



Perspective Piece

Improving early detection of breast cancer in Iran: Identifying barriers and proposing policy solutions

Maryam Janatolmakan^{1,2}, Marziyeh Lashkari³, Rebecca Lehto⁴, Reza Negarandeh^{1*}

¹Nursing and Midwifery Care Research Center, Tehran University of Medical Sciences, Tehran, Iran

²Social Development and Health Promotion Research Center, Health Policy and Promotion Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran

³Radiation Oncology Research Center, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran

⁴College of Nursing, Michigan State University, East Lansing, Michigan, United States

ARTICLE INFO

Received 07 February 2026
Accepted 02 May 2026

Available online at:
<http://npt.tums.ac.ir>

Keywords:

breast neoplasms;
early detection of cancer;
delayed diagnosis;
women's health;
Iran

Corresponding Author:

Reza Negarandeh, Nursing and Midwifery
Care Research Center, Tehran University of
Medical Sciences, Tehran, Iran.
E-mail: megarandeh@tums.ac.ir

DOI: 10.18502/npt.v13i2.21463

ABSTRACT

Background & Aim: Delays in early breast cancer detection increase late-stage presentation, treatment burden, mortality, and costs. Barriers are systemic (access, affordability), individual (fear, awareness), and socio-cultural (stigma, beliefs). This policy brief aims to improve early detection in Iran by identifying barriers and proposing solutions. **Methods & Materials:** This policy brief was developed through a multi-phase, evidence-informed study with a multidisciplinary panel. Phase 1 employed a scoping review to identify factors contributing to delayed breast cancer diagnosis globally. Phase 2 utilized semi-structured qualitative interviews with Iranian patients and healthcare providers to explore real-world barriers to early detection. Phase 3 applied an expert consensus approach to prioritize evidence-based, context-specific policy recommendations for improving early breast cancer diagnosis in Iran. The expert panel in Phase 3 comprised specialists from Radiation Oncology, Public Health, Health Education & Promotion, Medical Oncology, and Nursing.

Results: Policy recommendations were derived across five key priority areas: Enhancing equitable access to screening services; Strengthening follow-up and continuity of care systems; Improving health education and awareness; Promoting intersectoral coordination and multisectoral governance; and Ensuring sustainability of resources and digital infrastructure.

Conclusion: Initiating strategies to address these public health recommendations could substantially improve early breast cancer detection rates, reduce mortality, improve patient quality of life, and enhance the overall efficiency of the health system. Moreover, this framework may serve as a scalable model for managing non-communicable diseases in resource-limited settings.

Introduction

Breast cancer is a leading malignancy among Iranian women and is recognized as the second foremost cause of cancer-related deaths. According to the latest GLOBOCAN 2020 estimates, female breast cancer has surpassed lung cancer as the most commonly diagnosed cancer worldwide, with an estimated 2.3 million new cases (1). In contrast to high-income countries where over 70% of cases are detected at early stages, Iranian patients frequently present at advanced stages. Recent evidence indicates that nearly 45.8% of patients

are diagnosed at stage 3 or higher (2). This late presentation is driven by substantial diagnostic delays, with studies reporting a mean total delay of 9.4 weeks, comprising 6.3 weeks of patient delay and 3.1 weeks of system delay (3). Key determinants of these delays and late-stage presentation include rural residence, lower socioeconomic status, lack of awareness regarding breast self-examination, and a history of benign breast disease (2, 3).

This diagnostic delay significantly compromises patient prognosis. While the five-



year survival rate exceeds 90% for early-stage diagnoses, it drops below 30% for advanced stages, a trend exemplified by data from provinces such as Ardabil (4). Delayed breast cancer diagnosis is defined as the time interval between symptom onset and definitive confirmation. This delay stems from a complex interplay of factors, including healthcare system limitations such as restricted access to mammography, high costs, and long waiting times. Furthermore, individual and socio-cultural barriers, including fear of malignancy, lack of disease awareness, misconceptions, discomfort with male physicians, and inadequate family support, significantly contribute to late presentation (5).

The rising incidence of advanced breast cancer significantly impacts the quality of life and human capital of women aged 35–55, while imposing a substantial economic burden on families and the healthcare system, with annual costs reaching hundreds of billions of tomans (6). To address this challenge, the Iranian Ministry of Health launched the “National Program for Breast Cancer Care Management,” aimed at facilitating evidence-based decision-making, promoting equitable access to healthcare services, and strengthening intersectoral coordination (7, 8).

Although the National Program for Breast Cancer Care Management is a critical initiative, evidence suggests it has not yet been fully institutionalized or implemented nationwide (9). Screening programs remain fragmented and poorly coordinated, particularly in underserved regions where insufficient infrastructure, educational gaps, and weak referral systems hinder progress. Consequently, preventable advanced-stage cancers persist, reducing treatment efficacy and increasing socio-economic burdens.

However, there is a lack of in-depth evidence regarding the specific systemic and operational bottlenecks within the Iranian healthcare infrastructure. Previous studies have predominantly focused on patient-centric factors or statistical delays, neglecting the interaction between socio-cultural determinants and new health system pathways. Therefore,

this study aims to identify multi-level barriers to early breast cancer diagnosis in Iran and develop prioritized, evidence-based policy recommendations to enhance the National Program’s implementation.

Methods

A multi-phase, evidence-informed research project, supported by structured consultations with a multidisciplinary expert panel, was conducted to inform this policy brief. The study employed a sequential exploratory mixed-methods design.

Phase 1 (Scoping Review): A comprehensive literature search was conducted in international databases (PubMed, Scopus, Web of Science, Cochrane Library, ProQuest, Embase) and Iranian databases (MagIran) using keywords such as "breast cancer," "diagnostic delay," "barriers," "early detection," and "Iran." Studies published in English and Persian between 2000 and 2024 were included. The search strategy followed the PRISMA guidelines for scoping reviews to identify factors contributing to delays in breast cancer diagnosis globally and locally (10).

Phase 2 (Qualitative Interviews): In-depth semi-structured interviews were conducted with key stakeholders. Inclusion criteria for patients included having a confirmed diagnosis of advanced-stage breast cancer (Stage III or IV) and being willing to share their experiences. For healthcare providers (medical oncologists, radiologists, and nurses), criteria included having at least one year of clinical experience in breast cancer care. Participants were selected using purposeful sampling. Recruitment and data collection continued until data saturation was achieved, defined as the point at which no new codes or themes emerged from the analysis. This process resulted in a final sample of 15 patients, and 30 healthcare providers.

Phase 3 (Expert Consensus): The expert panel was selected using specific inclusion criteria, including a minimum of 10 years of professional experience, recognized expertise in fields relevant to breast cancer (e.g., public health, medical oncology, radiation

oncology, nursing, and health policy), and active involvement in national or provincial health programs. The findings from the first two phases informed the design of a draft recommendation list. To reach consensus and prioritize recommendations, a structured group discussion and consensus building was utilized. Experts scored each recommendation on two criteria: feasibility of implementation in the Iranian context and potential impact on reducing diagnostic delays.

Recommendations with a consensus score of >75% were finalized as priority areas.

The qualitative data from both patient and provider interviews were analyzed using conventional content analysis methodology (Elo & Kyngäs). This inductive approach involved reading transcripts multiple times for immersion, assigning initial codes to semantic units, grouping similar codes into subcategories, and finally abstracting these into higher-level categories that captured the core themes emerging directly from the data. For the patient group, this process yielded 10 primary categories (e.g., Poorly managed appointments and care, Care not meeting patient expectations, Deceptive marketing practices, Cost of diagnostic procedures, Lack of knowledge, fears, Transcendent beliefs, Competing priorities, Insufficient support, Diagnostic errors) with corresponding subcategories. For the healthcare provider group, the analysis resulted in five distinct categories.

To ensure methodological rigor, Lincoln and Guba's criteria for trustworthiness (credibility, dependability, confirmability, transferability) were applied throughout the analysis. The findings from these two stakeholder groups were then integrated to form a comprehensive list of factors. Subsequently, the insights from the first two phases informed the design and development of a new instrument to assess barriers to early diagnosis, which was validated using standardized psychometric evaluation processes. Using a structured group discussion and consensus building process were utilized (Table 1), policy recommendations were formulated, prioritized, and finalized to provide evidence-based and

contextually appropriate strategies to address the challenges that often prevent early breast cancer detection in Iran.

Results

Synthesis of Evidence: The integration of data from the scoping review and qualitative interviews revealed complex, multi-level barriers to early breast cancer diagnosis.

- **Scoping Review Results:** Literature data were organized and interpreted using the revised Penchansky framework, identifying critical gaps in accessibility, availability, acceptability, affordability, accommodation, and awareness. Additional themes included misdiagnosis, competing priorities, and personal factors (10).
- **Patient Qualitative Findings:** Key factors contributing to perceived delays included poorly managed appointments, care not meeting patient expectations, deceptive marketing practices, cost of diagnostic procedures, lack of knowledge, fears, transcendent beliefs, competing priorities, insufficient support, and diagnostic errors (11).
- **Provider Qualitative Findings:** Data from healthcare providers were categorized into major content areas, including individual patient factors, competing priorities (such as holiday events), misleading knowledge, socio-cultural factors, and health system problems.

Policy recommendations

Translating these comprehensive findings into actionable outcomes, the expert consensus process yielded 14 specific policy recommendations categorized across five priority areas. These recommendations are designed to directly address the systemic, cultural, and educational barriers identified above: 1. Enhancing equitable access to screening services (Addressing 'Affordability' & 'Accessibility' in Penchansky framework) 2. Strengthening follow-up and continuity of care systems (Addressing 'Poorly managed appointments' & 'Diagnostic errors') 3. Improving health education and awareness (Addressing 'Misleading knowledge' & 'Fears')

4. Promoting intersectoral coordination and multisectoral governance (Addressing 'Health system problems') 5. Ensuring sustainability of resources and digital infrastructure (Addressing 'Availability' & 'Accommodation')

The detailed mapping of these evidence-based outcomes, along with implementation considerations and responsible organizations, is presented in Table 2.

Table 1. Composition of the multidisciplinary expert panel

Discipline/ Expertise area	Institutional affiliation	Approx. Years of experience	Role in the study
Public Health Policy	Iranian University	22	Provided input on national health system gaps
Epidemiology & Women's Health	Tehran University of Medical Sciences	12	Advised on burden of disease and data sources
Medical Oncology	Tehran University of Medical Sciences	18	Validated clinical relevance of barriers
Public Health	Tehran University of Medical Sciences	14	Informed psychosocial domain development
Public Health	Army University of Medical Sciences	10	Contributed insights on rural/remote access
Health Education & Promotion	Shahid Beheshti University of Medical Sciences	16	Guided culturally tailored intervention design
Health Services Research	Tehran University of Medical Sciences	20	Supported equity and governance recommendations
Radiation Oncology	Tehran University of Medical Sciences	13	Advised on diagnostic infrastructure challenges
Instrument Development & Psychometrics	Tehran University of Medical Sciences	11	Led validity and reliability testing of the tool
Public Health	Tehran University of Medical Sciences	25	Informed psychosocial domain development
Global Oncology & Implementation Science	Michigan State University, USA	22	Provided international benchmarking perspective
Radiation Oncology	Tehran University of Medical Sciences	13	Advised on diagnostic infrastructure challenges
Public Health & Policy	Tehran University of Medical Sciences	22	Coordinated expert consensus process
Public Health	Tehran University of Medical Sciences	10	Conducted interviews, analysis, and synthesis

Table 2. Mapping research evidence to priority recommendations

Policy domain	Key recommendations	Financial cost considerations	Equity considerations	Responsible organizations
1. Equitable access to Screening services	a) Expanding mammography services and diagnostic capacity, especially in underserved rural areas; b) Providing mobile mammography units; c) Reducing out-of-pocket costs for diagnostic services.	High initial short-term setup costs may be offset by long-term savings by investment in early detection.	Prioritize underserved and rural provinces.	Ministry of Health and Medical Education (MoHME); Local health networks.
2. Strengthening follow-up and continuity of care systems	a) Developing an integrated patient-tracking and reminder system (digital registry); b) Standardizing referral and follow-up protocols.	Moderate cost for system setup and maintenance.	Ensures fair access for women across all regions.	MoHME; Provincial health authorities; Hospitals and clinics.
3. Health education and awareness promotion	a) Conducting culturally tailored public education campaigns; b) Integrating breast health education into primary care programs; c) Training healthcare staff and community health workers.	Relatively low implementation cost.	Focus on low-literacy populations and rural women.	MoHME; Universities of Medical Sciences; Nonprofit organizations.
4. Intersectoral coordination and multisectoral governance	a) Establishing a national coordinating committee for breast cancer control; b) Strengthening cooperation between public, private, and NGO (Non-governmental organization) sectors; c) Promoting gender-sensitive governance in health decision-making.	Moderate cost for coordination mechanisms.	Prevents concentration of resources in high-income regions.	National Breast Cancer Committee; Ministry of Women and Family Affairs; Health policy units.
5. Sustainability of resources and digital infrastructure	a) Allocating earmarked annual budgets for early detection programs; b) Expanding telemedicine and remote diagnostic services; c) Supporting local production of diagnostic equipment and software.	Cost-effective through efficient use of resources.	Reduces inequality in access to technology nationwide.	Ministry of Finance; MoHME; Technology and Innovation Centers.

Discussion

The recommendations presented in this framework, closely aligned with the principles of Iran's National Breast Cancer Screening Program (7), are not generic suggestions but are directly grounded in the specific barriers identified during the qualitative phases of our study. The primary focus on enhancing equitable access responds directly to the "financial barriers" (e.g., cost of diagnostic procedures) and geographic inaccessibility repeatedly cited by patient participants. As revealed in our interviews, many patients delayed diagnosis due to high out-of-pocket costs and lack of facilities in remote areas. Consequently, the expert panel prioritized mobile mammography units and cost reduction strategies to address these systemic inequities, ensuring that healthcare access aligns with international equity standards such as the Global Breast Cancer Initiative.

In the domain of education and awareness, the recommendation for improving health education is justified by the qualitative themes of "misleading knowledge" and "transcendent beliefs" identified in both patient and provider interviews. Participants often delayed seeking help due to fears and misconceptions. Therefore, prioritizing school-based education and culturally tailored campaigns is a direct intervention designed to target these specific socio-cultural factors found in our data, aiming to dismantle the barriers that prevent timely help-seeking behaviors.

Regarding technology and follow-up, the qualitative analysis uncovered significant operational failures in the care pathway. Both patients and providers reported issues categorized as "poorly managed appointments", "lack of support", and "diagnostic errors" due to disjointed records. To bridge this gap, the recommendation for a centralized digital registry and reminder system was formulated. This technological solution directly targets the "systemic follow-up" barriers identified by providers, ensuring that patients do not fall through the cracks of

the healthcare system and enabling continuous monitoring.

Finally, the emphasis on intersectoral coordination and governance arises from the expert panel's identification of fragmented implementation of the current National Program. While the national policy exists, our stakeholders highlighted that "systemic bottlenecks" prevent its translation into local practice. Establishing a national coordinating committee is thus a structural response to the governance gaps identified by the multidisciplinary panel, ensuring shared accountability and overcoming the "siloed" operation of the health system.

Conclusion

This policy brief presents fourteen prioritized recommendations across five domains, directly derived from the barriers identified in our multi-phase analysis. Unlike generic strategies, these recommendations are specifically justified by the empirical data obtained from patient and provider interviews, which highlighted critical gaps in cultural awareness, systemic follow-up, and resource allocation. The expert consensus process further validated these strategies as feasible within the current Iranian healthcare context, considering cost-effectiveness and equity. Therefore, implementing these evidence-based, context-specific recommendations, ranging from mobile screening units to digital registries, is expected to directly address the root causes of delayed presentation. By targeting these validated barriers, the proposed framework holds significant potential to improve early detection rates, reduce the burden of advanced-stage disease, and serve as a reproducible model for non-communicable disease management in similar resource-limited settings.

Acknowledgements

We express our sincere gratitude to the Vice-Chancellor for Research and Technology and the Nursing and Midwifery Care Research Center of Tehran University of Medical Sciences for their support and cooperation in approving this project.

Conflict of interest

The authors have no conflicts of interest related to the research.

Authors contributions

RN, ML, RL, and MJ played key roles in the conception and design of the study. Data collection was conducted by MJ. All authors (RN, ML, RL, and MJ) collaboratively performed data analysis and interpretation. MJ prepared the initial draft of the manuscript, and all authors critically reviewed and revised it to enhance its intellectual quality. Each author approved the final manuscript version and accepts responsibility for all aspects of the work

Funding

This article is part of a research project to obtain a Ph.D in Nursing from Tehran University of Medical Sciences with the code of 40011783001. This project is also funded by the Research and Technology Department and the Nursing and Midwifery Care Research Center of Tehran University of Medical Sciences under the code of 1402-3-160-68524.

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