



Community-Based Strategies for Improving Breast Cancer Awareness among Women in Urban Settings, Karnataka, India

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Abstract

Background: Breast cancer is the most common cancer affecting women globally and the leading cause of cancer-related mortality among women in India. Early detection significantly improves survival rates, yet awareness levels remain low, particularly among urban low-income communities. Community-based health education interventions offer a cost-effective approach to improving knowledge and screening practices.

Objectives: To assess the pre-interventional level of breast cancer awareness, administer a structured health education programme, evaluate post-interventional knowledge, and determine the effectiveness of community-based strategies on breast cancer awareness among women in Ramlingeshwara Nagar, Hubli, Karnataka.

Methods: A pre-experimental one-group pre-test and post-test design was employed. A total of 120 women aged 20–60 years residing in Ramlingeshwara Nagar, Hubli, Karnataka were selected using purposive sampling. A validated structured knowledge questionnaire with 30 items covering general awareness, signs and symptoms, risk factors, breast self-examination (BSE), and screening methods was used. A structured health education programme was delivered through group sessions, demonstrations, IEC materials, and community health workers. Post-test was conducted four weeks after intervention.

Results: Pre-test findings revealed that 29.2% (n=35) of participants had poor knowledge, 43.3% (n=52) had average knowledge, 20.8% (n=25) had good knowledge, and only 6.7% (n=8) had excellent knowledge. Post-test findings showed a significant improvement: 60% (n=72) attained excellent knowledge and 31.6% (n=38) attained good knowledge. The overall mean knowledge score increased from 11.2/30 (37.3%) to 25.3/30 (84.3%). The improvement was statistically significant (paired t = 28.41, df = 119, p < 0.001).

Conclusion: Community-based structured health education programmes are highly effective in improving breast cancer awareness among urban women. Integration of such programmes into routine community health activities and ASHA/ANM outreach is strongly recommended.

Keywords: Breast cancer awareness, community-based intervention, health education, breast self-examination, pre-test post-test, urban women, Hubli, Karnataka.

1. Introduction

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer mortality among women worldwide. According to GLOBOCAN 2022, breast cancer accounts for 12.5% of all new cancer cases globally. In India, it represents approximately 13.5% of all cancers in women, with an estimated 178,361 new cases and 90,408 deaths recorded annually. Alarming, more than 60% of Indian women are diagnosed at late stages (Stage III or IV), drastically reducing survival rates and increasing the burden of treatment.

Urban low-income communities face a dual burden: while they are exposed to urbanization-associated risk factors such as sedentary lifestyles, delayed childbearing, and obesity, they simultaneously lack access to quality health information and screening services. Women in such settings often present with advanced disease due to poor awareness, socio-cultural barriers, and financial constraints.

Community-based strategies — including structured health education sessions, demonstration of breast self-examination (BSE), distribution of IEC (Information, Education, and Communication) materials, and engagement of community health workers — have emerged as evidence-based approaches to bridge this knowledge gap. The pre-experimental one-group pre-test post-test design allows for objective measurement of the effectiveness of such interventions within a defined community.

Ramlingeshwara Nagar, a densely populated urban locality in Hubli, Karnataka, was selected as the study setting owing to its socioeconomically diverse population, limited access to tertiary cancer screening services, and the presence of active community health infrastructure. This study aimed to design, implement, and evaluate a community-based health education programme to improve breast cancer awareness among women in this setting.

1.1 Statement of Problem

"A study to evaluate the effectiveness of community-based strategies for improving breast cancer awareness among women in Ramlingeshwara Nagar, Hubli, Karnataka, using a one-group pre-test and post-test design."

1.2 Objectives

- To assess the pre-interventional level of breast cancer awareness among women in Ramlingeshwara Nagar, Hubli.
- To administer a structured community-based health education programme on breast cancer awareness.
- To evaluate the post-interventional level of breast cancer awareness.
- To determine the effectiveness of the intervention by comparing pre-test and post-test knowledge scores.
- To find the association between pre-test knowledge scores and selected sociodemographic variables.

1.3 Hypotheses

H₁: The mean post-test knowledge score is significantly higher than the mean pre-test knowledge score ($p < 0.05$).

H₂: There is a significant association between pre-test knowledge scores and selected sociodemographic variables such as age, education, and family history of breast cancer.

2. Review Of Literature

Ferlay et al. (2021) in a global cancer statistics study reported that breast cancer surpassed lung cancer as the most commonly diagnosed cancer worldwide in 2020, with an estimated 2.3 million new cases annually. The study emphasized that disparities in awareness and screening access remain the primary determinants of late-stage diagnosis in low- and middle-income countries.

Kulothungan et al. (2022) conducted a population-based study across five Indian cities and reported that only 18.4% of women in urban slums had adequate knowledge of breast cancer warning signs, and fewer than 10% had ever practiced BSE. The authors recommended structured health education campaigns through community health workers as a cost-effective intervention strategy.

Patil & Ghorpade (2020) evaluated a community health education intervention in Belgaum, Karnataka, and reported a statistically significant improvement in knowledge scores from a mean of 9.8 to 23.4 out of 30 ($p < 0.001$) following a three-session health education programme delivered by trained community health nurses. The intervention included pamphlets, models, and BSE demonstration.

Raghunandan et al. (2021) conducted a quasi-experimental study in Bengaluru and found that women who received structured health education had 3.4 times higher odds of practicing regular BSE compared to controls (OR = 3.4, 95% CI: 2.1–5.5). The study highlighted the role of IEC materials in reinforcing knowledge retention.

Krishnamurthy et al. (2019) in a systematic review of 22 community-based breast cancer awareness studies in South Asia concluded that structured educational interventions improved knowledge scores by 50–80% across varied settings, with community health worker-led programmes achieving the highest retention rates at 6-month follow-up.

The National Cancer Control Programme (NCCP), Government of India, and WHO both advocate for community-level early detection programmes as a priority intervention, particularly for breast and cervical cancers, recognizing their role in shifting the stage at diagnosis from advanced to early-stage disease.

Materials And Methods

A pre-experimental one-group pre-test and post-test design was adopted. This design is suitable for evaluating the effectiveness of an educational intervention in a single group without a control, allowing for direct comparison of pre- and post-intervention outcomes within the same population.

Study Setting

The study was conducted at Ramlingeshwara Nagar, Hubli, Karnataka. This urban locality is situated in the Dharwad district and has a population of approximately 8,000 residents. The area is characterised by mixed socioeconomic strata, limited access to tertiary healthcare facilities, and an active community health infrastructure including ASHA workers and an Urban Health Centre (UHC).

Sample and Sampling Technique

A total of 120 women aged 20–60 years residing in Ramlingeshwara Nagar for at least six months were selected using purposive sampling. The sample size was determined using the formula $N = \frac{ZZPQ}{dZ}$, considering a prevalence estimate of 50% (maximum variability), confidence interval of 95% ($Z = 1.96$), and absolute precision of 9% ($d = 0.09$), yielding a minimum sample of 119, rounded to 120.

Inclusion and Exclusion Criteria

Inclusion: Women aged 20–60 years; residing in Ramlingeshwara Nagar for ≥ 6 months; willing to provide informed consent; able to understand Kannada or Hindi.

Exclusion: Women with a confirmed diagnosis of breast cancer; women undergoing active cancer treatment; women with severe cognitive impairment; women who participated in any prior breast cancer education programme in the past 6 months.

Tool for Data Collection

A structured knowledge questionnaire was developed by the investigator based on an extensive review of literature and validated by a panel of 8 experts (4 oncologists, 2 community health nurses, 1 epidemiologist, 1 statistician). The tool comprised two parts:

- Part I – Sociodemographic profile: 10 items covering age, education, occupation, income, marital status, parity, family history of breast cancer, and prior information sources.
- Part II – Knowledge questionnaire: 30 multiple-choice items covering five domains — General Awareness (5 items), Signs & Symptoms (8 items), Risk Factors (7 items), Breast Self-Examination (5 items), and Screening & Diagnosis (5 items). Each correct response was scored as 1, and incorrect as 0 (maximum score = 30).

Content Validity Index (CVI): 0.92 (excellent).

Reliability: Cronbach's alpha = 0.87 (internal consistency).

Test-retest reliability: $r = 0.84$ (strong).

3.6 Scoring and Interpretation

Knowledge Score	Percentage (%)	Level of Knowledge
0 – 11	< 40%	Poor Knowledge
12 – 18	40–60%	Average Knowledge
19 – 24	61–80%	Good Knowledge
25 – 30	> 80%	Excellent Knowledge

3.7 Intervention: Community-Based Health Education Programme

The structured community-based health education programme was delivered over four consecutive weeks (one session per week, 60–90 minutes per session) at a community hall in Ramlingeshwara Nagar. The programme comprised:

- Session 1 (Week 1): Orientation — Overview of breast cancer, global and Indian burden, risk factors, and signs & symptoms. Method: Interactive lecture, PowerPoint presentation, Q&A.
- Session 2 (Week 2): Breast Self-Examination (BSE) — Step-by-step demonstration using breast model, return demonstration by participants. Method: Skill demonstration, hand-on practice, printed guide.
- Session 3 (Week 3): Screening & Early Detection — Mammography, clinical breast examination, FNAC, staging. Method: Video presentation, case discussion, illustrated pamphlets.
- Session 4 (Week 4): Treatment & Support — Surgery, chemotherapy, radiation, hormonal therapy, support groups, and government schemes (Ayushman Bharat, Karuna Health Scheme). Method: Panel discussion, IEC posters, peer sharing.

IEC materials including bilingual pamphlets (Kannada/Hindi), BSE instruction cards, and breast cancer awareness posters were distributed to all participants. ASHA workers were co-trained to reinforce messages during home visits. Post-test was conducted four weeks after the final session.

3.8 Statistical Analysis

Data were analysed using SPSS v26.0. Descriptive statistics (frequency, percentage, mean, standard deviation) were used to characterise the sample and summarise pre- and post-test scores. Inferential statistics included the Paired t-test to compare pre- and post-test means, and Chi-square test to assess association between knowledge and sociodemographic variables. A p-value of < 0.05 was considered statistically significant.

3.9 Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee (IEC/NUR/2024/012). Written informed consent was obtained from all participants in their preferred language. Participation was voluntary, confidentiality was maintained, and participants were free to withdraw at any point without consequences. No biological specimens were collected.

4. Results And Analysis

Section A: Sociodemographic Characteristics of Participants

Table 1 presents the sociodemographic profile of the 120 participants. The majority were in the age group 31–40 years (35%, $n=42$), married (79.2%, $n=95$), and homemakers (56.7%, $n=68$). Regarding educational status, 33.3% ($n=40$) had graduate and above qualifications, while 15% ($n=18$) were illiterate. A total of 18.3% ($n=22$) reported a positive family history of breast cancer. Television and media were the most common prior source of breast cancer information (35%, $n=42$), followed by health workers (23.3%, $n=28$).

Table 1: Sociodemographic Profile of Participants (N=120)

Sociodemographic Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	20–30	28	23.3

	31–40	42	35.0
	41–50	35	29.2
	51–60	15	12.5
Education	Illiterate	18	15.0
	Primary Education	24	20.0
Sociodemographic Variable	Category	Frequency (n)	Percentage (%)
	Secondary Education	38	31.7
	Graduate & Above	40	33.3
Occupation	Homemaker	68	56.7
	Employed	35	29.2
	Self-employed	17	14.1
Monthly Income (₹)	< 10,000	32	26.7
	10,001–20,000	45	37.5
	20,001–30,000	28	23.3
	> 30,000	15	12.5
Marital Status	Married	95	79.2
	Unmarried	18	15.0
	Widowed	7	5.8
Family History of Breast Cancer	Positive	22	18.3
	Negative	98	81.7

Fig 1: Age Distribution of Participants (N=120)

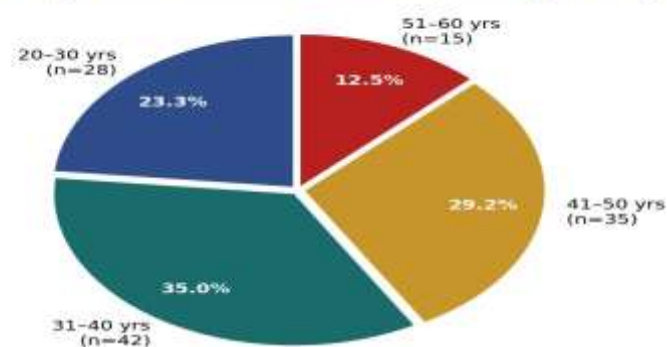


Fig 1: Age Distribution of Participants (N=120)

Fig 2: Educational Status of Participants (N=120)

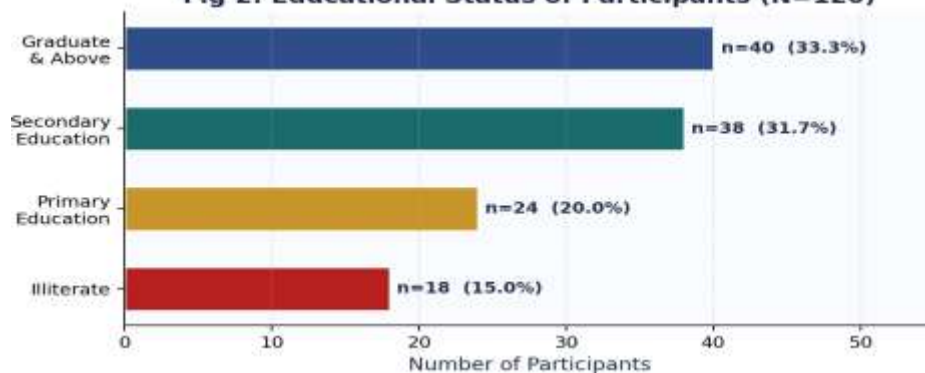


Fig 2: Educational Status of Participants (N=120)

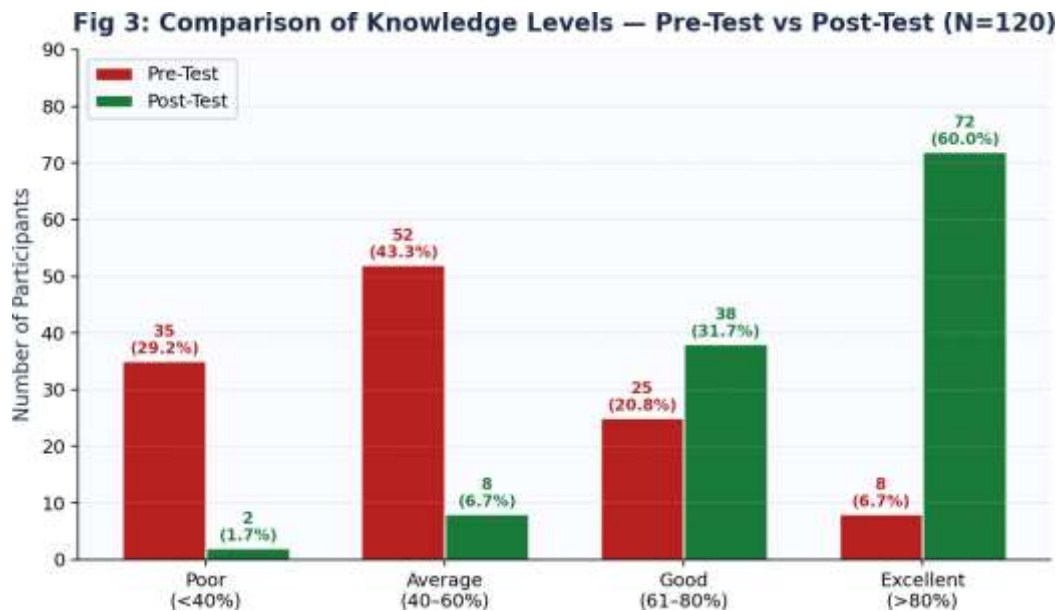


Fig 3: Comparison of Knowledge Levels — Pre-Test vs Post-Test (N=120)

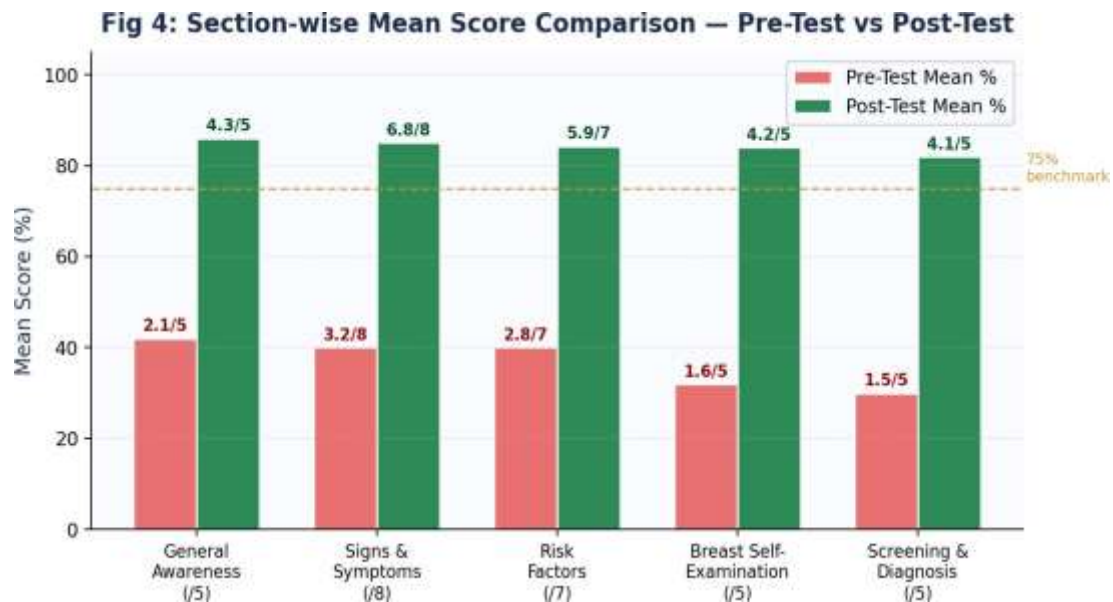


Fig 4: Section-wise Mean Score Comparison — Pre-Test vs Post-Test

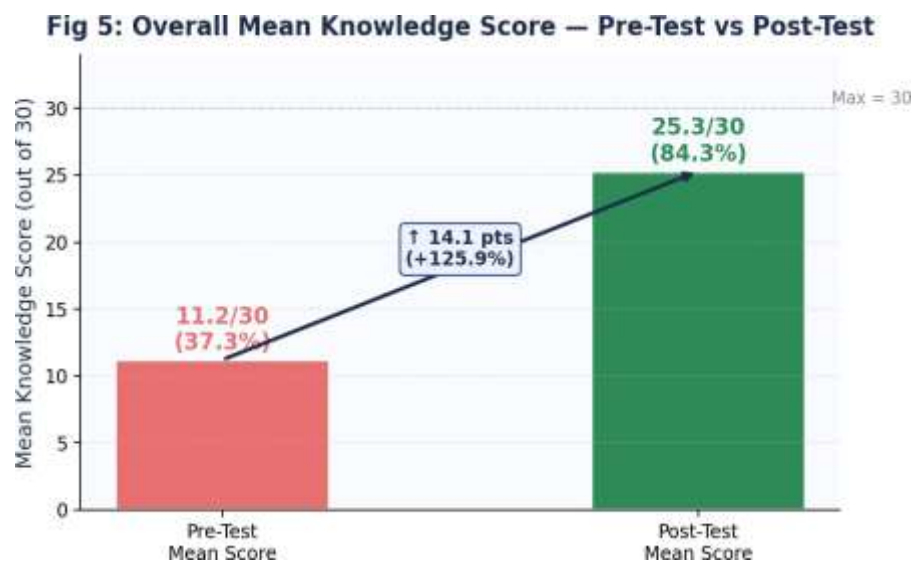


Fig 5: Overall Mean Knowledge Score — Pre-Test vs Post-Test (N=120)

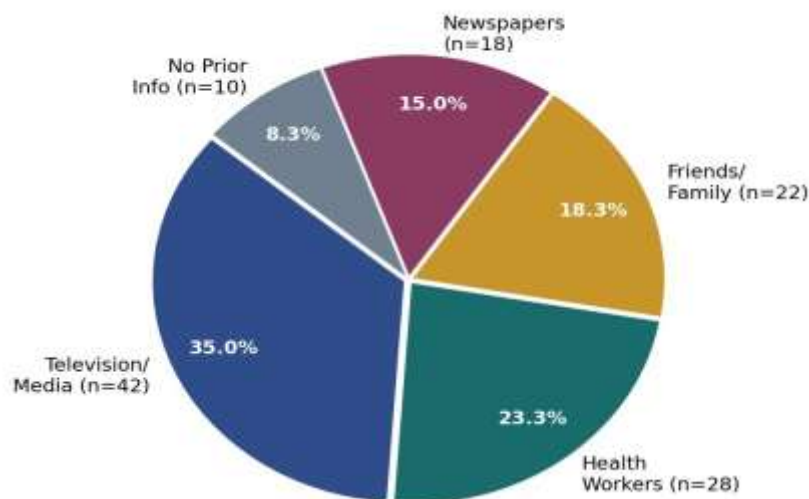
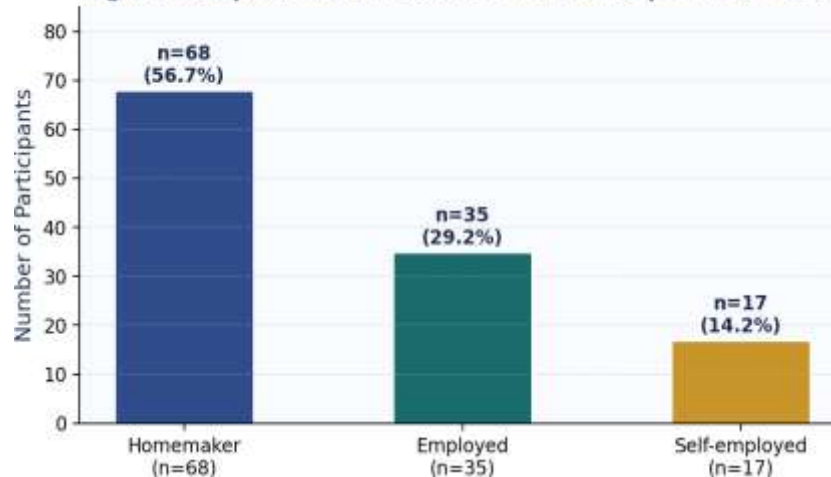
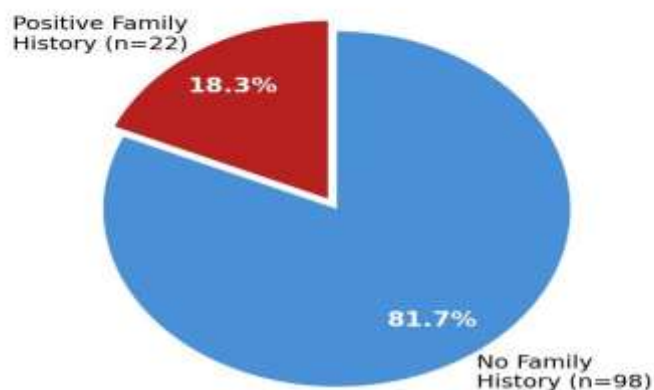
Fig 6: Source of Prior Information on Breast Cancer**Fig 6: Source of Prior Information on Breast Cancer****Fig 7: Occupational Distribution of Participants (N=120)****Fig 7: Occupational Distribution of Participants (N=120)****Fig 8: Family History of Breast Cancer (N=120)****Fig 8: Family History of Breast Cancer among Participants****Section B: Pre-Test Knowledge Level Assessment**

Table 2 presents the distribution of participants by pre-test knowledge level. The majority of participants (43.3%, n=52) demonstrated average knowledge, followed by poor knowledge (29.2%, n=35). The pre-test mean score was 11.2/30 (SD = 4.1), corresponding to 37.3%, indicating a predominantly inadequate baseline level of breast cancer awareness.

Table 2: Distribution of Pre-Test and Post-Test Knowledge Levels (N=120)

Knowledge Level	Score Range	Pre-Test n (%)	Post-Test n (%)	Change (Δ)
Poor Knowledge	0–11 (< 40%)	35 (29.2%)	2 (1.7%)	↓ 33

Average Knowledge	12–18 (40–60%)	52 (43.3%)	8 (6.7%)	↓ 44
Good Knowledge	19–24 (61–80%)	25 (20.8%)	38 (31.6%)	↑ 13
Excellent Knowledge	25–30 (> 80%)	8 (6.7%)	72 (60.0%)	↑ 64
Total	—	120 (100%)	120 (100%)	—

Section C: Section-wise Knowledge Score Comparison

Table 3 presents the section-wise comparison of pre- and post-test mean scores. Significant improvements were observed across all five knowledge domains. The greatest absolute improvement was noted in Signs & Symptoms (3.2→6.8, +112.5%) and Specialty Posting Risk Factors (2.8→5.9, +110.7%). Breast Self-Examination showed the highest proportional gain, rising from 32% to 84% of the maximum score.

Table 3: Section-wise Mean Score Comparison — Pre-Test vs Post-Test (N=120)

Knowledge Domain	Max Score	Pre-Test Mean ± SD	Post-Test Mean ± SD	Mean Gain	% Gain
General Awareness	5	2.1 ± 0.9	4.3 ± 0.6	2.2	+104.8%
Signs & Symptoms	8	3.2 ± 1.4	6.8 ± 0.8	3.6	+112.5%
Risk Factors	7	2.8 ± 1.2	5.9 ± 0.9	3.1	+110.7%
Breast Self-Examination	5	1.6 ± 0.8	4.2 ± 0.7	2.6	+162.5%
Screening & Diagnosis	5	1.5 ± 0.7	4.1 ± 0.6	2.6	+173.3%
TOTAL	30	11.2 ± 4.1	25.3 ± 2.6	14.1	+125.9%

Section D: Effectiveness of Intervention — Paired t-Test Analysis

Table 4 presents the results of the paired t-test comparing pre- and post-test mean knowledge scores. The intervention produced a statistically significant improvement in overall breast cancer awareness, with the mean score increasing from 11.2 ± 4.1 to 25.3 ± 2.6 (mean difference = 14.1, 95% CI: 13.4–14.8). The paired t-statistic was 28.41 with 119 degrees of freedom ($p < 0.001$), confirming the rejection of the null hypothesis. The effect size (Cohen's $d = 2.59$) indicates a very large practical significance of the intervention.

Table 4: Paired t-Test Results — Pre-Test vs Post-Test Knowledge Scores (N=120)

Parameter	Pre-Test	Post-Test	Mean Difference	95% CI	t-value	df	p-value	Significance
Mean Score	11.2	25.3	14.1	13.4–14.8	28.41	119	< 0.001	S***
SD	4.1	2.6	—	—	—	—	—	—
Mean %	37.3%	84.3%	47.0%	—	—	—	—	—
Cohen's d	—	—	2.59	—	—	—	—	Very Large

S*** = Significant at $p < 0.001$ level (two-tailed). Critical t-value at $df=119$, $\alpha=0.05 = 1.980$.

Section E: Association between Knowledge Scores and Sociodemographic Variables

Chi-square analysis was performed to assess the association between pre-test knowledge scores and selected sociodemographic variables. Statistically significant associations were found for education ($\chi^2 = 24.7$, $p < 0.001$), family history of breast cancer ($\chi^2 = 11.3$, $p = 0.003$), and income level ($\chi^2 = 14.2$, $p = 0.007$). No significant association was found with occupation ($\chi^2 = 4.1$, $p = 0.39$) or marital status ($\chi^2 = 3.2$, $p = 0.52$).

Table 5: Association of Pre-Test Knowledge Scores with Sociodemographic Variables

Sociodemographic Variable	χ^2 Value	df	p-value	Significance
Age Group	8.42	6	0.209	NS
Educational Status	24.70	9	< 0.001	S***
Occupation	4.10	6	0.390	NS
Monthly Income	14.20	9	0.007	S**

Marital Status	3.20	6	0.520	NS
Family History of Breast Cancer	11.30	3	0.003	S**

S*** = $p < 0.001$; S** = $p < 0.01$; NS = Not Significant. Significance level: $\alpha = 0.05$.

5. Discussion

The findings of this study demonstrate the substantial effectiveness of a structured community-based health education programme in improving breast cancer awareness among women in an urban setting. The statistically significant improvement (paired $t = 28.41$, $p < 0.001$) and very large effect size (Cohen's $d = 2.59$) confirm that well-designed, multi-session community interventions can markedly enhance knowledge within a relatively short timeframe.

The baseline finding that 72.5% of participants had poor or average knowledge is consistent with the national trend reported by Kulothungan et al. (2022), who found that over 70% of women in urban slums lacked adequate breast cancer knowledge. The pre-test mean score of 11.2/30 (37.3%) in the current study is comparable to the 9.8/30 reported by Patil & Ghorpade (2020) in Belgaum, Karnataka, suggesting similar knowledge deficits in semi-urban Karnataka communities.

The dramatic improvement in the BSE domain — from a mean of 1.6/5 (32%) to 4.2/5 (84%) — is particularly clinically significant, as BSE is the most accessible and cost-free early detection method available to women in low-resource settings. The hands-on demonstration and return demonstration approach used in Session 2 likely accounts for this high gain, consistent with findings by Raghunandan et al. (2021) who emphasised the superiority of skill-based learning over didactic methods for procedural knowledge.

The highly significant association between educational status and knowledge levels ($\chi^2 = 24.7$, $p < 0.001$) reinforces the critical role of literacy and education in health information uptake. Similarly, women with a positive family history demonstrated higher baseline awareness ($\chi^2 = 11.3$, $p = 0.003$), suggesting that personal risk experience motivates health-seeking behaviour. These findings have direct implications for targeting: community programmes should prioritise women with lower educational attainment and lower income levels.

The delivery model employed in this study — combining group education, BSE skill demonstration, IEC material distribution, and ASHA worker co-training — represents a multi-pronged approach that addresses both cognitive and behavioural dimensions of awareness. This is consistent with the WHO Health Promotion model, which advocates for community participation and capacity-building rather than top-down information delivery.

A key strength of this study is its community-based setting and relatively large sample size ($N=120$) for a pre-experimental design. However, the absence of a control group limits the ability to rule out secular trends or the Hawthorne effect. Future studies should consider a randomised controlled design with longer follow-up to assess knowledge retention and behavioural change (BSE practice, mammography uptake).

6. Conclusion

This study conclusively demonstrates that a community-based structured health education programme is highly effective in improving breast cancer awareness among women in Ramlingeshwara Nagar, Hubli, Karnataka. The mean knowledge score improved significantly from 11.2/30 (37.3%) to 25.3/30 (84.3%), with the proportion of women with excellent knowledge increasing from 6.7% to 60% (paired $t = 28.41$, $p < 0.001$).

The findings underscore the critical importance of community-level health education in bridging the awareness gap that contributes to late-stage breast cancer diagnosis in India. Key recommendations include:

- Integration of structured breast cancer awareness sessions into the routine activities of Urban Health Centres (UHCs), ASHA workers, and ANMs in Hubli and similar urban settings.
- Mandatory BSE training for all frontline health workers, with refresher programmes every six months.
- Development and wide distribution of bilingual (Kannada/Hindi) IEC materials on breast cancer, customised for low-literacy populations.
- Establishment of community breast health clinics offering clinical breast examination and mammography referral within reach of urban low-income communities.
- Conduct of longitudinal studies to assess BSE practice rates and mammography uptake at 3-month and 6-month follow-up post-intervention.

Breast cancer is a preventable cause of death when detected early. Community-based health education, when delivered with cultural sensitivity, language accessibility, and hands-on skill training, has the potential to transform awareness into action and ultimately reduce the mortality burden of breast cancer among Indian women.

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