

Social Determinants of Inequities in Breast Cancer Care Across the Care Continuum in Low- and Middle-Income Countries: A Systematic Review

Danial Fazilat-Panah¹, Masoomah Karimi¹, Ali Shabestani Monfared¹, Atefe Rangani², Mina Heidarian³

¹Cancer Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran. ²General Practitioner, Babol, Iran. ³Department of Radiation Oncology, School of Medicine, Shahid Rajayee Hospital, Babol University of Medical Sciences, Babol, Iran.

Abstract

Introduction: Breast cancer is the most frequently diagnosed cancer among women worldwide, yet mortality remains disproportionately high in low- and middle-income countries (LMICs). Social determinants of health (SDoH), including socioeconomic status, education, geographic access, gender norms, and health system capacity, contribute substantially to inequities across the breast cancer care continuum. This systematic review synthesized evidence on the impact of SDoH on breast cancer care and outcomes in LMICs. **Methods:** PubMed/MEDLINE, Scopus, Web of Science, and Embase were searched for eligible observational and intervention studies examining associations between SDoH and breast cancer care outcomes in LMICs. Outcomes included screening, diagnostic delay, stage at diagnosis, treatment access, adherence, and survival. Two reviewers independently screened studies, extracted data, and assessed study quality. Owing to substantial heterogeneity, findings were synthesized narratively. **Results:** A total of 221 studies were included. Socioeconomic disadvantage was consistently associated with delayed diagnosis, advanced-stage presentation, limited access to guideline-concordant treatment, and poorer survival. Rural populations experienced reduced access to oncology services and lower treatment completion rates. Health system constraints, including inadequate pathology services, workforce shortages, weak referral systems, and limited access to radiotherapy and systemic therapies, further exacerbated inequities. Financial hardship frequently caused treatment interruption, while low health literacy, stigma, fear of mastectomy, and gender-related barriers delayed healthcare seeking. Community-based interventions, task-shifting, and resource-stratified care models showed promise, although evidence supporting their long-term effectiveness remains limited. **Conclusions:** Breast cancer care inequities in LMICs result from interacting socioeconomic, geographic, sociocultural, and health system factors. Addressing these disparities requires equity-focused policies that strengthen primary healthcare, expand financial protection, decentralize oncology services, and target upstream social determinants. Future research should prioritize evaluating interventions that effectively reduce inequities.

Keywords: Breast cancer- Social determinants of health- Health inequities- Cancer care continuum

Rep Radiother Oncol, 11 (1), 125-137

Submission Date: 07/01/2025

Acceptance Date: 08/22/2025

Introduction

Breast cancer is the most commonly diagnosed cancer and remains a leading cause of cancer-related mortality among women worldwide. Although substantial advances in early detection and multimodal treatment have improved survival over recent decades, these gains have not been equitably distributed. Women living in low- and middle-income countries (LMICs) continue to experience

disproportionately high mortality because of delayed diagnosis and limited access to effective cancer care [1, 2].

Global survival studies consistently demonstrate substantial disparities in breast cancer outcomes between high-income countries and LMICs. These differences are largely explained by variation in stage at diagnosis, timely diagnostic evaluation, and access to guideline-concordant

Corresponding Author:

Dr. Mina Heidarian

Department of Radiation Oncology, School of Medicine, Shahid Rajayee Hospital, Babol University of Medical Sciences, Babol, Iran.

Email: hdn.mina721@gmail.com

treatment. Consequently, women in LMICs are more likely to present with advanced-stage disease and experience poorer survival than those in high-income settings [3, 4].

Many of these disparities arise from structural weaknesses within health systems. Inadequate diagnostic capacity, limited pathology and imaging services, inefficient referral pathways, shortages of specialized healthcare professionals, and restricted availability of surgery, systemic therapy, and radiotherapy collectively impede timely and comprehensive breast cancer care [5, 6].

Beyond health system constraints, social determinants of health (SDoH) provide a broader framework for understanding inequities across the breast cancer care continuum. Socioeconomic status, educational attainment, employment, housing conditions, geographic accessibility, and social support influence health-seeking behavior, access to diagnostic services, treatment initiation, adherence to therapy, and long-term survivorship. These determinants interact throughout the continuum of care, shaping both healthcare access and clinical outcomes [3, 7].

Evidence from cohort and population-based studies consistently demonstrates that socioeconomic disadvantage is associated with delayed diagnosis, advanced-stage presentation, lower likelihood of receiving guideline-concordant treatment, and poorer survival. These individual-level disadvantages are further amplified by structural barriers, including inadequate radiotherapy capacity, limited pathology services, urban concentration of oncology facilities, and high out-of-pocket healthcare expenditures, creating cumulative obstacles to equitable cancer care [6, 8].

Importantly, breast cancer inequities cannot be explained solely by individual socioeconomic characteristics. Upstream structural determinants, including health financing policies, governance, resource allocation, and the geographic distribution of oncology services, shape downstream social determinants and collectively influence access to quality cancer care. Understanding the interaction between these structural and individual factors is essential for developing effective strategies to reduce inequities in LMICs [7].

Although numerous studies have examined individual barriers to breast cancer care in LMICs, the available evidence remains fragmented across different stages of the care continuum, including screening, diagnosis, treatment, and survival. To date, few systematic reviews have synthesized how multiple social determinants interact across the entire continuum of breast cancer care, limiting a comprehensive understanding of where and how inequities arise and accumulate over time [9].

Therefore, this systematic review aimed to synthesize the available evidence on the association between social determinants of health and inequities in breast cancer care across LMICs, with particular emphasis on screening, diagnostic delay, stage at diagnosis, treatment access and adherence, and survival outcomes throughout the breast cancer care continuum.

Materials and Methods

Study Design and Reporting Guidelines

This systematic review was conducted to synthesize evidence on the association between social determinants of health (SDoH) and inequities across the breast cancer care continuum in low- and middle-income countries (LMICs). The review examined disparities in breast cancer screening, diagnostic delay, stage at diagnosis, access to treatment, treatment adherence, and survival outcomes. The methodology and reporting of this review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement [10].

Protocol Registration

The review protocol was developed a priori before study selection but was not prospectively registered. To enhance methodological transparency and reproducibility, all review procedures were conducted and reported in accordance with the PRISMA 2020 guideline.

Search Strategy

A comprehensive literature search was conducted in PubMed/MEDLINE, Scopus, Web of Science, and Embase to identify eligible studies published between January 2010 and March 2026. The search strategy combined controlled vocabulary, including Medical Subject Headings (MeSH) and Emtree terms, with free-text keywords related to breast cancer, social determinants of health, healthcare access, diagnostic delay, treatment disparities, and survival in LMICs.

The search included combinations of the following concepts: breast cancer, breast neoplasms, social determinants of health, socioeconomic status, education, income, healthcare access, diagnostic delay, treatment adherence, survival, and low- and middle-income countries. Boolean operators ("AND" and "OR") and database-specific search adaptations were applied where appropriate.

To maximize retrieval of eligible studies, the reference lists of all included articles and relevant review papers were also manually searched.

Eligibility Criteria

Studies were included if they met the following criteria:

1. Were conducted in countries classified as low- or middle-income according to the World Bank classification at the time of the study.
2. Included adult women (≥ 18 years) with histologically confirmed breast cancer.
3. Evaluated at least one social determinant of health, including socioeconomic status, education, income, employment, health insurance, ethnicity, geographic accessibility, housing conditions, or social support.
4. Reported associations between SDoH and breast cancer outcomes, including screening participation, diagnostic delay, stage at diagnosis, healthcare utilization, treatment initiation, treatment adherence, or survival.
5. Employed observational (cross-sectional, cohort, or case-control), interventional, qualitative, or mixed-

methods study designs.

6. Were published in English between January 2010 and March 2026.

Conference abstracts, editorials, commentaries, letters, case reports, case series, duplicate publications, animal studies, and studies conducted exclusively in high-income countries were excluded.

Study Selection

All retrieved records were imported into EndNote X20 (Clarivate Analytics) for reference management and duplicate removal. Two reviewers independently screened titles and abstracts for eligibility. Potentially relevant studies underwent full-text assessment using the predefined inclusion and exclusion criteria.

Disagreements between reviewers were resolved through discussion and consensus. When necessary, a third reviewer was consulted. The study selection process is summarized in the PRISMA 2020 flow diagram (Figure 1).

Data Extraction

Data were independently extracted by two reviewers using a standardized, pilot-tested data extraction form. The following information was collected from each study:

- First author and year of publication;
- Country and World Bank income classification;
- Study design and study setting;
- Sample size and participant characteristics;
- Social determinants of health evaluated;
- Breast cancer outcomes assessed;
- Measures of association, including odds ratios (ORs), hazard ratios (HRs), and relative risks (RRs), where available;
- Variables included in multivariable adjustment models; and
- Principal findings related to inequities in breast cancer care.

Any discrepancies in data extraction were resolved through discussion and consensus.

Quality Assessment and Risk of Bias

Methodological quality and risk of bias were independently assessed by two reviewers using study design-specific appraisal tools. The Newcastle–Ottawa Scale (NOS) was used to evaluate cohort and case-control studies, whereas the Joanna Briggs Institute (JBI) Critical Appraisal Checklists were applied to cross-sectional and qualitative studies.

For the NOS, studies scoring 7–9 stars were classified as having low risk of bias, 5–6 stars as moderate risk, and ≤4 stars as high risk. For the JBI tools, studies meeting ≥70% of appraisal criteria were considered low risk of bias, those meeting 50–69% were classified as moderate risk, and those meeting <50% were classified as high risk.

Disagreements between reviewers were resolved through discussion and consensus, with consultation of a third reviewer when required. Methodological quality was considered during interpretation of the findings but

was not used as an exclusion criterion.

Data Synthesis

Because of substantial heterogeneity in study populations, exposure definitions, outcome measures, and methodological approaches, quantitative meta-analysis was not considered appropriate. Therefore, the findings were synthesized narratively.

Studies were grouped according to major domains of the breast cancer care continuum, including screening and early detection, diagnostic delay, stage at diagnosis, access to treatment, treatment adherence, and survival outcomes. Findings were further organized according to the principal social determinants investigated, including socioeconomic, geographic, financial, sociocultural, and health system factors. Patterns of inequity across different LMIC settings were compared qualitatively to identify recurring barriers and evidence gaps.

Results

Study Selection and Study Characteristics

A total of 1,046 records were identified through searches of PubMed/MEDLINE, Scopus, Web of Science, and Embase. After removing 96 duplicate records and excluding 53 records for other reasons, 897 records underwent title and abstract screening. Of these, 592 were excluded. The remaining 305 full-text articles were assessed for eligibility, and all were successfully retrieved. Following full-text review, 84 studies were excluded because they did not meet the predefined eligibility criteria. Ultimately, 221 studies were included in the qualitative synthesis (Figure 1).

The included studies represented a wide range of LMICs across Africa, Asia, Latin America, and the Middle East. Most employed cross-sectional or cohort designs, although case-control studies, registry-based analyses, qualitative studies, mixed-methods research, ecological studies, and implementation studies were also included.

Across the included literature, the most frequently evaluated outcomes were breast cancer screening participation, diagnostic delay, stage at diagnosis, access to treatment, treatment completion, and survival. Commonly investigated social determinants included socioeconomic status, educational attainment, geographic accessibility, health insurance coverage, ethnicity, gender-related social factors, health system characteristics, and financial barriers. More recent studies increasingly adopted intersectional approaches, examining the combined effects of multiple social and structural determinants on inequities across the breast cancer care continuum.

Socioeconomic Inequities in Breast Cancer Care

Socioeconomic disadvantage was the most consistently reported determinant of inequity across the breast cancer care continuum. Women with lower income, lower educational attainment, or unstable employment were more likely to experience delayed presentation, advanced-stage disease at diagnosis, reduced access to guideline-concordant treatment, and poorer survival

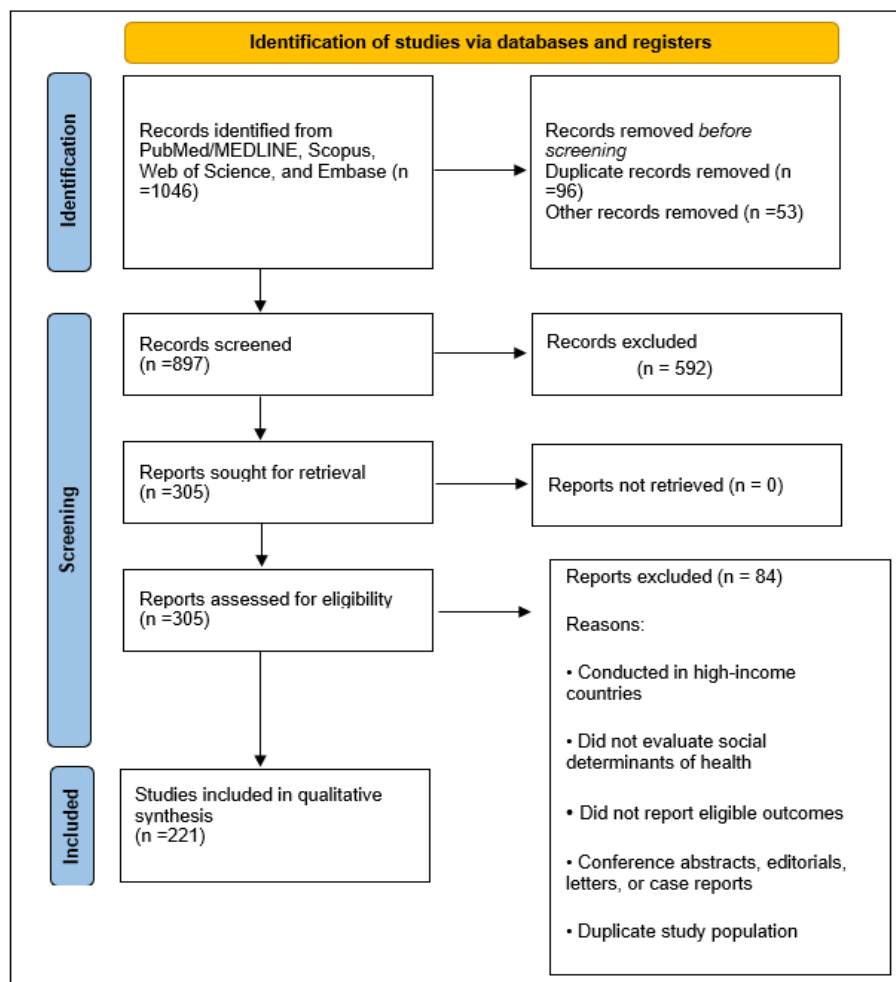


Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process

outcomes [3, 11, 12].

Several studies demonstrated that limited educational attainment was associated with lower awareness of breast cancer symptoms, reduced participation in screening programs, and longer delays before seeking medical attention [13, 14]. Socioeconomic disadvantage was also associated with lower utilization of surgery, systemic therapy, and radiotherapy consistent with clinical guidelines [15, 16].

Population-based studies from Brazil, China, India, and sub-Saharan Africa consistently reported survival disparities across socioeconomic groups [17–20]. Importantly, several investigations found that socioeconomic disadvantage remained independently associated with poorer outcomes even after adjustment for tumor stage and biological characteristics [21, 22].

Geographic Disparities and Rural–Urban Inequities

Geographic inequalities were consistently reported across all regions. Women residing in rural and remote areas experienced delayed diagnosis, reduced access to oncology specialists, longer travel distances, and lower treatment completion rates [23, 24].

Limited availability of mammography, pathology, surgical oncology, and radiotherapy services in rural settings contributed to prolonged diagnostic intervals and

treatment delays [25–27]. The concentration of specialized oncology services in urban tertiary hospitals further widened disparities between urban and rural populations.

Studies from Africa, Asia, Brazil, China, and India consistently demonstrated that greater travel distance to cancer facilities was associated with later-stage diagnosis and poorer survival [17, 24, 28–31].

Health System Barriers

Structural weaknesses within healthcare systems emerged as major contributors to inequitable breast cancer care. Frequently reported barriers included shortages of oncology specialists, inadequate pathology services, fragmented referral systems, insufficient radiotherapy capacity, and limited access to systemic therapies [32–34].

Delayed pathological diagnosis and inefficient referral pathways prolonged the interval between symptom presentation and treatment initiation in many LMICs [26, 35]. Limited radiotherapy capacity, particularly in sub-Saharan Africa and parts of Latin America, resulted in prolonged waiting times and restricted treatment availability [27, 36].

Financial constraints within healthcare systems also limited access to essential anticancer medicines and newer systemic therapies, contributing to disparities in treatment quality and survival [37, 38]. Weak primary healthcare

systems further reduced opportunities for early detection and timely referral [39].

Financial Toxicity and Economic Burden

Financial hardship was one of the most frequently reported barriers across the included studies. Out-of-pocket expenditures for diagnostic tests, transportation, surgery, chemotherapy, and supportive care frequently resulted in catastrophic health expenditure, treatment interruption, or treatment abandonment [40, 41].

Studies conducted in Southeast Asia, sub-Saharan Africa, and Latin America consistently showed that financial hardship was associated with poorer treatment adherence and increased mortality [42, 43]. Even where cancer treatment was partially subsidized, indirect costs including transportation, accommodation, and income loss remained substantial barriers to continued care [44].

Several studies suggested that universal health coverage and financial protection policies could improve equitable access to cancer care; however, inadequate insurance coverage and limited oncology infrastructure continued to constrain service delivery [45, 46].

Sociocultural Determinants and Gender-Related Barriers

Sociocultural factors substantially influenced awareness, healthcare-seeking behavior, and treatment decisions. Fear of mastectomy, cancer-related stigma, fatalistic beliefs, and misconceptions regarding breast cancer were consistently associated with delayed presentation [47-49].

Qualitative studies from Africa, South Asia, and the Middle East highlighted the influence of gender norms and patriarchal social structures on women's autonomy in seeking healthcare. In some settings, women required approval from male family members before pursuing diagnostic evaluation or treatment [50].

Limited health literacy further contributed to delayed symptom recognition, reduced participation in screening, and underutilization of healthcare services [51, 52]. Persistent cancer stigma also contributed to psychosocial distress and reluctance to seek treatment [53, 54].

Ethnic, Racial, and Intersectional Inequities

Several studies reported disparities in breast cancer outcomes across racial and ethnic groups. Minority populations and socially marginalized communities experienced reduced access to screening, delayed treatment initiation, and poorer survival [55, 56].

Recent research increasingly adopted an intersectional perspective, demonstrating that the combined effects of socioeconomic disadvantage, rural residence, ethnicity, and gender discrimination produced cumulative barriers across the breast cancer care continuum [44].

Interventions to Reduce Inequities

The included studies described several interventions aimed at reducing inequities in breast cancer care, including community health worker programs, public awareness campaigns, mobile health technologies, task-shifting strategies, and resource-stratified treatment

guidelines [42, 57, 58].

Task-shifting and decentralized models of care appeared particularly valuable in settings with severe oncology workforce shortages [59]. Community-based education programs also improved breast cancer awareness and screening participation in several low-resource settings. However, most interventions were implemented at local or pilot scale, and evidence regarding their long-term sustainability, cost-effectiveness, and impact on health equity remains limited [60]. Few studies addressed upstream determinants such as poverty, gender inequality, or broader health system financing reforms.

Overall Synthesis of Findings

Overall, the evidence indicates that breast cancer inequities in LMICs arise from the interaction of socioeconomic disadvantage, geographic barriers, sociocultural influences, financial hardship, and structural health system limitations. These determinants operate across the entire breast cancer care continuum from symptom recognition and diagnosis to treatment and survivorship and disproportionately affect socially vulnerable populations.

Discussion

This systematic review demonstrates that inequities across the breast cancer care continuum in low- and middle-income countries (LMICs) arise from the complex interaction of socioeconomic disadvantage, geographic barriers, sociocultural influences, and structural health system limitations. Rather than functioning independently, these determinants reinforce one another throughout the continuum of care, creating cumulative disadvantages that begin before diagnosis and extend through treatment and survivorship. This pattern is consistent with contemporary conceptual models of social determinants of health, which emphasize that health inequities result from interconnected structural and social processes rather than isolated individual-level risk factors.

Among the determinants identified, socioeconomic disadvantage emerged as the most consistent predictor of inequitable breast cancer outcomes. Women with lower income, limited educational attainment, and insecure employment were more likely to experience delayed presentation, advanced-stage disease at diagnosis, reduced access to guideline-concordant treatment, and poorer survival. Importantly, several studies demonstrated that these associations remained significant after adjustment for tumor characteristics and other clinical variables, suggesting that socioeconomic position influences breast cancer outcomes through mechanisms that extend beyond disease biology. Financial constraints, limited health literacy, competing household priorities, and restricted healthcare utilization likely contribute simultaneously to these disparities.

Geographic inequities represented another major source of unequal care. Across diverse LMIC settings, women living in rural and remote regions consistently experienced delayed diagnosis, reduced access to

specialized oncology services, longer travel distances, and lower treatment completion rates. These findings largely reflect the concentration of diagnostic and treatment facilities within urban tertiary centers, a pattern that remains common throughout many resource-limited healthcare systems. Improving geographic accessibility therefore requires not only expansion of oncology infrastructure but also stronger referral networks and decentralization of selected cancer services.

The review also highlights the importance of structural health system capacity as an upstream determinant of equity. Limited pathology services, shortages of trained oncology professionals, inadequate radiotherapy capacity, fragmented referral systems, and restricted availability of systemic therapies collectively delayed diagnosis and interrupted treatment across many LMICs. These findings indicate that improving patient outcomes cannot rely solely on increasing individual awareness or modifying health behaviors. Sustainable reductions in inequity require investment in health system infrastructure, workforce development, diagnostic capacity, and equitable resource allocation.

Financial toxicity emerged as a recurrent barrier throughout the breast cancer pathway. Direct medical costs together with transportation expenses, accommodation costs, and income loss frequently resulted in treatment interruption, catastrophic household expenditure, and, in some settings, treatment abandonment. Although universal health coverage and financial protection programs have reduced some direct costs in several countries, many patients continue to face substantial indirect expenses that remain inadequately addressed by existing healthcare financing mechanisms.

Sociocultural determinants further influenced access to timely diagnosis and treatment. Fear of cancer, stigma, fatalistic beliefs, misconceptions regarding breast cancer, and limited health literacy were repeatedly associated with delayed healthcare-seeking behavior. In several settings, gender norms and limited decision-making autonomy further restricted women's access to healthcare services. These observations emphasize that effective cancer control strategies should combine improvements in healthcare delivery with culturally appropriate educational interventions and community engagement programs designed to reduce stigma and improve awareness.

An important contribution of more recent studies is the increasing application of an intersectionality perspective. Rather than examining single determinants independently, contemporary research demonstrates that multiple forms of social disadvantage including poverty, rural residence, minority status, and gender inequality often coexist and interact to produce substantially greater barriers than any single determinant alone. Future research should continue adopting intersectional analytical frameworks to better understand how overlapping vulnerabilities shape breast cancer outcomes across different LMIC contexts.

Although several promising interventions were identified including community health worker programs, decentralized service delivery, mobile health technologies, task-shifting strategies, and resource-stratified clinical

guidelines the available evidence regarding their long-term effectiveness remains limited. Most interventions were evaluated within pilot projects or localized implementation programs, with relatively few studies examining sustainability, scalability, or long-term effects on health equity. Future implementation research should therefore prioritize rigorous evaluation of equity-focused interventions using standardized outcome measures.

Strengths and Limitations

This review has several strengths. It synthesizes evidence from a large number of studies representing diverse LMIC settings and examines inequities across the entire breast cancer care continuum rather than focusing on a single stage of care. The review also incorporates both individual-level and structural determinants, providing a comprehensive perspective on the multifactorial nature of breast cancer disparities.

Several limitations should also be acknowledged. First, most included studies were observational, precluding causal inference. Second, substantial heterogeneity in study design, definitions of social determinants, and outcome measures limited direct comparison across studies and precluded quantitative meta-analysis. Third, only English-language publications were included, introducing the possibility of language bias. Finally, considerable variation in healthcare systems and socioeconomic contexts across LMICs may limit the generalizability of findings to specific national settings.

Implications for Policy and Research

The findings suggest that reducing breast cancer inequities requires coordinated action at multiple levels. Policy initiatives should strengthen primary healthcare, expand financial protection, decentralize oncology services, improve referral pathways, and invest in diagnostic and treatment infrastructure. At the same time, interventions addressing health literacy, community awareness, and sociocultural barriers should complement health system reforms. Future research should prioritize prospective studies, standardized measurement of social determinants, and rigorous evaluation of interventions according to their effectiveness in reducing inequities rather than improving average outcomes alone.

In conclusions, breast cancer inequities in low- and middle-income countries arise from the interaction of socioeconomic disadvantage, geographic barriers, sociocultural influences, and structural weaknesses within healthcare systems. These determinants operate across the entire continuum of care, resulting in delayed diagnosis, unequal access to treatment, lower treatment completion, and poorer survival among socially disadvantaged populations. Reducing these inequities will require comprehensive, equity-oriented strategies that integrate health system strengthening with broader actions addressing the social determinants of health. Future policies and research should prioritize interventions capable of narrowing disparities and improving outcomes for the populations most affected by breast cancer.

Acknowledgements

Statement of Transparency and Principles

Author declares no conflict of interest.

References

1. Organization WH. breast cancer. World Health Organization <https://www.who.int/news-room/fact-sheets/detail/breast-cancer>; 16 April 2026..
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: a cancer journal for clinicians*. 2021 05;71(3):209-249. <https://doi.org/10.3322/caac.21660>
3. Coughlin SS. Social determinants of breast cancer risk, stage, and survival. *Breast cancer research and treatment*. 2019;177(3):537-48.
4. Allemani C, Silva GAE, Mathur P, Coleman MP. The CONCORD-Lancet Global Commission on Cancer. *Lancet*. 2024 07 27;404(10450):320-322. [https://doi.org/10.1016/S0140-6736\(24\)01345-X](https://doi.org/10.1016/S0140-6736(24)01345-X)
5. Anderson BO, Shyyan R, Eniu A, Smith RA, Yip C, Bese NS, Chow LWC, et al. Breast cancer in limited-resource countries: an overview of the Breast Health Global Initiative 2005 guidelines. *The Breast Journal*. 2006;12 Suppl 1:S3-15. <https://doi.org/10.1111/j.1075-122X.2006.00199.x>
6. Atun R, Jaffray DA, Barton MB, Bray F, Baumann M, Vikram B, Hanna TP, et al. Expanding global access to radiotherapy. *The Lancet. Oncology*. 2015 09;16(10):1153-1186. [https://doi.org/10.1016/S1470-2045\(15\)00222-3](https://doi.org/10.1016/S1470-2045(15)00222-3)
7. Braveman P, Gottlieb L. The social determinants of health: it's time to consider the causes of the causes. *Public Health Reports*. 2014;129 Suppl 2(Suppl 2):19-31. <https://doi.org/10.1177/00333549141291S206>
8. Downing A, Prakash K, Gilthorpe MS, Mikeljevic JS, Forman D. Socioeconomic background in relation to stage at diagnosis, treatment and survival in women with breast cancer. *British Journal of Cancer*. 2007 03 12;96(5):836-840. <https://doi.org/10.1038/sj.bjc.6603622>
9. Brand NR, Qu LG, Chao A, Ilbawi AM. Delays and Barriers to Cancer Care in Low- and Middle-Income Countries: A Systematic Review. *The Oncologist*. 2019 Dec;24(12):e1371-e1380. <https://doi.org/10.1634/theoncologist.2019-0057>
10. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021 03 29;372:n71. <https://doi.org/10.1136/bmj.n71>
11. Oliveira NPD, Camargo Cancela M, Martins LFL, Souza DLB. A multilevel assessment of the social determinants associated with the late stage diagnosis of breast cancer. *Scientific Reports*. 2021 02 01;11(1):2712. <https://doi.org/10.1038/s41598-021-82047-0>
12. Booth CM, Li G, Zhang-Salomons J, Mackillop WJ. The impact of socioeconomic status on stage of cancer at diagnosis and survival: a population-based study in Ontario, Canada. *Cancer*. 2010 09 01;116(17):4160-4167. <https://doi.org/10.1002/cncr.25427>
13. Kumarasamy H, Veerakumar AM, Subhathra S, Suga Y, Murugaraj R. Determinants of Awareness and Practice of Breast Self Examination Among Rural Women in Trichy, Tamil Nadu. *Journal of Mid-Life Health*. 2017;8(2):84-88. https://doi.org/10.4103/jmh.JMH_79_16
14. Gangane N, Khairkar P, Hurtig A, San Sebastián M. Quality of Life Determinants in Breast Cancer Patients in Central Rural India. *Asian Pacific journal of cancer prevention: APJCP*. 2017 Dec 29;18(12):3325-3332. <https://doi.org/10.22034/APJCP.2017.18.12.3325>
15. Griggs JJ, Hawley ST, Graff JJ, Hamilton AS, Jagsi R, Janz NK, Mujahid MS, et al. Factors associated with receipt of breast cancer adjuvant chemotherapy in a diverse population-based sample. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology*. 2012 09 01;30(25):3058-3064. <https://doi.org/10.1200/JCO.2012.41.9564>
16. Rueth NM, Lin HY, Bedrosian I, Shaitelman SF, Ueno NT, Shen Y, Babiera G. Underuse of trimodality treatment affects survival for patients with inflammatory breast cancer: an analysis of treatment and survival trends from the National Cancer Database. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology*. 2014 07 01;32(19):2018-2024. <https://doi.org/10.1200/JCO.2014.55.1978>
17. Gonzaga CMR, Freitas-Junior R, Curado M, Sousa AL, Souza-Neto J, Souza MR. Temporal trends in female breast cancer mortality in Brazil and correlations with social inequalities: ecological time-series study. *BMC public health*. 2015 02 07;15:96. <https://doi.org/10.1186/s12889-015-1445-7>
18. Sparano JA, Wang M, Zhao F, Stearns V, Martino S, Ligibel JA, Perez EA, et al. Race and hormone receptor-positive breast cancer outcomes in a randomized chemotherapy trial. *Journal of the National Cancer Institute*. 2012 03 07;104(5):406-414. <https://doi.org/10.1093/jnci/djr543>
19. Mathew A, George PS, Ramadas K, Mathew BS, Kumar A, Roshni S, Jayakumar KNL, Booth CM. Sociodemographic Factors and Stage of Cancer at Diagnosis: A Population-Based Study in South India. *Journal of Global Oncology*. 2019 07;5:1-10. <https://doi.org/10.1200/JGO.18.00160>
20. Joko-Fru WY, Griesel M, Mezger NCS, Hämmerl L, Seraphin TP, Feuchtnr J, Wabinga H, et al. Breast Cancer Diagnostics, Therapy, and Outcomes in Sub-Saharan Africa: A Population-Based Registry Study. *Journal of the National Comprehensive Cancer Network: JNCCN*. 2021 Dec 29;20(13). <https://doi.org/10.6004/jnccn.2021.7011>
21. Li N, Deng Y, Zhou L, Tian T, Yang S, Wu Y, Zheng Y, et al. Global burden of breast cancer and attributable risk factors in 195 countries and territories, from 1990 to 2017: results from the Global Burden of Disease Study 2017. *Journal of Hematology & Oncology*. 2019 Dec 21;12(1):140. <https://doi.org/10.1186/s13045-019-0828-0>
22. Keegan THM, Kurian AW, Gali K, Tao L, Lichtensztajn DY, Hershman DL, Habel LA, et al. Racial/ethnic and socioeconomic differences in short-term breast cancer survival among women in an integrated health system. *American Journal of Public Health*. 2015 05;105(5):938-946. <https://doi.org/10.2105/AJPH.2014.302406>
23. Baade PD, Turrell G, Aitken JF. Geographic remoteness, area-level socio-economic disadvantage and advanced breast cancer: a cross-sectional, multilevel study. *Journal of Epidemiology and Community Health*. 2011 Nov;65(11):1037-1043. <https://doi.org/10.1136/jech.2010.114777>
24. Dickens C, Pfeiffer RM, Anderson WF, Duarte R, Kellett P, Schüz J, Kielkowski D, McCormack VA. Investigation of breast cancer sub-populations in black and white women in South Africa. *Breast Cancer Research and Treatment*. 2016 Dec;160(3):531-537. <https://doi.org/10.1007/s10549-016-4019-1>

25. Gentil J, Dabakuyo TS, Ouedraogo S, Poillot M, Dejardin O, Arveux P. For patients with breast cancer, geographic and social disparities are independent determinants of access to specialized surgeons. A eleven-year population-based multilevel analysis. *BMC cancer*. 2012 08 13;12:351. <https://doi.org/10.1186/1471-2407-12-351>
26. Bright K, Barghash M, Donach M, Barrera MG, Schneider RJ, Formenti SC. The role of health system factors in delaying final diagnosis and treatment of breast cancer in Mexico City, Mexico. *Breast*. 2011 04;20 Suppl 2:S54-59. <https://doi.org/10.1016/j.breast.2011.02.012>
27. Bishr MK, Zaghloul MS. Radiation Therapy Availability in Africa and Latin America: Two Models of Low and Middle Income Countries. *International Journal of Radiation Oncology, Biology, Physics*. 2018 Nov 01;102(3):490-498. <https://doi.org/10.1016/j.ijrobp.2018.06.046>
28. Marcus TS, Lunda S, Fernandez L. Delayed breast cancer presentation: hospital data should inform proactive primary care. *African Journal of Primary Health Care & Family Medicine*. 2013 08 15;5(1):7.
29. Galukande M, Wabinga H, Mirembe F. Breast cancer survival experiences at a tertiary hospital in sub-Saharan Africa: a cohort study. *World Journal of Surgical Oncology*. 2015 07 19;13:220. <https://doi.org/10.1186/s12957-015-0632-4>
30. Fei X, Wu J, Kong Z, Christakos G. Urban-rural disparity of breast cancer and socioeconomic risk factors in China. *PloS One*. 2015;10(2):e0117572. <https://doi.org/10.1371/journal.pone.0117572>
31. Hutajulu SH, Prabandari YS, Bintoro BS, Wiranata JA, Widiastuti M, Suryani ND, Saptari RG, et al. Delays in the presentation and diagnosis of women with breast cancer in Yogyakarta, Indonesia: A retrospective observational study. *PloS One*. 2022;17(1):e0262468. <https://doi.org/10.1371/journal.pone.0262468>
32. Cazap E, Anderson BO, Curigliano G, Sehdev S, Cardoso F, Gonzalez AR, Shash E, et al. Bridging gaps in breast cancer care: a Breast Cancer Care Quality Index to improve outcomes worldwide. *Ecancermedicalscience*. 2025;19:1981. <https://doi.org/10.3332/ecancer.2025.1981>
33. Horton S, Camacho Rodriguez R, Anderson BO, Aung S, Awuah B, Delgado Pebé L, Duggan C, et al. Health system strengthening: Integration of breast cancer care for improved outcomes. *Cancer*. 2020 05 15;126 Suppl 10(Suppl 10):2353-2364. <https://doi.org/10.1002/cncr.32871>
34. Mittal A, Deo SVS, Gogia A, Batra A, Kumar A, Bhorival S, Deb KS, et al. Profile of Pathogenic Mutations and Evaluation of Germline Genetic Testing Criteria in Consecutive Breast Cancer Patients Treated at a North Indian Tertiary Care Center. *Annals of Surgical Oncology*. 2022 02;29(2):1423-1432. <https://doi.org/10.1245/s10434-021-10870-w>
35. Harford JB. Breast-cancer early detection in low-income and middle-income countries: do what you can versus one size fits all. *The Lancet. Oncology*. 2011 03;12(3):306-312. [https://doi.org/10.1016/S1470-2045\(10\)70273-4](https://doi.org/10.1016/S1470-2045(10)70273-4)
36. Kraus R. Examining religious/spiritual change among women with metastatic breast cancer. *Journal for the Scientific Study of Religion*. 2022;61(2):314-330. <https://doi.org/10.1111/jssr.12771>
37. Cherny N, Sullivan R, Torode J, Saar M, Eniu A. ESMO European Consortium Study on the availability, out-of-pocket costs and accessibility of antineoplastic medicines in Europe. *Annals of Oncology: Official Journal of the European Society for Medical Oncology*. 2016 08;27(8):1423-1443. <https://doi.org/10.1093/annonc/mdw213>
38. Cruz-Aguirre K, Cortés-Sanabria L, Salas-González E, Canales-Muñoz JL, Aguayo-Alcaraz G, Ayala-Cortés RA, Palomares-Hernández CY. Direct medical costs in a cohort of patients with breast cancer. *Revista Medica Del Instituto Mexicano Del Seguro Social*. 2022 03 01;60(2):107-115.
39. Figueiredo FWDS, Almeida TCDC, Cardial DT, Maciel ÉDS, Fonseca FLA, Adami F. The role of health policy in the burden of breast cancer in Brazil. *BMC women's health*. 2017 Nov 28;17(1):121. <https://doi.org/10.1186/s12905-017-0477-9>
40. Jan S, Kimman M, Peters SAE, Woodward M. Financial catastrophe, treatment discontinuation and death associated with surgically operable cancer in South-East Asia: Results from the ACTION Study. *Surgery*. 2015 06;157(6):971-982. <https://doi.org/10.1016/j.surg.2015.02.012>
41. Goryakin Y, Suhrcke M. The prevalence and determinants of catastrophic health expenditures attributable to non-communicable diseases in low- and middle-income countries: a methodological commentary. *International Journal for Equity in Health*. 2014 Nov 07;13:107. <https://doi.org/10.1186/s12939-014-0107-1>
42. Ginsburg O, Rositch AF, Conteh L, Mutebi M, Paskett ED, Subramanian S. Breast Cancer Disparities Among Women in Low- and Middle-Income Countries. *Current Breast Cancer Reports*. 2018 09 01;10(3):179-186. <https://doi.org/10.1007/s12609-018-0286-7>
43. Okoronkwo IL, Ejike-Okoye P, Chinweuba AU, Nwaneri AC. Financial barriers to utilization of screening and treatment services for breast cancer: an equity analysis in Nigeria. *Nigerian Journal of Clinical Practice*. 2015;18(2):287-291. <https://doi.org/10.4103/1119-3077.151070>
44. Ngan TT, Jenkins C, Minh HV, Donnelly M, O'Neill C. Breast cancer screening practices among Vietnamese women and factors associated with clinical breast examination uptake. *PloS One*. 2022;17(5):e0269228. <https://doi.org/10.1371/journal.pone.0269228>
45. González-Robledo MC, Wong R, Ornelas HA, Knaul FM. Costs of breast cancer care in Mexico: analysis of two insurance coverage scenarios. *Ecancermedicalscience*. 2015;9:587. <https://doi.org/10.3332/ecancer.2015.587>
46. Alshamsan R, Lee JT, Rana S, Areabi H, Millett C. Comparative health system performance in six middle-income countries: cross-sectional analysis using World Health Organization study of global ageing and health. *Journal of the Royal Society of Medicine*. 2017 09;110(9):365-375. <https://doi.org/10.1177/0141076817724599>
47. Akuoko CP, Armah E, Sarpong T, Quansah DY, Amankwaa I, Boateng D. Barriers to early presentation and diagnosis of breast cancer among African women living in sub-Saharan Africa. *PloS One*. 2017;12(2):e0171024. <https://doi.org/10.1371/journal.pone.0171024>
48. Nyblade L, Stockton M, Travasso S, Krishnan S. A qualitative exploration of cervical and breast cancer stigma in Karnataka, India. *BMC women's health*. 2017 08 02;17(1):58. <https://doi.org/10.1186/s12905-017-0407-x>
49. Martei YM, Pace LE, Brock JE, Shulman LN. Breast Cancer in Low- and Middle-Income Countries: Why We Need Pathology Capability to Solve This Challenge. *Clinics in Laboratory Medicine*. 2018 03;38(1):161-173. <https://doi.org/10.1016/j.cll.2017.10.013>
50. Donnelly TT, Al Khater A, Al Kuwari MG, Al-Bader SB, Al-Meer N, Abdulmalik M, Singh R, et al. Do socioeconomic factors influence breast cancer screening practices among Arab women in Qatar?. *BMJ open*. 2015 01 22;5(1):e005596. <https://doi.org/10.1136/bmjopen-2014-005596>
51. Muthoni A, Miller AN. An exploration of rural and urban Kenyan women's knowledge and attitudes regarding breast cancer and breast cancer early detection measures. *Health Care for Women International*. 2010 09;31(9):801-816.

- <https://doi.org/10.1080/07399331003628453>
52. Sayed S, Ngugi AK, Mahoney MR, Kurji J, Talib ZM, Macfarlane SB, Wynn TA, et al. Breast Cancer knowledge, perceptions and practices in a rural Community in Coastal Kenya. *BMC public health*. 2019 02 12;19(1):180. <https://doi.org/10.1186/s12889-019-6464-3>
 53. Rayne S, Schnippel K, Grover S, Fearnhead K, Kruger D, Benn C, Firnhaber C. Unraveling the South African Breast Cancer Story: The Relationship of Patients, Delay to Diagnosis, and Tumor Biology With Stage at Presentation in an Urban Setting. *The Journal of Surgical Research*. 2019 03;235:181-189. <https://doi.org/10.1016/j.jss.2018.09.087>
 54. Swinny CA, Kagee A, Roomaney R. Delayed help-seeking for symptomatic breast cancer: reasons for delay among participants receiving treatment at a public healthcare facility in South Africa.. <https://doi.org/10.1177/0081246321992477>
 55. Hirko KA, Rocque G, Reasor E, Taye A, Daly A, Cutress RI, Copson ER, et al. The impact of race and ethnicity in breast cancer-disparities and implications for precision oncology. *BMC medicine*. 2022 02 11;20(1):72. <https://doi.org/10.1186/s12916-022-02260-0>
 56. Bhoo-Pathy N, Hartman M, Yip C, Saxena N, Taib NA, Lim S, Iau P, et al. Ethnic differences in survival after breast cancer in South East Asia. *PloS One*. 2012;7(2):e30995. <https://doi.org/10.1371/journal.pone.0030995>
 57. Javanparast S, Windle A, Freeman T, Baum F. Community Health Worker Programs to Improve Healthcare Access and Equity: Are They Only Relevant to Low- and Middle-Income Countries?. *International Journal of Health Policy and Management*. 2018 Oct 01;7(10):943-954. <https://doi.org/10.15171/ijhpm.2018.53>
 58. Yip CH, Buccimazza I, Hartman M, Deo SVS, Cheung PSY. Improving outcomes in breast cancer for low and middle income countries. *World Journal of Surgery*. 2015 03;39(3):686-692. <https://doi.org/10.1007/s00268-014-2859-6>
 59. Challinor JM, Galassi AL, Al-Ruzzieh MA, Bigirimana JB, Buswell L, So WKW, Steinberg AB, Williams M. Nursing's Potential to Address the Growing Cancer Burden in Low- and Middle-Income Countries. *Journal of Global Oncology*. 2016 06;2(3):154-163. <https://doi.org/10.1200/JGO.2015.001974>
 60. Rositch AF, Unger-Saldana K, DeBoer RJ, Ng'ang'a A, Weiner BJ. The role of dissemination and implementation science in global breast cancer control programs: Frameworks, methods, and examples. *Cancer*. 2020 05 15;126 Suppl 10:2394-2404. <https://doi.org/10.1002/cncr.32877>



This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.