

2023

The impact of breast awareness on the early detection of breast cancer in young women: A systematic review

Dorsa Banihashemi

Meagan E. Brennan

Follow this and additional works at: https://researchonline.nd.edu.au/med_article



Part of the [Medicine and Health Sciences Commons](#)

This article was originally published as:

Banihashemi, D., & Brennan, M. E. (2023). The impact of breast awareness on the early detection of breast cancer in young women: A systematic review. *Breast Care*, 18 (1), 60-68.

Original article available here:

[10.1159/000526990](https://doi.org/10.1159/000526990)

This article is posted on ResearchOnline@ND at . For more information, please contact researchonline@nd.edu.au.



This is the author's version of the following article, as accepted for publication.

Banihashemi, D., & Brennan, M. (2023). The impact of breast awareness on the early detection of breast cancer in young women: A systematic review, *Breast Care*, 18(1) 60-68.
<https://doi.org/10.1159/000526990>

This article was published in *Breast Care* in February 2023.

Published version available online at: <https://doi.org/10.1159/000526990>

Title page

Title

The impact of breast awareness on the early detection of breast cancer in young women: A systematic review

Authors

Dorsa Banihashemi¹
Meagan E. Brennan^{1,2}

Affiliations

¹School of Medicine Sydney, The University of Notre Dame Australia, Oxford St, Darlinghurst, NSW Australia
²Westmead Breast Cancer Institute, Westmead Hospital, Westmead, NSW Australia

Running title

Systematic review: Breast awareness in young women

Corresponding author

Meagan E. Brennan
School of Medicine Sydney
The University of Notre Dame Australia
Oxford St
Darlinghurst, NSW
Australia

Tel +61 419 984035

Email meagan.brennan@nd.edu.au

Dorsa Banihashemi

School of Medicine Sydney
The University of Notre Dame Australia
Oxford St
Darlinghurst, NSW
Australia

Email dorsa.banihashemi@my.nd.edu.au

Word count	2737
Number of Figures	1
Number of Tables	2
Keywords	breast awareness; breast cancer; screening; young women; <40 years

Abstract

Background

'Breast awareness' is a recommendation that women understand the symptoms of breast cancer and become familiar with the usual look and feel of their breasts. It is recommended for women of all ages in breast cancer screening guidelines around the world.

The objective of this study was to assess the evidence for breast awareness by investigating its effect on breast cancer outcomes in women of pre-mammographic-screening age (under age 40), at average risk of breast cancer.

Methods

A systematic review was performed using PRISMA methodology. Following the search, abstracts and full text articles were assessed against eligibility criteria. Data were extracted into evidence tables, risk of bias was assessed, narrative synthesis was performed and results were described. Eligible studies were original research studies assessing the impact of breast awareness on cancer outcomes (such as stage at diagnosis or survival) in women ≤ 40 . Medline, PubMed and Cochrane Library were searched.

Results

After screening the 6,204 abstracts identified in the search, no studies meeting all eligibility criteria were found. Two partially eligible studies were identified. These met the intervention and outcomes criteria but included mixed-age cohorts that included but were not limited to women ≤ 40 . These studies provided low-level (Level IV) evidence of moderate quality that there is some benefit (earlier stage at diagnosis and/or improved survival) of breast awareness in a mixed-age cohort that included some younger women.

Conclusions

No studies evaluating the impact of breast awareness exclusively in young women were identified. Limited evidence of benefit of breast awareness was found. Guidelines that recommend breast awareness should be reviewed and qualified with an explanation that the evidence of benefit is weak. Women have limited screening options available to them for the early detection of breast cancer until they reach mammographic screening age.

The study was registered on Prospero (ID: CRD42021279457).

The impact of breast awareness on the early detection of breast cancer in young women: A systematic review

Introduction

Around five percent of breast cancer occurs in women under the age of 40.[1] It remains the most common cancer in women under 35 years worldwide.[2] While breast cancer in women under 40 is less common than in older women, it is often more aggressive.[3] There is also evidence to suggest that the incidence of early-onset breast cancer is increasing.[4]

Early detection of breast cancer is associated with increased survival.[5] Population-based screening mammography programs are available in many countries for women over the age of 40–50. MRI screening is available for younger women at high genetic risk of breast cancer (such as BCRA gene mutation carriers).[6] However, for women under the age of 40 at average risk, options for early detection of breast cancer are limited. Clinical trials and meta-analyses have shown no survival benefit from regular, systematic breast self-examination (BSE). Routine clinical breast examination by a clinician is also unproven in this age group.[7, 8]

A Cochrane review of BSE trials was published in 2003.[9] Two eligible randomised trials were included. These large, population-based trials from Russia (1999)[10] and China (2002)[11] that included nearly 400,000 women found no effect of BSE on breast cancer mortality. One showed no effect of BSE on cancer detection.[11] The other showed increased cancer detection with BSE and this was associated with the harm of twice as many benign biopsies.[10] As the preliminary results of these trials became available, the recommendation for BSE was removed from guidelines around the world.

With an evidence base for BSE lacking, the concept of ‘breast awareness’ evolved as an alternative. This refers to women understanding the symptoms of breast cancer, becoming familiar with the usual look and feel of their breasts and promptly reporting any changes to their doctor.[12] While self-examination is a component of this, it may be intermittent and need not be part of a structured monthly regimen.

Current guidelines in Australia,[13] the United Kingdom[14] and the United States[15, 6] recommend breast awareness for women of all ages and all risk groups. This recommendation has evolved as a response to the lack of evidence for BSE rather than a response to specific evidence supporting breast awareness. The evidence base for breast

awareness as a population-based health promotion intervention is unclear. As young women have limited options for the early detection of breast cancer, it is essential that recommendation be based on high-quality evidence.

This aim of this study was to perform a systematic review to investigate the impact of breast awareness on breast cancer outcomes (cancer detection, stage of detection, treatment and survival outcomes) in women of pre-mammographic-screening age (under age 40), at average risk of breast cancer.

Methods

This systematic review was registered on PROSPERO (ID: CRD42021279457) after a search showed no previous reviews on this topic. The study protocol is available on PROSPERO.[16] This review was conducted using PRISMA methodology.[17] See PRISMA checklist in the supplementary material.

Eligibility criteria

Eligibility criteria were: original quantitative studies, published in English from 1985 (when the concept of breast awareness evolved in the literature) to December 2021, assessing the impact of breast awareness on breast cancer outcomes (cancer detection rate, stage at diagnosis, treatment information and/or survival) in women aged ≤ 40 at average risk of breast cancer. Prospective studies providing awareness education then assessing cancer outcomes and retrospective studies, assessing breast awareness in women following a cancer diagnosis were eligible. Exclusion criteria were: non-peer-reviewed reports, reviews, conference presentations, abstract-only publications, newspaper, magazine, letters, commentaries, editorial articles and books and studies in women at high risk of breast cancer (such as BRCA mutation carriers).

Information sources and search strategy

A preliminary scoping search in PubMed was conducted to refine search terms. Medline (via Ovid), PubMed and The Cochrane Library were used for the final search. Reference lists of potentially eligible papers were also reviewed.

The following search terms were used:

(breast cancer OR breast carcinoma OR breast lump OR breast mass OR breast neoplasm OR breast tumour OR breast tumor) AND

(young women OR young woman OR young female* OR young adult* OR early-onset OR early onset OR pre-screening OR screen* OR under forty OR under forty OR under 40) AND

("breast aware*" OR self* OR self-exam* OR self exam* OR self inspect* OR self-inspect) AND (diagnosis OR detection OR stage OR recur* OR survival)

Selection process

Citations identified from the search were exported to EndNote 20[18] and duplicates were removed. Screening of titles and abstracts was performed using Rayyan Intelligent Systematic Review.[19]

One reviewer (DB) screened the title and abstracts. A second reviewer (MB) checked the quality of the screening by reviewing 20% of the articles. Two reviewers independently reviewed the full text papers and applied the pre-determined eligibility criteria. Any disagreement between the reviewers was resolved by consensus.

Data collection, data items and data synthesis

Data on study characteristics, methodology and results were extracted by one reviewer (DB) and was checked for accuracy by the other reviewer (MB). The extracted data were stored in an Excel spreadsheet evidence table for analysis. A narrative synthesis was conducted, and results were presented in tables and text.

Risk of bias

Risk of bias was assessed using the JBI critical appraisal tool for cohort studies (11 items) and the tool for cross-sectional studies (8 items).[20] Two reviewers assessed the risk of bias independently, and the final quality assessment was based on consensus. The JBI tool uses a 'yes/no/unclear/not applicable' category for each item.

Results

Results from the search and screening are shown in the PRISMA flowchart (Figure 1). The search identified 6,204 abstracts. After removal of duplicates, 4,096 were screened and 9

met eligibility criteria. Following review of full-text articles, none of the studies met all eligibility criteria. No studies were identified that reported cancer outcomes in women aged ≤ 40 years who were educated in or practised breast awareness.

As no studies met eligibility criteria, the age criterion was broadened slightly. Two studies reporting relevant outcomes in mixed-aged cohorts that included women under 40 were identified. These were studies that met the breast awareness and cancer outcomes criteria but did not meet the age criterion as they did not present data separately for the women in the study aged ≤ 40 . These were considered to be 'partially eligible' and their results were systematically evaluated to provide insight into the impact of breast awareness on mixed-age cohorts that include young women.[21, 22]

Study characteristics

Characteristics of the two partially eligible studies [21, 22] are shown in Table 1. The first study was a prospective cohort study from India, published in 2017.[21] Information about breast health and breast cancer was mailed out to the cohort of 22,500 women aged 30 to 69 on an annual basis for 4 years. Additional breast clinics and nurses were made available in the targeted communities. The features of cancers diagnosed before and after the intervention were compared. The title of the study indicates that 'interim' results were presented (after the planned four rounds of breast awareness mail-outs were completed but not including long-term follow-up data).[21] A follow-up paper reporting final long-term results could not be identified. The second study was a cross-sectional survey from South Africa published in 2018.[22] In this study, a questionnaire was administered to 499 women aged over 18 years with newly diagnosed breast cancer. Self-reported breast cancer knowledge and awareness was compared with their stage of disease at diagnosis (early or late stage).

Risk of bias

The risk of bias was assessed as 'moderate' for both studies. The Indian cohort study scored 'yes,' indicating good quality, for 8 of the 11 items (73%).[21] The South African cross-sectional study scored 'yes' for 6 of the 8 items (75%).[22]

Results of individual studies

Results of the two partially eligible studies are shown in Table 2.

The large cohort study from India mailed out awareness brochures to 22,500 women aged 30–69 on four occasions.[21] 233 cancers were diagnosed, 156 before the intervention (8-year period) and 77 during the intervention (three-year period). The number of women ≤ 40

years in the mail-out cohort was not reported. Of the cancers, 21% occurred in women <50 pre-intervention and 28% during the intervention; this was not a statistically significant increase ($p=0.27$). There was, however, a significant increase in the proportion of women pre-menopausal at diagnosis (17% to 30%, $p=0.03$). In the cohort overall, there was a significant decrease in the use of chemotherapy (84% to 56%, $p<0.01$) and increased three-year survival mortality (92% to 100%, $p=0.01$).

Other indicators that improved during the intervention period but were not statistically significant include earlier tumour stage at diagnosis (74% to 81%, $p=0.25$), an increase in node negative cancers (46% to 53%, $p=0.31$), proportion of tumours <5cm (85% to 89.5%, $p=0.39$) and an increase in breast conserving surgery (39% to 51%, $p=0.09$). The proportion of advanced stage (III-IV) tumours decreased from 22% to 18% ($p=0.54$). The changes in these indicators were not reported by age group.

In the second study, the cross-sectional study from South Africa, 499 women with breast cancer completed a breast cancer knowledge, attitudes and barriers questionnaire.[22] In this study, 69 (14%) of the cancers were diagnosed in women under the age of 40 (23 (33%) early stage 0–II and 46 (67%) late stage III–IV). There was a highly significant protective effect of knowledge, with lower odds for advanced stage at diagnosis (mean score 6.2 vs 5.5 out of 9 questions, OR 0.82, 95%CI 0.74, 0.91, $p<0.01$). Women who reported taking more than three months to access healthcare after noticing breast symptoms were at higher risk for advanced-stage at diagnosis than those who had taken less than one month (OR = 2.84, 95%CI: 1.84–4.39). One of the most common reasons for this delay was failure to recognise that symptoms were serious. Non-significant factors for late-stage presentation were prior breast examination 'no, or self-examination' vs 'clinician examination, ($p=0.35$), waiting time within the health system ($p=0.68$) and residential distance from hospital ($p=0.33$). The odds ratios for these indicators were not reported by age group.

Discussion

This systematic review identified over 6,000 abstracts in the search, however none met the full eligibility criteria of evaluating cancer outcomes in young women in relation to breast awareness. To gain some insight into the outcomes of breast awareness, the eligibility criteria were broadened to include studies that had a mixed-age cohort including women ≤40 even when results for younger women were not reported separately. While the two

studies identified do not meet full eligibility and they were assessed as having 'moderate' risk of bias, they represent the 'best available' evidence on this topic.

There is significant heterogeneity between the studies. While they are both performed in developing areas, they use very different methodology and included different age groups so direct comparison between the two studies is not possible. Despite this, they both provide evidence that improved breast awareness is associated with improved cancer outcomes. This is shown in one study with improved 3-year survival during a 4-year annual mailout intervention and in the other with lower odds of more advanced stage at presentation in women with a higher knowledge score. The specific relevance of these results to very young women is difficult to ascertain as only a small proportion of the study participants were young and the outcomes for them were not reported separately. The intention of this review was to evaluate the evidence in the under-40 age group. In the first study, 21% of the cancers occurred in the under-50 age group, and it is unknown how many were under 40. In the second study, 14% of the cancers occurred in women under age 40. Without sub analysis, it is not possible to know whether the results of the studies overall also apply to the very young group.

The many guidelines around the world recommending breast awareness for all women are therefore based on low-level evidence. The change from recommending BSE to recommending breast awareness evolved as BSE was shown in large, randomised trials to have no survival benefit. Breast awareness, therefore, evolved as a compromise recommendation due to lack of benefit of BSE rather than due to proven benefit of breast awareness. The evidence presented in this review supports a recommendation for breast awareness, however this should be qualified as a weak recommendation based on Level IV evidence,[23] and without a proven benefit in particularly young women. While it is possible that a randomised trial will be conducted in a developing country, it is unlikely for it to be possible in developed nations as reasonably high baseline levels of health literacy and women's health education would present challenges in identifying a control group.

If the benefit of breast awareness is tenuous, there may be an argument to still recommend it. Apart from breast cancer survival, it may have other benefits (not yet investigated) such as empowering young women to understand their bodies and preparing them for breast care related to breast feeding. It is also possible that breast awareness will help women distinguish benign from malignant features if a lump develops. However, there may also be harms of breast awareness, such as increased anxiety, increased use of the health system and increase in the need for imaging and biopsy due to false positive results, as was found

in one of the BSE trials.[10] Population-based screening recommendations must therefore be based on robust evidence in order to have the effect of increasing the health of the population, with a positive cost-benefit ratio and without doing harm.

This review has strengths and limitations. The strengths are the robust PRISMA methodology and the broad search criteria. The main limitation is that there is overlap in the use and definitions of the terms 'breast awareness' and 'breast self-examination.' These were challenging to separate when studies were being screened for inclusion. Search criteria were kept deliberately broad to avoid missing significant studies, however the different use of these terms may have resulted in studies not being identified. Other limitations were the risk of bias in the 'partially eligible' included studies and the lack of data presented specifically for the ≤ 40 age group.

In conclusion, no studies meeting the eligibility criteria of evaluating cancer outcomes in women ≤ 40 practising breast awareness were identified. The two partially eligible studies provide low-level evidence that there is some benefit in a mixed-age cohort that includes younger women. Guidelines that recommend breast awareness for all women should be reviewed and qualified with an explanation that the evidence of benefit is weak. Women have limited screening options available to them for the early detection of breast cancer until they reach mammographic screening age.

Conflict of interest statement

The authors have no conflicts of interest to declare.

Funding sources

The authors received no financial support for the research, authorship and/or publication of this article.

Acknowledgements

None

Statement of Ethics

This systematic review was registered on PROSPERO (ID: CRD42021279457).

This research complies with internationally accepted standards for research practice and reporting. An ethics statement is not applicable because this study is based exclusively on published literature.

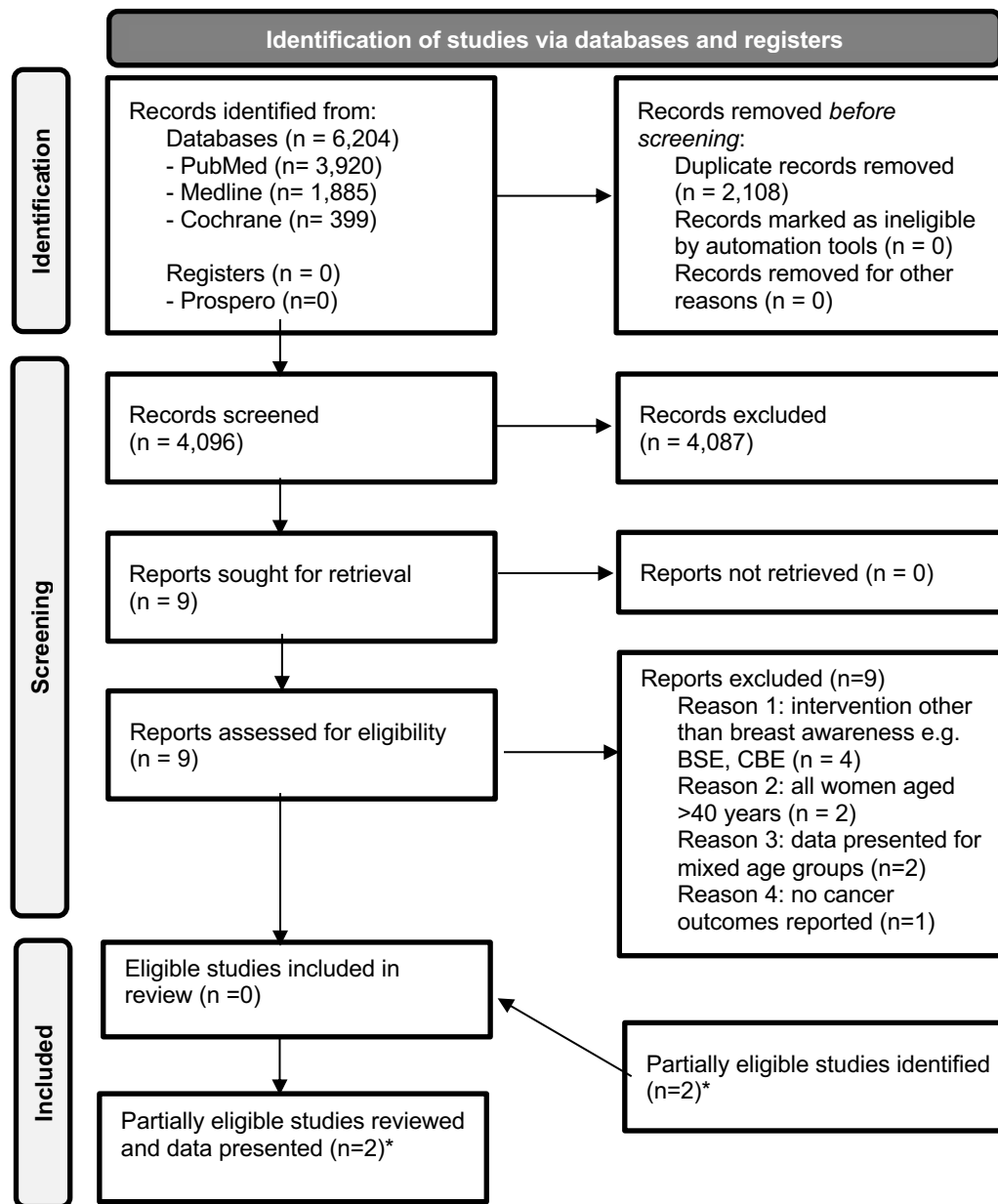
Author contributions

Dorsa Banihashemi and Meagan Brennan were both responsible for study design, data collection, data analysis, drafting of manuscript, final approval of manuscript and responsibility for integrity of the research.

Data Availability Statement

No data were generated during this study.

Figure 1: PRISMA flowchart



*Partially eligible studies were those that met eligibility for breast awareness and cancer data but not age criteria. These studies included a group of women ≤ 40 years but results were not reported separately for these younger women.

Table 1: Characteristics of studies reporting breast cancer outcomes related to breast awareness*

First author (year)	Title	Journal	Country (years)	Study design	No. of Participants	No. \leq age 40	Intervention	Method	Outcome measured	Risk of bias assessment
Gadgil A (2017) [21]	Cancer early detection program based on awareness and clinical breast examination: Interim results from an urban community in Mumbai, India.	Breast	India (2013-2016)	Prospective cohort study	<ul style="list-style-type: none"> • 22,500 women • 30- 69 years • Enrolled in the occupational health care scheme of a government department in India 	Not reported separately for <40.	Breast awareness information yearly mail-out	<ul style="list-style-type: none"> • Breast awareness brochures were mailed annually between June 2013 - June 2016. • Women with suspected breast cancers were provided with diagnostic investigations and treatment. • Outcomes were compared between the pre-intervention period (Jan 2005 - May 2013) and the intervention period after four rounds of mailers (June 2013 - June 2016). • Data regarding the pre-intervention period were collected from 	<p>Tumour characteristics</p> <ul style="list-style-type: none"> • Size of tumour • Axillary node-negative tumours • Stage at diagnosis <p>Treatment</p> <ul style="list-style-type: none"> • Breast-conserving • Chemotherapy • 3-year mortality 	<p>JBI score 8/11</p> <p>Moderate risk of bias</p>

								electronic medical records.		
Joffe M (2018) [22]	Barriers to early presentation of breast cancer among women in Soweto, South Africa.	PLoS ONE	South Africa (2015-2016)	Cross-sectional survey	<ul style="list-style-type: none"> • 499 women, • Over 18 years • Newly diagnosed with breast carcinoma at the Chris Hani Baragwanath Academic Hospital in Soweto, Johannesburg. 	69 participants (13.8% of total). However, no breakdown of knowledge score is provided for women diagnosed at early and late stage who are under 40 years old.	Self-reported breast cancer knowledge and awareness	Face-to-face interviewer-administered questionnaire was used to compare self-reported socioeconomics, demographics, comorbidities, risk factors, personal and health system barriers experienced by participants with clinical staging, receptor subtype, and tumour grade obtained from their clinical records.	Clinical stage at diagnosis of breast cancer (early 0-II or late III/IV)	JBI score 6/8 Moderate risk of bias

*Partially eligible studies were those that met eligibility for breast awareness and cancer data but not age criteria. These studies included a group of women ≤ 40 years but results were not reported separately for these younger women.

Table 2: Results from studies reporting breast cancer outcomes related to breast awareness*

First author (year) Country	Intervention	Results	Conclusions	p value	Limitations
Gadgil A (2017) India [21]	<ul style="list-style-type: none"> • Approximately 88,000 breast awareness brochures • Mailed on an annual basis in four rounds from June 2013-June 2016 to all eligible women • Contained information about breast anatomy, physiological changes in the breast, early symptoms and signs of breast cancer, high cure rates and improved cosmetic outcome following early detection and adequate treatment. <p>Five breast clinics were established to enable the targeted women to seek early detection services and further referral for diagnosis and treatment.</p>	<p>During the intervention period:</p> <ul style="list-style-type: none"> • 2709 women attended breast clinics seeking care. • 427 women were referred to the central hospital for further evaluation. • 93 FNAC were performed. • 77 cancers were diagnosed. <p>This is compared to 156 women with breast cancers detected in the pre-intervention period.</p> <p>Statistically significant results:</p> <ul style="list-style-type: none"> • The proportion of women receiving chemotherapy decreased from 84% to 55.8% (p<0.01). • Dying within 3 years from diagnosis decreased from 8.3% to nil (p= 0.01). <p>Results that were not statistically significant:</p> <ul style="list-style-type: none"> • Early pathological stage (I-II) tumours increased from 73.7% to 80.5% (p= 0.25). • Axillary lymph node negative cancers increased from 46.2% to 53.2% (p= 0.31). • Smaller size tumours (less or equal to 5 cm) increased from 85.3% to 89.5% (p= 0.39). • Advanced (III-IV) tumours decreased from 21.9% to 18.4% (p= 0.54). 	<ul style="list-style-type: none"> • Interim results indicate early diagnosis and improved three-year survival in the intervention period compared to the pre-intervention period. • The use of chemotherapy declined significantly after the intervention. • The clinical down-staging following awareness intervention should be followed up during further rounds of mailing to be better understood. • Overall, preliminary results support that improving awareness can reduce the stage at diagnosis. <p>Potentially improving the odds of survival, cure, and enabling simpler and more cost-effective treatment.</p>	See results column.	<p>Women in an occupational healthcare setting does not reflect a routine population, especially in a low- or middle-income country.</p> <p>Short duration of follow-up.</p> <p>Small number of breast cancer cases on which the results have been reported.</p>

		<ul style="list-style-type: none"> Breast conserving surgery increased from 39.1% to 50.6% ($p=0.09$). 			
Joffe M (2018) South Africa [22]	9 questions from the 'Barrier to Care' questionnaire assessing awareness and knowledge of breast cancer.	<p>Those with greater knowledge and awareness of breast cancer and symptoms had a lower odds for advanced stage at diagnosis (OR 0.82, 95%CI 0.74–0.91, $p<0.01$.)</p> <p>Knowledge Score (0-9). Mean +/- SD as below:</p> <ul style="list-style-type: none"> Total = 5.86 +/- 1.88 Early stage (0-II) = 6.2 +/- 1.73 Late stage (III-IV) = 5.53 +/- 1.97 p value <0.01 <p>One of the most common reasons for delays was failure to recognize that breast symptoms were serious.</p> <ul style="list-style-type: none"> Those taking >3 months after noticing a breast symptom to access healthcare were at higher risk for advanced-stage disease at diagnosis than patients who had taken less than one month (OR = 2.84, 95%CI: 1.84–4.39, p value <0.01.) 	Partnering with Cancer NGOs in South Africa, coordinating outreach programs at community and clinic levels to increase knowledge and awareness of breast cancer symptoms would enable more patients to be diagnosed and treated at an early stage, thereby reducing breast cancer morbidity and mortality.	$p <0.01$ statistically significant	<p>Participants from urban, black community in Johannesburg may have limited generalisability.</p> <p>Patient survey responses may be biased or less accurate.</p> <p>Larger studies will be required to detect smaller odds ratios.</p>

*Partially eligible studies were those that met eligibility for breast awareness and cancer data but not age criteria. These studies included a group of women ≤ 40 years but results were not reported separately for these younger women.

References

1. Australian Institute of Health and Welfare (AIHW). Cancer in Australia 2019. 2019
2. Kudela E, Samec M, Kubatka P, Nachajova M, Laucekova Z, Liskova A, et al. Breast Cancer in Young Women: Status Quo and Advanced Disease Management by a Predictive, Preventive, and Personalized Approach. *Cancers (Basel)*. 2019 Nov 14;11(11).
3. Australian Institute of Health and Welfare (AIHW), Cancer Australia. Breast cancer in Australia: an overview. Canberra: AIHW; 2012
4. Sundquist M, Thorstenson S, Brudin L, Wingren S, Nordenskjöld B. Incidence and prognosis in early onset breast cancer. *Breast*. 2002 Feb;11(1):30-5.
5. Austoker J. Screening and self examination for breast cancer. *Bmj*. 1994 Jul 16;309(6948):168-74.
6. American Cancer Society. ACS Breast Cancer Screening Guidelines: American Cancer Society; 2022 [Available from: <https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection/american-cancer-society-recommendations-for-the-early-detection-of-breast-cancer.html> accessed September 2022.
7. Brennan ME. The role of clinical breast examination in cancer screening for women at average risk: A mini review. *Maturitas*. 2016;92:61-63.
8. Mitra I, Mishra GA, Dikshit RP, Gupta S, Kulkarni VY, Shaikh HKA, et al. Effect of screening by clinical breast examination on breast cancer incidence and mortality after 20 years: prospective, cluster randomised controlled trial in Mumbai. *BMJ*. 2021:n256.
9. Kusters JP, Gotzsche PC. Regular self-examination or clinical examination for early detection of breast cancer. *Cochrane Database Syst Rev*. 2003 (2):Cd003373.
10. Semiglazov VF, Manikhas AG, Moiseenko VM, Protsenko SA, Kharikova RS, Seleznev IK, et al. [Results of a prospective randomized investigation [Russia

(St.Petersburg)/WHO] to evaluate the significance of self-examination for the early detection of breast cancer]. *Vopr Onkol.* 2003;49(4):434-41.

11. Gao DL, Hu YW, Wang WW, Chen FL, Pan LD, Yuan Y, et al. [Evaluation on the effect of intervention regarding breast self-examination for decreasing breast cancer mortality]. *Zhonghua Liu Xing Bing Xue Za Zhi.* 2006 Nov;27(11):985-90.

12. Mac Bride MB, Pruthi S, Bevers T. The evolution of breast self-examination to breast awareness. *Breast J.* 2012 Nov-Dec;18(6):641-3.

13. Cancer Australia. Position statement on Early Detection of Breast Cancer (updated 2015) 2015 [Available from: <https://www.canceraustralia.gov.au/resources/position-statements/early-detection-breast-cancer> accessed September 2022.

14. National Institute for Health and Care Excellence (NICE). Clinical Guideline Familial breast cancer: classification, care and managing breast cancer and related risks in people with a family history of breast cancer. 2019.

15. Centers for Disease Control and Prevention (CDC). What Is Breast Cancer Screening? : CDC; 2021 [Available from: https://www.cdc.gov/cancer/breast/basic_info/screening.htm accessed September 2022.

16. National Institute for Health Research (NIHR). International prospective register of systematic reviews (PROSPERO): Centre for Reviews and Dissemination, University of York, UK; [Available from: <https://www.crd.york.ac.uk/prospero/> accessed September 2022.

17. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ.* 2021;372:n71.

18. Endnote (Clarivate). <https://endnote.com/> [Available from: <https://endnote.com/> accessed September 2022.

19. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews. *Systematic Reviews*. 2016 2016/12/05;5(1):210.
20. Joanna Briggs Institute. Critical Appraisal Tools for Use in JBI Systematic Reviews. 2017 [Available from: <https://joannabriggs.org/critical-appraisal-tools> accessed September 2022.
21. Gadgil A, Sauvaget C, Roy N, Muwonge R, Kantharia S, Chakrabarty A, et al. Cancer early detection program based on awareness and clinical breast examination: Interim results from an urban community in Mumbai, India. *Breast*. 2017 Feb;31:85-89.
22. Joffe M, Ayeni O, Norris SA, McCormack VA, Ruff P, Das I, et al. Barriers to early presentation of breast cancer among women in Soweto, South Africa. *PloS one*. 2018 2018;13(2):e0192071.
23. Oxford Centre for Evidence-Based Medicine (OCEBM), Levels of Evidence Working Group. The Oxford Levels of Evidence 2 2011 [Available from: <https://www.cebm.ox.ac.uk/resources/levels-of-evidence/ocebmllevels-of-evidence> accessed September 2022.

Figure 1: PRISMA flowchart

Table 1: Characteristics of studies reporting breast cancer outcomes related to breast awareness

Table 2: Results from studies reporting breast cancer outcomes related to breast awareness