclusion: A holistic approach involving awareness campaigns, improved infrastructure, increased screening accessibility, and efforts to destigmatize breast health is required. Collaborative endeavors by stakeholders are crucial to mitigate breast cancer's impact on the Indian population and improve healthcare awareness, especially in rural areas.

Keywords: Awareness, Breast Cancer, Public health, rural population, India

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INTRODUCTION

The total burden of breast cancer is projected to surpass 2 million cases worldwide, with a disproportionate impact on developing countries.[1] Breast cancer in Indian context, accounts for 13.5% of all cancer cases and 10.6% of all cancer-related deaths in 2020.[2] The incidence and mortality of breast cancer are increasing, with cases occurring at younger ages.[3] Numerous risk factors have been acknowledged, including nulliparity, late pregnancy, lack of breastfeeding,[4] genetic or family history, and lifestyle habits[5]. Interestingly, studies have found that women with high fertility and early childbirth have a minor threat of breast cancer compared to those with late motherhood.[6] This suggests that the declining fertility rate and delayed marriage in India may be associated with the rising incidence of breast cancer.[7] The elevated mortality associated with breast cancer can be attributed to inadequate public awareness, delayed diagnosis, and restricted access to efficacious treatments.[8] Socioeconomic and cultural factors, such as poverty, poor health-seeking behavior, gender inequality in healthcare access, and social stigma, are also contributing to cancer-related deaths.[9]

The elevated fatality rate among females due to breast cancer is exacerbated by the delayed identification of the risk factors.[10] It is essential to evaluate the magnitude and quality of knowledge of overall cancer among the Indian population, given the increasing number of cases and the disproportionately high death rate.[11] This is especially important since women in India are diagnosed at an average age ten years younger than their Western counterparts.[12,13] Conducting a comprehensive cancer awareness evaluation is vital in developing effective health interventions, including targeted campaigns that engage both male and female groups and promote early detection and treatment.[14] Despite long-standing nationwide efforts, such as the National Cancer Control Program,[15] many studies have reported poor awareness and knowledge about breast cancer, particularly among rural Indian women. They exhibit limited understanding of its symptoms, self-examination, early diagnosis, and associated risk factors.[16] Illiteracy or low educational attainment, lack of medical literacy, lack of exposure to mass media or internet also contribute to poor awareness about breast cancer.[17] This comprehensive review seeks to evaluate the awareness and comprehension of breast cancer among rural Indian women.

METHODOLOGY

This comprehensive systematic review adhered to the established principles outlined in the recommended preferred reporting guidelines for conducting systematic reviews and meta-analyses of relevant studies on the topic of breast cancer (Figure 1).

Study selection: An exhaustive systematic search was conducted on qualitative and quantitative literature published from 2012 to 2022. The search was performed via internet databases including PubMed, Science Direct, Medline and Google Scholar. The search was conducted from 18 November 2023 to 15 January 2024. The keywords utilised are enumerated in four different databases are given below:

'Breast Cancer' OR 'Breast Neoplasms' OR 'Breast Cancer Lymphedema' OR 'Unilateral Breast Neoplasms'. The search terms for population includes 'Indian population' OR 'India'. The search term for outcome was 'awareness' OR 'Metacognition' OR 'knowledge attitude practice' OR 'KAP'.

Search strategy: The PECO framework was employed to create a question for this systematic review, considering the population, exposure, comparator, and outcome variables.

Population	Rural Indian population OR Rural India.
Exposure	Socio-economic characteristics of a study population
Comparator	Populations with different levels of awareness about breast cancer
Outcome	Awareness OR Metacognition

The search results were subsequently restricted to studies that were published in English and consisted of original articles from randomised controlled trials conducted in India.

Inclusion criteria: This study encompasses research undertaken in India, specifically targeting the sociodemographic of individuals. The study may adopt either a cross-sectional or prevalence-based approach and can be conducted in many settings, including hospitals, nursing homes (Government and private), or community residences. This study examined the prevalence of knowledge and awareness about various cancer types, with a particular focus on breast cancer screening.

This diagnostic approach utilized both closed-ended and open-ended questionnaires to gain a comprehensive understanding of the population's knowledge and perceptions on these important health topics. Studies with titles or abstracts that clearly stated that health awareness values were gathered from adult breast cancer patients or individuals without breast cancer were included. **Only English-language papers were included from 2012-2022.**

Exclusion criteria: We excluded articles that were duplicate publications, meta-analyses, or systematic reviews. We have also disregarded research conducted on non-human species (i.e. animal studies), studies that provided inadequate data, and studies published in languages other than English. We ran a comprehensive search for grey literature across many search engines, but we encountered limitations in accessing all of the available grey literature sources.

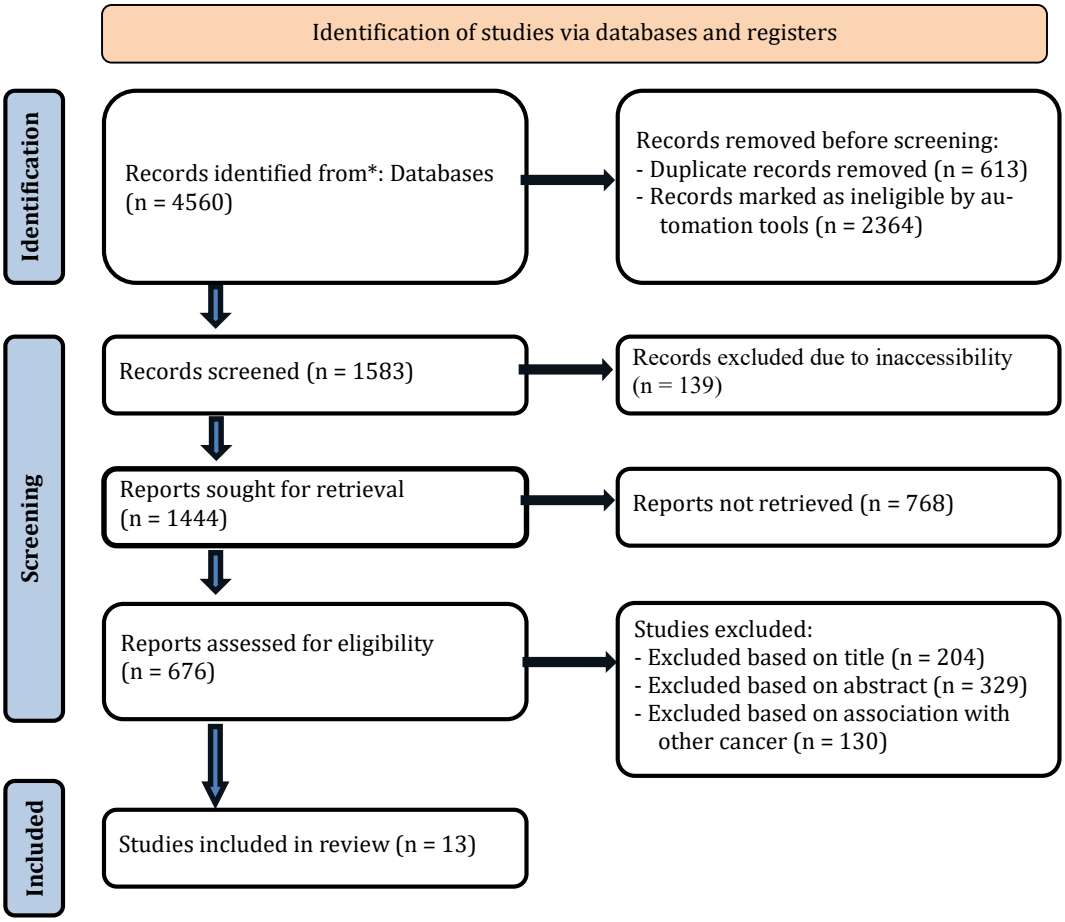

Figure 1: Flowchart showing the steps followed for data search and extraction

Study selection: One reviewer screened abstracts and full texts of all retrieved citations to determine eligibility as per the study. The data extraction from the eligible material was carried out autonomously by two reviewers (DB and ST) in directive to ensure accuracy and reliability of the findings. Study information (location, year of study, participants, inclusion criteria, sample size) and results were used to extract the data (number and total). Co-authors' discussions helped to settle disagreements by the third and fourth author (MB and RLF). For analysis, the data were added from different databases further collected in the Zotero Reference Manager folder for future analysis.

Data Extraction: The selected articles were imported to the Zotero library, and if the discrepancies were found in the data, then articles were discussed and finally excluded by the four authors. The summary of the selected studies was recorded in the Excel 2010, which include: author's name, year of publication, objective/s, study design, study setting, methodology, study population, sample size and major findings.

Quality Assessment: The GRADE system was implemented to assess the quality of the studies. The quality assessment of the cited publications was determined by evaluating key attributes such as study design, data inconsistency, risk of biasness, and clarity of text. The studies of satisfactory and superior quality were included.

Data Presentation

Types of study design: A total thirteen studies were considered to investigate the awareness regarding breast cancer among the rural women of India and how their socio-economic status is affecting the awareness level. Among the listed researches, only one (n=1/13) is a longitudinal, follow-up-based study, and the rest (n=12/13) follows a cross-sectional study design to opt the data.

Assessment tool of awareness: A narrative synthesis was performed by categorising the outcomes into three assessment instruments. Three studies (n=3/13) used KAP questionnaires. In addition, two more research investigations utilised qualitative methodologies, specifically IDI and FGDs (In-depth interviews and focus group discussions) (n=2/13). The remaining eight studies (n=8/13) employed pre-structured questionnaires to assess the level of awareness among different populations concerning breast cancer.

RESULTS

A wide-ranging search was conducted across various electronic databases, yielding an initial total of 4,560 potentially relevant studies. Using targeted keywords, PubMed identified 50 publications, Science Direct identified 512 publications, Medline identified 12 publications, while Google Scholar yielded ap-

proximately 3,990 articles that were deemed pertinent to the subject under investigation. Of these, 12 articles that satisfied the pre-determined inclusion criteria were selected and included in the systematic review (Supplementary 1). The majority of the studies conducted were cross-sectional in nature. The overall study encompassed a total sample size of 7,428 women, ranging in age from 16 to 65 years (Table 1). In terms of geographical region, most of the studies were carried out in southern regions of India, with 25% originating from North India, followed by Eastern and North-Eastern regions. Furthermore, most of the studies employed a community-based approach. Notably, only two studies were conducted in slum and socio-economically underdeveloped regions, while the remaining studies were carried out in rural areas across India (Table 1).

Awareness level of Breast Cancer among Rural Women: A total of 7428 women were included from the 12 studies. It has been observed that 43.4% (n=3225) of the total samples were completely unaware about breast cancer or self-breast assessment (Table 1). Qualitative data from a study by Kathrikolly et al., (2020) has reported the various opportunities and barriers to breast cancer screening among rural women in southern India, emphasising the importance of awareness campaigns, philanthropic support, and involving men in promoting better health-seeking behaviour.[18] Similarly, Khapre et al., (2021) explain behavioural modification intervention improved breast cancer understanding and compliance in women compared to pre-test.[19] They further show that community health practitioners learn, do focused screens, and refer clients faster with training (Table 1).

Knowledge and Awareness about the symptoms of breast cancer: The reviewed studies have examined the characteristics of self-breast examination and found that the knowledge of breast cancer and breast self-examination among the study populations ranged from 9.6% to 48.7%. In general, women had a limited understanding of the risk factors associated with breast cancer. A study even showed that 87.8% of participants believed there were no risk factors for breast cancer.[20] Comparable results were observed in other research studies.[21,22] However, women had greater familiarity with breast cancer symptoms compared to their understanding of breast self-examination and associated risk factors.

Studies noted substantial variation in awareness of the main risk factors related to age at menarche and menopause. Respondents from other studies recognized family history and tobacco use as potential risk factors.[21,22] Moreover, 11-51% of respondents considered overweight and obesity as risk factors.

Effects of Socio-culture approach on the awareness of breast cancer: Only two of the reviewed studies reported that the age groups of the studied population were associated with breast cancer awareness.[20,21] Importantly, education was identified as a key factor linked to breast cancer awareness among low-socioeconomic populations in several studies.[11,21,23] These findings suggest that educational interventions could be crucial in improving breast cancer awareness, particularly for women from low-socioeconomic backgrounds. The present study provided some relevant insights into women's understanding and practices regarding breast cancer and breast self-examination in rural India.

DISCUSSION

This review seeks to assess the extent of breast cancer consciousness among women in rural India. The findings reveal alarmingly low awareness regarding breast cancer, its symptoms, and risk factors. Knowledge about the screening process is also severely lacking. The study identified that both awareness and practices related to breast self-examination were inadequate. One of the reviewed studies highlighted that health education initiatives effectively enhanced awareness and adoption of breast self-examination practices.[19] This suggests that dedicated efforts to disseminate knowledge could enhance awareness and health outcomes. Additionally, involving cancer survivors as educators may potentially boost health-seeking behaviours.[18] Key factors associated with breast cancer awareness include economic constraints, socioeconomic status,[18,21] education levels,[11,21,23,24] marital statuses,[21] cultural inhibitions, forgetfulness, and apprehension towards tertiary healthcare. Regarding risk factor awareness, there was significant variation.

Globally, breast cancer stands as the leading malignancy impacting women.[2] In India, the prevalence has risen considerably, posing a major public health challenge. Timely diagnosis is crucial for successful management and treatment; hence, basic awareness of the condition and its symptoms is necessary to reduce mortality. In India, approximately 60% of breast cancer diagnoses occur only when the disease has progressed to advanced stages, specifically stages III or IV.[25] Many people only seek care when visible changes occur, as women often overlook minor symptoms and delay visiting the hospital until the condition worsens, largely due to their domestic responsibilities.[2] Limited awareness, particularly in rural areas, is another contributing factor to this late presentation. Consequently, fewer women engage in self-breast examinations, seek periodic examinations by healthcare workers, or undergo mammography screening. Additionally, the initial breast cancer symptom, a lump, is often painless, which significantly contributes to delayed treatment in 50 to 70% of cases in rural araes.[26] Other factors influencing timely detection and treatment include the accessibility of diagnostic and treatment services, the level of confidence patients have in their healthcare providers, the duration of travel required to reach the service center, and the financial constraints of the patient's household.[27]

Table 1: Literature Review of the present review

Name of the Authors	Location of the study	Sample size	Assessment Tools	Study Population	Age Group	Unaware	Aware	Risk factors for breast cancer	Factors associated with awareness	P-Value
Baburajan et al., 2022[20]	Rural missionary-run hospital in Ramanagara District	416	Breast Cancer Awareness Measure (Breast-CAM)	Rural Women	>18 years, 31.60 ± 13.7 years	338 (81.2)	Discharge from nipple- 50 (12), change in shape of breast- 45 (10.8), Pain in the breast- 41 (9.9), Change in nipple position- 40 (9.6), Redness over breast- 40 (9.6), Lumps in breast- 39 (9.4), Change in size of breast- 38 (9.1), Rash over breast-28 (6.7), Nipple pulled inwards- 27 (6.5)	Not aware- 365 (87.7), Past history of breast cancer- 16 (3.9), Being overweight- 15 (3.6), Excess consumption of alcohol- 13 (3), Family history of breast cancer-11 (2.6), Having children in later life-8 (1.9), Oral contraceptive pills- 7 (1.7), Early Menarche-6 (1.4), Late menopause-6 (1.4), Inadequate physical activity- 6 (1.4)	Literacy- Illiterate- Reference, High school-3.61, Pre-university-5.13, College degree-8.88, Personal or family history of breast cancer No- Reference, Yes- 5.31 (p=0.013)	Literacy-High school-p=0.021, Pre-university-p=0.004, College degree-p=0.001, Personal or family history of breast cancer p=0.013
Kathrikolly et al., 2020[18]	Udupi taluk, a coastal province in the state of Karnataka in southern India	44	Focus Group Discussion	Rural women	42.8 ± 7.8 years	Breast Self-Examination=8 (18.2), mammography= 7 (27.3),	1. Breast and urogenital related concerns, 2. Utilisation of health services, 3. Regular screening	Factors motivating the uptake of screening facilities- Motivating figures, Awareness camps, Philanthropic support	Cultural barriers, lapses in memory, financial limitations, and apprehension about accessing tertiary healthcare facilities	Not Applicable
Khapre et al., 2022[19]	Tehri Garhwal, a hilly district of Uttarakhand	1061	WIDER recommendations for reporting Behavioral change intervention	Rural Women	36.9 (±10) years	Baeline- 940 (88.5), Follow-up- 0	Cancer breast examination Baseline- 121 (11.4%), Follow up- 993 (100)	Age, Age of first child./ Nulliparous > 30 years, BMI, Early menarche (< 12 years), Late menopause (>55 years), Exposure to hormonal pills	Age 55-64 years- 57 (9.6) >65 years- 21 (3.5) Age of first child > 30 yrs/ Nulliparous -12 (2.03) BMI Overweight- 101 (17.1) Obesity- 39 (6.6) Early menarche (< 12 yrs)- 5 (0.85) Late menopause (>55 years)-14 (2.4) Exposure to hormonal pills 2-5 years- 12 (2) >5 years- 8 (1.35)	NM

Name of the Authors	Location of the study	Sample size	Assessment Tools	Study Population	Age Group	Unaware	Aware	Risk factors for breast cancer	Factors associated with awareness	P-Value
Kumarasamy et al., 2017[24]	Rural area of Trichy district	200	KAP survey	Rural Women	36.9 ± 8.8 years.	22 (11)	178 (89%)	Age and Educational attainment	Poor Knowledge- 138 (69) Fair knowledge-54 (27) Good Knowledge - 8 (4)	Age (P = 0.02), Education (χ2=22.22, P<0.001)
Malik et al., 2020[23]	Kupwara District of Kashmir	Kashmir-399, Fiji-1968	22 item questionnaire	Rural Women	35 (±14) Years	250 (63)	147 (37%)	NM	Education- 10 (1.7–59)	p=0.010
Prushty et al., 2020[11]	Mumbai	480	Structured questionnaire	Socio-economically disadvantaged women	18-55 years	246 (51.2)	NM	NM	Education Illiterate- Reference >10 years schooling- 3.93 (2.57-6.02)	p<0.01
Ray et al., 2023[21]	Muchisa Village of Budge-Budge II block, West Bengal	300	pre-tested, structured schedule	Rural women	31.6 ± 7.4 years	175 (51.3)	NM	NM	Age group, Marital status, Occupation, Socio-economic status,	Age group= 0.009, Marital status= 0.031, Occupation= 0.009, Socio-economic status=0.003
Singh et al., 2018[22]	Department of Surgery of Medical college and hospital	500	KAP survey	Rural women	16-65 years	295 (59.60)	NM	NM	NM	Not Applicable

NM= Not Mentioned

Table 2: Characteristics of breast self-examination among the different studies

S. No.	Characteristics of Breast Self-Examination	Studies							
		Baburanjan et al., 2022[20]	Khapre et al., 2022[19]		Kumarasamy et al., 2017[24]	Malik et al., 2020[23]	Prusty et al., 2020[11]	Ray et al., 2023[21]	Singh et al., 2018[22]
			Before intervention	After intervention					
1	Have heard about BSE	40 (9.6)	121 (11.4)	993 (100)	28 (14)	177 (45)	234 (48.7)	52 (17.3)	94 (19)
2	Have been taught the technique of BSE	NM	44 (4.2)	812 (82)	75 (37.5)	58 (15)	NM	38 (12.7)	0
3	Perform BSE on a regular basis		14 (1.3)	926 (93.25)	36 (18)	144 (36)		NM	0
4	**Time interval between BSE**								
a.	Never	NM	NM	NM	143 (71.5)	253 (68)	NM	NM	NM
b.	Once annually			567 (58)	NM	1 (0.3)			
c.	More often than once a month			44 (4.4)	7 (5)	110 (30)			
5	**Symptoms of Breast Cancer**								
a.	Discharge from nipple	50 (12)	NM	NM	42%	NM	48.30%	68 (51.1)	126 (25.4)
b.	Change in the shape	45 (10.8)			NM	13 (2.8)	NM	15 (11.3)	NM
c.	Pain	41 (9.9)			25.50%	NM	55.60%	NM	161 (32.52)
d.	Change in nipple position	40 (9.6)			NM		47.90%	15 (11.3)	NM
e.	Redness over breast	40 (9.6)					NM	93 (69.9)	99 (20)
f.	Lumps in breast	39 (9.4)			65%		74.80%	132 (99.2)	63 (12.7)
g.	Change in size of breast	38 (9.1)			NM		56.80%	NM	103 (21)
h.	Rash over breast	28 (6.7)					NM	NM	NM
i.	Nipple pulled inwards	27 (6.5)					NM	39 (29.3)	60 (12.2)
6	**Knowledge regarding the risk factors of the breast cancer**								
a.	No risk factors	365 (87.7)	NM		NM	NM	NM	57 (42.8)	200 (40.4)
b.	Late Age	NM	78 (13.05)					NM	158 (31.9)
c.	Stressful life		NM						195 (39.4)
d.	Family history	11 (2.6)							250 (50.5)
e.	Relation with menstrual period	NM						22 (28.9)	45 (9.1)
f.	Early menarche	6 (1.4)	5 (0.85)					22 (28.9)	35 (7.07)
g.	Late menopause	6 (1.4)	14 (2.4)					13 (17.1)	84 (17.2)
h.	Breast Hygiene	NM	NM					NM	396 (80)
i.	Always Wearing Brassiere								298 (60.2)
j.	Tobacco intake							58 (76.3)	148 (30.1)
k.	Alcohol intake	13 (3)						9 (11.8)	59 (12)
l.	Late age of first conception	8 (1.9)	12 (2)					NM	99 (20.1)
m.	Not having children	8 (1.9)	NM						65 (13.1)
n.	Repeated abortion	NM							144 (29)
o.	Excessive intake of Oily food								181 (36.5)
p.	Postmenopausal Obesity/Obesity	15 (3.6)	140 (23.69)						54 (11)
q.	Radiation Exposure to breast	NM	NM					6 (7.9)	334 (45.5)
r.	Oral contraceptive	7 (1.7)						18 (23.5)	NM
s.	Inadequate physical activity	6 (1.4)						NM	

*NM=Not mentioned

This review has expanded on the key points and provided more detailed information about the factors contributing to low breast cancer awareness and late presentation for treatment among rural Indian women.[3] There exist notable disparities in the incidence rates of breast cancer between rural and urban areas in India, which suggests that transitioning from a rural to an urban lifestyle may heighten the risk of developing breast cancer.[27] Increasing awareness, especially among rural women as well as the urban women with poor socio-economic conditions, is crucial to ensure timely management of breast cancer. The government has recognized this disparity and has taken several initiatives to address it.

The government has consolidated various disease-specific programs into a comprehensive National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke. This integrated approach seeks to address the common risk factors and promote timely detection and management of these non-communicable diseases through behavioural and lifestyle interventions.[28] This program highlights the government's dedication to addressing the increasing challenges posed by non-communicable diseases in India.

Furthermore, the Indian government aims to lower premature mortality from non-communicable diseases, including cancer, by 25% by the year 2025 in alignment with WHO Global Monitoring Framework. Achieving this goal will require a concerted effort to enhance primary prevention through tobacco cessation, healthy diet, and physical activity. Additionally, the government has prioritized the expansion of cancer screening programs, particularly for breast, cervical, and oral cancers, to enable early detection and improve treatment outcomes.[29,30] These initiatives demonstrate the government's recognition of the growing cancer burden in India and its commitment to implementing a comprehensive, population-based approach to cancer control.

However, significant challenges remain in terms of improving awareness, access, and affordability of cancer screening and treatment services, especially in rural and remote areas. To address these challenges, continued investment and multi-stakeholder collaboration will be essential to strengthen the public health system and achieve equitable cancer care for all Indians.

Engaging community members, the healthcare system, and local governing bodies is crucial for implementing an effective and inclusive cancer screening program. A breast cancer screening program that leverages local stakeholders for early detection can be a viable strategy in resource-limited environment, potentially enhancing survival rates.[30] Therefore, capacity building of rural primary health care centres along with community participation can not only increase the awareness level but also change the attitude towards breast cancer and the acceptance of screening practices. This expanded approach can help reach more individuals in remote and underserved areas, ensuring breast cancer screening.

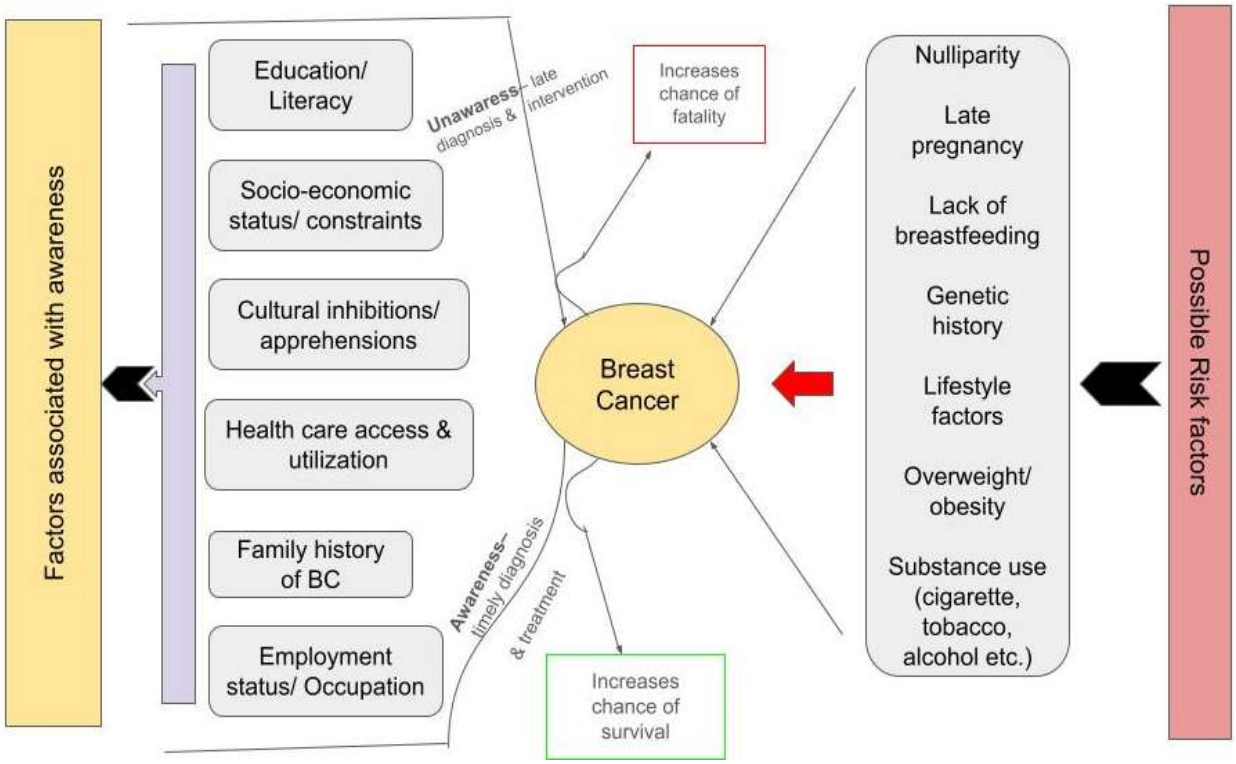

Figure 2: Conceptual framework derived from the review

Conclusion

Breast cancer awareness in rural India is notably limited, with little knowledge about its symptoms, risk factors, and preventive measures. Education and awareness about cancer are critical to raise awareness and empower individuals. Key steps to reduce breast cancer deaths include regular self-exams, early detection through screening, access to appropriate treatment, and universal healthcare. Strengthening primary health centers and prioritizing effective health campaigns are crucial in rural areas. Involving community health workers and providing them training on communication is essential for lasting change. Wider preventive healthcare, more healthcare investments, and using AI to expand diagnostic capabilities can improve access and affordability of healthcare. This may encourage women to seek healthcare and ensure equitable access. The government should address breast cancer mortality through comprehensive legislation like the 'Breast Cancer Bill, 2022' which has not yet been enacted into a law. It aims to combat breast cancer through mass awareness, free medical screening and advanced treatment facilities. Mass media, social media, and influential figures play a crucial role in increasing awareness and promoting breast cancer screening. Addressing breast cancer in India demands a comprehensive strategy that includes better community education, strengthened healthcare systems, and the implementation of focused policies.

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No use of generative AI tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

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