REVIEW ARTICLE

Factors Associated with Delays in Breast Cancer Diagnosis in Low- and Middle-income Countries: A Scoping Review

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ABSTRACT

Background: Delayed breast cancer diagnosis in low- and middle-income countries (LMICs) reduces the survival rates. This review identifies the causes of these delays to inform strategies for improving early detection.

Methods: This scoping review followed the Arksey and O'Malley framework to explore the factors contributing to delayed breast cancer diagnosis in LMICs. Seven databases, including PubMed, Scopus, Web of Science, Cochrane Library, ProQuest, Embase, and Magiran, were searched for English and Persian studies published between January 2000 and September 2024. The search combined the keywords (e.g., "diagnostic delay," "missed diagnosis," "breast cancer," "late-stage," "barriers"), using Boolean operators. To focus on LMICs, we applied country filters, where available, and supplemented the search with manual screening of reference lists from the included studies.

Results: The initial database search identified 5,313 records. After removing 1,036 duplicates, 4,277 studies were screened based on title, abstract, and country of origin. Of these, 4,217 were excluded for reasons including irrelevance to delayed breast cancer diagnosis, study design, population, setting (e.g., high-income countries), or publication date (outside 2000–2024). The remaining 60 studies met the inclusion criteria and were included in the narrative synthesis. Extracted data were organized and interpreted using the revised Penchansky framework (accessibility, availability, acceptability, affordability, accommodation, awareness). Additional themes included misdiagnosis, competing priorities, and personal factors.

Conclusions: Multiple modifiable factors contribute to diagnostic delays in LMICs. Addressing them can accelerate diagnosis, improve outcomes, and reduce harm. Targeted improvements in these areas offer significant potential to enhance breast cancer care and save lives in LMICs.

Keywords: Breast cancer; Late diagnosis; Lower-Middle-Income Countries; Scoping review

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INTRODUCTION

Early diagnosis plays a crucial role in improving breast cancer outcomes; however, significant diagnostic delays persist, particularly in Low- and Middle-Income Countries (LMICs).[1, 2] These delays, often associated with various factors including limited resources, barriers to healthcare access, socio-cultural factors, and health system-related issues, lead to late-stage diagnosis, poorer prognoses, and higher mortality rates.[3-5] Global surveys indicate varying rates of diagnostic delay, highlighting the universal nature of this challenge, but the complexities within LMICs remain under-explored.[6, 7]

In developed countries, several factors, including individual factors (such as low symptom awareness, fear of diagnosis, reluctance to seek medical attention), organizational factors (such as long waiting times for appointments, poor quality of diagnostic services, lack of effective referral systems), and social factors (such as social stigma, racial disparities, lack of social support), have been identified as contributing factors to diagnostic delay.[8-10] However, our understanding of the factors contributing to diagnostic delay in LMICs is limited. These countries face unique challenges such as financial and human resource scarcity, weak healthcare infrastructure, cultural and social barriers (such as misconceptions about cancer, lack of family support), and inefficient health systems, which can lead to longer diagnostic delays.[11-13]

Although numerous primary studies have been conducted in LMICs, only a very limited number of systematic or scoping reviews have synthesized the findings of these primary studies, and those that exist are typically restricted to specific subregions, such as South Asia or sub-Saharan Africa, failing to capture the full spectrum across LMICs as a whole.[1, 5, 11] Moreover, the factors contributing to diagnostic delay are highly context-dependent and differ substantially between high-income countries (HICs) and LMICs, as noted earlier. Critically, no comprehensive scoping review to date has mapped the entire body of evidence on breast cancer diagnostic delays across all LMICs or systematically categorized the multilevel determinants, spanning patient, health care provider, and health system levels, that specifically operate during the diagnostic phase. Given that delays in diagnosis directly affect not only the timeliness and accuracy of detection but also subsequent treatment pathways and survival outcomes, a precise and context-specific understanding of these factors is of paramount clinical and policy relevance. Therefore, the present study is warranted to fill this gap by providing a comprehensive synthesis of evidence focused exclusively on diagnostic delay in breast cancer across LMICs, thereby informing the development of targeted, stage-specific interventions in resource-constrained settings.

MATERIALS AND METHODS

The present study is a scoping review conducted from October 2023 to September 2024 to explore the factors associated with delays in breast cancer diagnosis in LMICs. Scoping reviews are an effective method for assessing the breadth of existing literature on a specific topic and providing a comprehensive overview of the subject.[14] In this review, we utilized the five-step methodological framework proposed by Arksey and O'Malley.[15] The steps of this framework include identifying a research question, identifying relevant literature, selecting literature, charting the data, and reporting the findings. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guideline was utilized to conduct and report this scoping review.[16]

In identifying a research question step, a structured approach using the PCC (Population: Women with delayed diagnoses; Concept: Delay in receiving a timely diagnosis; Context: LMICs) framework guided the formulation of the research question, which asked: What factors contribute to delayed breast cancer diagnosis in LMICs?

In identifying relevant literature, a comprehensive literature search was conducted to identify relevant studies published between January 2000 and September 2024. The following databases were searched: PubMed, Scopus, Web of Science, Cochrane, ProQuest, Embase, and Magiran. Magiran is a Persian-language database indexing Iran's scientific journals. Medical Subject Headings (MeSH) terms and free-text keywords, along with their Persian equivalents for the Magiran database, were used in combination. Key search terms included “delay", "missed", “error",”delays", “delaying", “delayed”, “errors”, “late”, “poor”, “diagnosis*”, “detection”, “breast neoplasm*”, “breast cancer”, “breast tumor”, “breast carcinoma”, “breast malignancy”, “breast cancer diagnosis”, and “breast cancer delay”. Search strategy for PubMed is shown in Table 1. To ensure a thorough and systematic search, we consulted with a librarian expert in literature searches.

Since the preliminary review revealed that many primary studies did not explicitly mention the term “LMICs” or did not adhere to the precise World Bank classification when categorizing the study location, the initial search strategy was formulated regardless of the research location to ensure the inclusion of all relevant studies. After finalizing the search syntax, two authors independently conducted database searches.

In selection of literature step, following the retrieval of search results, duplicate entries were removed. Subsequently, the titles and abstracts of the remaining articles were screened for relevance to the research question of this scoping review. Then, the full texts of potentially eligible articles were assessed against pre-defined inclusion and exclusion criteria, and irrelevant studies were excluded. Inclusion criteria encompassed studies with various designs (quantitative, qualitative, mixed methods, and reviews) conducted in LMICs based on the precise World Bank classification and published in Persian and English between January 2000 and September 2024. Exclusion criteria included studies with findings reported for men and documents such as abstracts, theses, or dissertations.

In charting the data step, the data extracted from the selected articles were systematically recorded using a data extraction form, which included the authors' names, the country of the study, the age of the participants, study design, the number of samples, data gathering tools, and the reasons for delays in breast cancer diagnosis (Tables 2 and 3).”

In reporting the findings step, to synthesize the extracted data, we found that a significant portion of the factors influencing delays in breast cancer diagnosis aligned with the Penchansky framework, as revised by Levesque and Saurman.[17] This framework evaluates dimensions related to access to care, including “accessibility,” “availability,” “acceptability,” “affordability,” “accommodation,” and “awareness.” This comprehensive framework facilitated an effective presentation of the extracted data and provided a clearer understanding of the factors contributing to delays in breast cancer diagnosis. Additionally, the remaining data from our study were categorized into three more dimensions: “misdiagnosis,” “competitive priorities,” and “personal factors.”

Table 1: Search Strategy for PubMed Database

Syntax
((“delay”[Title/Abstract] OR “missed”[Title/Abstract] OR “error”[Title/Abstract] OR “delays”[Title/Abstract] OR “delaying”[Title/Abstract] OR “delayed”[Title/Abstract] OR “errors”[Title/Abstract] OR “late”[Title/Abstract] OR “poor”[Title/Abstract]) AND (“diagnosis*”[Title/Abstract] OR “detection”[Title/Abstract]) AND (“breast neoplasm*”[Title/Abstract] OR “breast cancer”[Title/Abstract] OR “breast tumor”[Title/Abstract] OR “breast carcinoma”[Title/Abstract] OR “breast malignancy”[Title/Abstract]) AND (“breast cancer diagnosis”[Title/Abstract] OR “breast cancer delay”[Title/Abstract]))

Table 2: Characteristics of the studies included in this scoping review

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
Abdel-Fattah M, et al, 2000[24]	Egypt	Less than 50 and greater than 50	Quantitative study	565 women	Questionnaire	Not performing breast self-examination
Parsa P, et al, 2006[20]	Iran and Malaysia	Not mentioned	A mini literature review	50 articles	Not mentioned	Knowledge factors, psychosocial factors, socio-demographic factors
Ermiah E, et al, 2012[25]	Libya	22-75	Quantitative study	200 women	Questionnaire	Dismissing symptoms; using alternative therapies; fear/ shame; misinterpreting benign diagnoses; atypical breast cancer presentation (without a lump); lack of self-examination; older age; and illiteracy
Sharma k, et al, 2012[1]	USA*	Not mentioned	A systematic review	13 articles	Data extraction form	Personal, sociocultural, economic
Shieh S-H, et al, 201[42]7	Taiwan	48.7±10.5	Quantitative study	450 women	Structured questionnaire	Number of hospitals visited before diagnosis, level of medical service at first visit.
Dickens C, et al, 2018[43]	South African	55.4± 14.3	Quantitative study	1071 women	Clinical records, and census-derived socio-economic indicators	Long travel distances to healthcare facilities.
Poum A, et al, 2014[26]	Thailand	Mean: 50.0±11.0 Range: 25–83	Quantitative study	180 women	Questionnaire	Family income, smoking, previous breast symptoms, self-treatment, longer travel time to the hospital, older age, lower education level, and a greater number of pre-diagnosis consultations with a surgeon.
Pace LE, et al, 2015[2]	Rwanda	Under 40, 40 to 49, 50 to 59, and 60 and older.	Quantitative study	144 women	Structured questionnaire	Low education levels, initial consultation with traditional healers, multiple (≥5) health center visits before diagnosis, and long distances to hospitals.
Thakur N, et al, 2015[28]	India	45.9±9.6	Quantitative study	120 women	Previous information of patients	Rural residence, low socioeconomic status, and advanced age.
Dianatinasab M, et al, 2016[21]	Iran	47.7±10.6	Quantitative study	505 women	Medical records	Illiteracy, rural residence, single marital status, lobular or medullary cancer type, lack of breast self-examination, non-mass clinical symptoms, and general practitioner awareness.

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
MaghousA, et al, 2019[62]	Morocco	48.3±10.4	Quantitative study	137 women	Structured questionnaire	Misattributing symptoms, reliance on traditional medicine, false reassurance from negative physical exams, rural residence (limiting access to care), lack of breast self-examination, and family history.
Moodle J, et al, 2016[57]	South Africa	30–74	Qualitative study	20 women	Interview	Lack of awareness about symptoms and bodily changes.
Brinton L, et al, 2017[52]	Ghana, West Africa	Median: 49	Quantitative study	1184 women	Structured questionnaire	Low education, use of traditional medicine, seeking non-physician help, marital status(divorced/separated/ widowed), and age more than 50
Mirfarhadi N, et al, 201[72]2	Iran	49.8±10.2	Quantitative study	232 women	Structured questionnaire	Insurance coverage, history of mammography (yes/no), knowledge of breast cancer signs, attitudes toward disease, familiarity with breast self-examination.
Akuoko CP, et al, 2012[71]	Sub-Saharan Africa	Not mentioned	Systematic Review	17 studies	National Institute of Health Quality Assessment Tool, and quality appraisal checklist	Limited awareness and knowledge; low participation in recommended screening and examination practices; issues related to healthcare facilities and the services they provide; poor health-seeking behavior; and socio-demographic and socio-cultural factors.
Sathwara JA, et al, 2017[39]	India	Median: 49.0 Range: 21-89	Quantitative study	1210 patients	Hospital electronic medical records system	Socio-demographic inequalities, Rural residence, Illiteracy
Rivera-Franco MM, et al, 2018[19]	Mexico	Not mentioned	Narrative Review	Not mentioned	Not mentioned	Limited early detection programs and inadequate diagnostic/treatment facilities.
Scheel JR, et al, 2018[30]	Sub-Saharan Africa	Not mentioned	Collection on Global	Not mentioned	Global report	Cost, rural residence, transportation difficulties, social stigma, loss of social support, low provider knowledge, and complex referral systems.

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
Martei YM, et al, 2018[63]	Ghana	Range:25-85, Mean: 47.12±3.86 Median: 48	Qualitative study	31 women	Interview	Fear of mastectomy due to self and social stigma, the influence of religious institutions (like the church) on perceptions of stigma, limited breast cancer knowledge, the misconception that painless breast lumps are not a concern, and financial burdens.
McKenzie F, et al, 2018[58]	Sub-Saharan Africa	50.0±14.0	Quantitative study	1091 women	Questionnaire	Being Black, younger age, recent pregnancy, low education level, lower socioeconomic status, working in unskilled employment, and poor breast cancer awareness.
Sharp JW, et al, 201[94]0	Sub-Saharan Africa	25-39, 40-49, and 50-74	Quantitative study	401 women	Structured questionnaire	Lack of knowledge, economic barriers, fear, poor social support, rural residence, and infrequent breast self-examination.
Rayne S, et al, 2019[31]	South African	Less than 45, 45 or older	Quantitative study	252 women	Questionnaire	Transport issues, low education, and work constraints.
Soliman AA, et al, 2019[41]	Morocco	Not mentioned	Qualitative study	25 women	Interview	Structural barriers, socio-cultural barriers
Gakunga R, et al, 2019[53]	Kenya	30-60	Qualitative study	Four focus group discussions	Interview	Knowledge deficits, health system delays, limited access to information, negative healthcare experiences, cost of care, and stigma.
Gebremariam A, et al, 2019[54]	Ethiopia	Less than 40, 40 to 50, and greater than 50	Qualitative study	23 People	Interview	Lack of awareness and misperceptions about the disease, self-treatment, fear, competing priorities, financial insecurity, and health system barriers.
Gebremariam A, et al, 2019[51]	Ethiopia	44.4±12.2	Quantitative study	441 women	Questionnaire	Illiteracy, older age (≥60 years), prior use of traditional medicine, and multiple healthcare visits (≥4) before diagnosis confirmation.
Bonsu AB and Ncama BP, 2019[64]	Ghana	32-70	Qualitative study	11 women	Interview	Symptom experience, breast cancer knowledge, social networks, coping mechanisms, and healthcare-seeking intentions.

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
Agbokey F, et al, 2019[49]	Ghana	18-30, 31-60, and greater than 60	Qualitative study	35 Participants: Patients, Caregivers, Health Worker, Herbalists/Traditional Healers	Interview	Limited patient knowledge, lack of screening, symptom misinterpretation, cultural influences, fear of mastectomy, physician delays, healthcare provider negligence, and spousal influence on diagnosis and treatment decisions.
Gulzar F, et al, 2019[59]	Pakistan	Mean: 44.1±9.9, Range: 24–75	Quantitative study	125 women	Questionnaire	Lack of awareness, Financial barriers, Educational factors, Social status.
Yang K, et al, 2019[55]	Tanzania	51.6±12.9	Quantitative study	152 women	Questionnaire	Financial constraints, time constraints, lack of breast examination history, and underestimating the likelihood of death from breast cancer.
Baig M, et al, 2019[42]	Pakistan	25-64	Quantitative study	89 women	Questionnaire	Lack of knowledge, limited access to healthcare services, cultural and religious factors such as purdah, and fear of a cancer diagnosis.
Abo Al-Shiekh SS, et al, 2019[4]	Palestine	51.2±11.9	Mixed method	122 women	Questionnaire and interview	Age, income, education level, mammography findings, and ultrasound findings.
Foroozani E, et al, 2020[3]	Iran	43.7±8.2	Quantitative study	725 women	Medical records and structured interviews	Older age, low income, lack of insurance, rural residence, single marital status, menopausal status, history of benign breast disease, lack of breast self-examination awareness, and chronic disease.
Shamsi U, et al, 2020[32]	Pakista n	48.0±12.3	Quantitative study	327 women	Questionna ire and medical records	Lack of awareness, fear, service delays, and reliance on traditional treatments.
Tesfaw A, et al, 2020[44]	Ethiopia	48.1 (SD Not reported)	Quantitative study	371 women	Questionnaire	Rural residence, illiteracy, painless wound, distance ≥5km, absence of axillary lump/swelling, and no prior breast problems

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
Scheel JR, et al, 2020[18]	Uganda	Not mentioned	Mixed method	95 women	Questionnaire and interview	Low symptom awareness, underuse of clinical breast exams, centralized diagnostic testing (radiology/pathology), preference for excisional over needle biopsies, workforce shortages, and poor referral system knowledge.
Getachew S, et al, 2020[43]	Ethiopia	Less than 30, 31-40, 41-50, 51-60, and greater than 61	Qualitative study	25 women	Interview	Limited breast cancer knowledge, reliance on traditional medicine/religious practices, insufficient social/ financial support, long travel distances to facilities, high diagnostic costs, lengthy wait times, and lack of local screening/diagnostic services.
Shakor JK and Mohammed AK, 2020[70]	Iraq	Less than 30, 30-39, and greater than 40 Median: 30	Quantitative study	323 women	Questionnaire	Marital status, economic status, chronic diseases, low health motivation.
Gbenonsi G, et al, 2021[5]	Sub-Saharan Africa	Not mentioned	Systematic review	28 Areticles	Data extraction form	Health systems components (service delivery, workforce, information systems, financing, medication/ technology access, and governance)
Hassen AM, et al, 2021[33]	Ethiopia	44.1±11.8	Quantitative study	204 women	Questionnaire	Underestimation of disease severity; low breast cancer awareness; consulting traditional healers; age ≥40; rural residency; illiteracy; single marital status; multiple prior consultations; financial constraints; belief in spontaneous remission; and absence of palpable axillary mass.
Nguyen SM, et al, 2021[34]	North Vietnam	49.5±10.7	Quantitative study	462 women	Structured questionnaire, Research Electronic Data Capture (REDCap) mobile application, and medical record	Financial and physical limitations, psychological factors, lack of knowledge, and rural residence.
Togawa K, et al, 2021[45]	Sub-Saharan African	50.3±13.7	Quantitative study	1541 women	Medical record	Limited access to care due to long distances and rural residence.

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
Tesfaw A, et al, 2021[35]	Ethiopia	42.7±13.4	Quantitative study	398 women	Medical record	Rural residence, presence of a breast lump, and pre-existing comorbidities.
Agodirin O, et al, 2021[65]	Nigeria	Less than 40, 41-60, greater than 60	Quantitative study	405 Women	Questionnaire and medical record	Visiting alternative care, low acknowledge, concerns for hospital care
Foerster M, et al, 2021[60]	Sub-Sahar an Africa	50.1±13.9	Quantitative study	1429 women	m-health mobile application and clinical record	Misattributing symptoms, illiteracy, reliance on traditional medicine, HIV infection, and initial consultation with informal healthcare providers.
Farooqi S, et al, 2021[66]	Pakistan	46.4±8.8	Qualitative study	15 women	Interview	Personal/psychological factors, socio-cultural factors, healthcare system factors.
Hussain M, et al, 202[16]7	Pakistan	47±12	Quantitative study	334 women	Questionnaire and medical record	Self-neglect, multiple opinions, inconsistent diagnosis.
Ismail HM, et al, 2021[68]	Egypt	less than 35, 35-44, 45-54, 55-64, greater than 65	Quantitative study	400 women	Medical records and questionnaire	Biological factors (molecular subtype), behavioral factors (patient delay), and healthcare system factors (provider delay)
Sakafu LL, et al, 2022[36]	Sub-Saharan Africa	50 (SD, Not reported) Range: 40–65	Qualitative study	12 women	Interview	Lack of cancer knowledge, financial hardship, difficulties navigating the healthcare system, reliance on traditional or alternative therapies, fear and stigma surrounding cancer, and influences from family and friends.
Rajagopal S, et al, 2022[48]	India	37-83	Qualitative study	25 women	Interview	Lack of awareness, family obligations, financial constraints, limited access to diagnostics and female doctors, shame, and misdiagnosis.
Saeedi H, et al, 2022[23]	Iran	Not mentioned	Qualitative study	21 Women	Interview	Gender disparities in diagnosis, family history of non-informative illness, limited access to care, stigma, minimal social support, and lack of body awareness.
Maggi RM, et al, 2022[50]	India	18-30, 30-50, and greater than 50	Qualitative study	29 women, 17 men	Interview	Awareness, access, and stigma in breast cancer care.
Hewage S, et al, 2022[37]	Sri Lanka	Mean: 55.5±10.7 Range: 28-79	Quantitative study	800 Women	Questionnaire and medical records	Poverty, lack of knowledge, and healthcare system inefficiencies.

Author, year	Country	Age, (year) (Mean±SD/ range/ median)	Study Design	Number of samples	Data gathering tools	Reasons for delay in diagnosis
Afaya A, et al, 2022[11]	South Korea	Not mentioned	Mixed-methods systematic review	26 studies	Data extraction form	Barriers to service delivery, Financial barriers, Geographic barriers, Structural barriers, Cultural barriers.
Al-Shiekh SSA, et al, 2022[62]	Palestinian	Mean: 51.0±11.9 Range: 23–72	Quantitative study	122 women	Questionnaire	Lack of awareness about symptoms.
Balhi S, et al, 2023[69]	Tunisia	50.1± 10.9	Quantitative study	146 patients	Questionnaire	Lack of knowledge
Darré T, et al, 2023[46]	Sub-Saharan Africa	38.6±12.5	Quantitative study	62 Women	Interview during the consultation. Registers of the Laboratory of Pathological Anatomy and Cytology	Fear of diagnosis, extended diagnostic delays, infrequent breast self-exams, distance from healthcare facilities, the type of initial consultation, and waiting times.
Mapanga W, et al, 2023[47]	South Africa	55.6±14.3	Quantitative study	2058 women	Questionnaire and medical records	Health system level, socio-economic level, individual level
Daniel O, et al, 2023[13]	Kenya	Median: 50 Range: 25–88	Mixed-methods	378 women	Questionnaire, Medical Records, Interview	Socio-economic factors and the healthcare system
Hanafi I, et al, 2023[56]	Syrian	25-42, 43-50, 51-57, and 58-87	Quantitative study	519 women	Archived patient records, and structured personal interviews	Disruption and destruction of healthcare infrastructure caused by war, a general lack of health knowledge, non-specific or subtle symptoms that are easily overlooked, and cultural or personal shyness that prevents individuals from seeking timely medical attention.

*Although the authors of this systematic review are affiliated with institutions in the United States, the primary studies included in their analysis originate from low- and middle-income countries such as Egypt, India, Pakistan, Ghana, Nigeria, Iran, Tunisia, Malaysia, Colombia, and Thailand. Therefore, this review was included in the present search.

RESULTS

In the initial search, 5,313 records were identified across multiple databases. After removing 1,036 duplicates, 4,277 studies remained for screening based on the title, abstract, and country of origin. During the screening phase, 4,217 studies were excluded for the following reasons: 850 studies were conducted in HICs; 225 were neither focused on the female population nor conducted in human populations; 802 represented irrelevant study types, such as letters to the editor, conference abstracts, theses, case reports or case series, and clinical trials that did not provide relevant data; 1,703 lacked information directly related to the reasons for delayed breast cancer diagnosis; and 637 were published outside the time frame of interest (2000–2024).

Table 3: Reasons for diagnostic delay in breast cancer patients

Dimension	Reason
Accessibility	Distance of residence from medical services, lack of means of transportation, high cost of access to service provider centers[2, 3, 21, 26, 28-31, 33-35, 37-47]
Availability	Lack of diagnostic facilities, such as mammography and ultrasound[5, 19, 43, 48]
Acceptability	Preference for consultation with a female physician[5, 49] Negative perceptions and reluctance to receive services from government hospitals[49, 50] Lack of empathy from service provider [2, 51] Preferring traditional medicine, prayer and spiritual healing over conventional medicine[29, 41, 50-54] Negative personal experiences from previous visits[55, 56] Disappointment with treatment effectiveness[42]
Affordability	The absence of health insurance in reducing diagnostic costs[3-5, 30, 40] Financial and economic challenges[1-5, 11, 13, 31, 36, 38, 40, 43, 45-47, 49, 51, 53-55, 57-62]
Accommodation	Non-standard initial consultations[5, 42] Poor planning and long wait times for initial diagnostic procedures[5, 46, 54]
Awareness	Lack of awareness about breast cancer symptoms, self-exams, and screening[3, 4, 12, 13, 18, 20-25, 29, 32-40, 42-44, 46-49, 51-60, 62-69]
Misdiagnosis	Providers' carelessness and lack of awareness[13, 18, 30, 32, 48-51, 60, 61, 63, 64, 66, 67]
Competitive priorities	Major life events such as death, birth, official ceremonies, visits, illness, and war[56, 64] Women's roles and responsibilities[23, 48, 51, 54, 55, 64]
Personal factors	Education Level[2, 13, 21, 25, 26, 31, 33, 37, 39, 44, 47, 51, 52, 58, 60, 61] Marital status [3, 21, 33, 47, 52, 70] Age[3, 4, 23, 25, 26, 28, 33, 51, 52, 54, 58] Ethnicity and race[58] Personal or family history of breast cancer[3, 29] No prior breast issues[44] Pregnancy[58] Chronic diseases[3, 35, 47, 60, 70] Smoking and alcohol consumption[26, 47]

The remaining 60 studies underwent full-text assessment. All met the inclusion criteria and were included in the synthesis. Consistent with the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines, this review did not assess or exclude studies based on methodological quality, as the primary aim of scoping reviews is to map the breadth and nature of existing evidence rather than to evaluate its quality. Therefore, all 60 studies were retained and synthesized narratively (Figure 1).

A summary of the main characteristics of the included studies is displayed in Table 2. Out of 60 reviewed studies, 37 were quantitative, 13 were qualitative, seven studies utilized a review methodology, and three studies were conducted using a mixed-method design.[1-5, 11-13, 18-60, 62-70] Two review studies were conducted on primary studies in Africa.[5, 12] The third study was conducted in Mexico.[19] The fourth review study, conducted in America, examined primary case series, cross-sectional, or case-control studies from developing countries.[1] The review in South Korea was the fifth and was based on initial studies conducted among women in LMICs in Asia.[11] The sixth study was a mini literature review jointly conducted between Iran and Malaysia, examining barriers to breast cancer screening among Asian women.[20]

Iran's contribution to this search was four studies.[3, 21-23] In the review studies conducted, South Africa,[5, 12] ranked first with two studies. The highest number of studies included in the review search was related to a study in Iran and Malaysia, which examined 50 studies.[20] The period of delay was reported in the range of 28 days to twenty-four months.[3, 22, 24-37]

The sample size of studies was in the range of 62 to 2058 people for quantitative and mixed studies;[2-4, 13, 18, 21, 22, 24-29, 31-35, 37-40, 42, 44-47, 51, 52, 55, 56, 58-60, 62, 65, 67-70] and for qualitative studies, it was reported in the range of 11 to 35 people.[23, 36, 41, 43, 48-50, 53, 54, 57, 63, 64, 66]

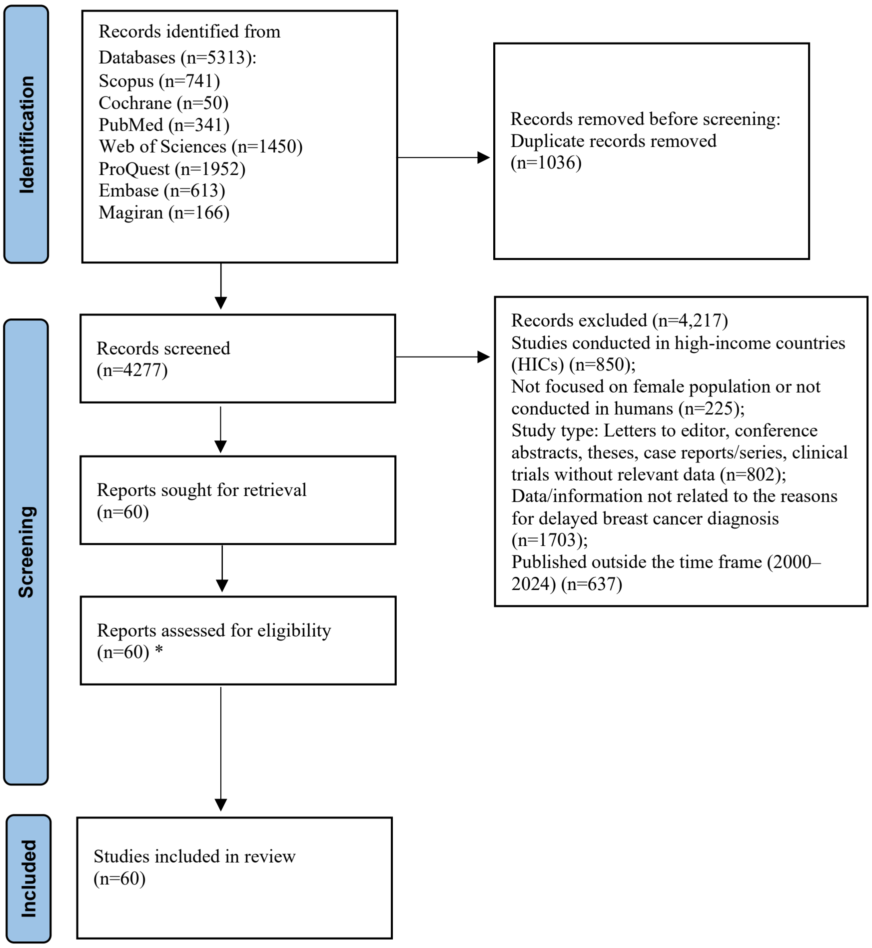

Figure 1: PRISMA diagram flow for studies selection. *No studies were excluded at the full-text stage because this scoping review aimed to map all available evidence on diagnostic delay in Low- and Middle-Income Countries, regardless of methodological quality. All 60 retrieved articles met the inclusion criteria.

Synthesis of the findings from the included studies indicated that the main reasons for diagnostic delay in breast cancer patients involved problems in various aspects of access, misdiagnosis, competitive priorities, and personal factors.

1. Problems with Different Aspects of Access

1.a. Accessibility

Accessibility pertains to the relationships between the site of service delivery and the location of the users, factoring in elements such as resources, costs of transportation, time, and distance. In the studies included in this review, the distance of the patient's residence from the place of supply of medical services, the lack of means of transportation, and the high cost of access to service provider centers were identified as one of the influential factors in the diagnostic delay of cancer patients.[2, 3, 21, 26, 28-31, 33-35, 37-47]

1.b. Availability

Availability is the term used to describe the relationships between the quantity and variety of services and resources at hand, concerning the quantity and variety of the needs of the customers. In many studies regarding this aspect, it has been pointed out that there is a lack of diagnostic facilities such as mammography and ultrasound.[5, 19, 43, 48]

1.c. Acceptability

Acceptability is defined as the relationship between the attitudes of customers and service providers towards each other, specifically in terms of their acceptable personal and practical attributes as compared to their actual and current characteristics. Numerous studies included in this scoping review have highlighted various aspects of acceptability. These include the preference of patients to consult with a female doctor,[5, 49] the negative perception and reluctance of patients towards receiving services from government hospitals,[49, 50] patients' dissatisfaction with the lack of empathy from service providers,[2, 51] the preference for traditional medicine, prayer, and prayer therapy over conventional medicine,[29, 41, 50-54] negative personal experiences with treatment and diagnostic centers from previous visits,[55, 56] and disappointment with the effectiveness of the treatment.[42]

1.d. Affordability

Affordability is characterized as the relationship between the cost of services and the insurance support provided by service providers, in comparison to the customers' income and their financial ability to pay. The studies underscore the impact of the absence of health insurance in mitigating diagnostic costs,[3-5, 30, 40] along with the numerous financial and economic difficulties encountered by patients.[1-5, 11, 13, 31, 36, 38, 40, 43, 45-47, 49, 51, 53-55, 57-62] These factors have significantly influenced this area and have contributed to delays in the timely diagnosis of patients.

1.e. Accommodation

Accommodation is characterized as the relationships between the organization of resources, the customers' ability to adjust to these resources, and their perception of the suitability of these resources. The studies reviewed in this area indicate that non-standard initial patient visits,[5, 42] along with inappropriate scheduling and extended waiting times for patients to undergo primary diagnostic procedures,[5, 46, 54] have contributed to delays in diagnosis.

1.f. Awareness

Awareness refers to the use of effective information and communication strategies by a health system to engage relevant users, including clinicians, patients, and the public, while accounting for their sociocultural context and health literacy. In the studies included in this review, inadequate information and communication strategies were associated with low patient awareness of both specific and nonspecific breast cancer symptoms, infrequent or absent breast self-examination, and non-adherence to recommended annual screening tests, contributing to delays in diagnosis.[3, 4, 12, 13, 18, 20-25, 29, 32-40, 42-44, 46-49, 51-60, 62-69]

2. Misdiagnosis

Misdiagnosis is the incorrect conclusion about the cause of the disease or the problem and also the unnecessary service. In the studies reviewed in this review, carelessness and little knowledge of the service providers in the assessment and correct diagnosis of patients have been identified as reasons for delay in timely diagnosis.[13, 18, 30, 32, 48-51, 60, 63, 64, 66, 67]

3. Competitive Priorities

Competing priorities are related to issues and subjects that, despite them, a person has paid less attention to himself and has not prioritized his health. The studies reviewed in this regard point to the occurrence of important events in life such as illness, death of acquaintances, birth of a baby, visits, attendance at official ceremonies, and the occurrence of war.[56, 64] as well as the performance of individual roles and responsibilities of women in the family and society have led to failure in the follow-up of symptoms and timely diagnosis.[23, 48, 51, 54, 55, 64]

4. Personal Factors

In the studies included in this scoping review, several individual characteristics in patients were related to delayed diagnosis. Most of these features include education level,[2, 13, 21, 25, 26, 31, 33, 37, 39, 44, 47, 51, 52, 58, 60, 61] age,[3, 4, 23, 25, 26, 28, 33, 51, 52, 54, 58] ethnicity and race,[58] existence of a personal and family history of breast cancer,[3, 29] marital status,[3, 21, 33, 47, 52, 70] lack of a history of breast problems,[44] recent pregnancy,[58] suffering from chronic diseases,[3, 35, 47, 60, 70] and smoking and alcohol consumption.[26, 47]

DISCUSSION

This scoping review examined the causes of delayed breast cancer diagnosis in LMICs. A qualitative synthesis of 60 studies identified four key areas contributing in delayed breast cancer diagnosis including: access barriers (encompassing accessibility, availability, acceptability, affordability, accommodation, and awareness), misdiagnosis, competitive priorities, and personal factors.

This scoping review confirms that in LMICs, limited accessibility, defined as the mismatch between the location of service delivery and users' residences, compounded by distance, transportation costs, time, and resource constraints, is a primary driver of delayed breast cancer diagnosis. In contrast, HICs generally operate within systems where diagnostic infrastructure is fundamentally available at the system level, and delays are more often shaped by psychosocial, behavioral, and contextual factors at the individual level, such as atypical symptoms and reluctance to disclose symptoms, rather than by a lack of diagnostic services.[71] Similarly, research identified that among Black women in developed countries, particularly the US, delays arise from a complex interplay of fear, stigma, embarrassment in discussing symptoms with clinicians, and concerns about cancer treatment or partner abandonment. Notably, older studies included in their review also reported structural access barriers (e.g., lack of insurance or healthcare inaccessibility); however, these occur within systems where diagnostic capacity fundamentally exists.[10] Unlike the infrastructural challenges faced in LMICs, in European HICs, women tend to prioritize rapid result delivery and efficient service pathways, reflecting an expectation of a responsive healthcare system with established baseline access.[72] Moreover, even in upper-middle-income Eastern European countries, necessary diagnostic technologies like digital mammography and biomarker testing are widely available despite implementation gaps.[73] Therefore, while LMICs struggle with fundamental system absence and infrastructural deficits, HICs focus more on optimizing patient pathways and addressing psychosocial barriers. Hence, foundational investments in infrastructure and service integration remain critical for LMICs to enable timely breast cancer diagnosis.

A key finding of this study is the critical mismatch between the availability of breast cancer screening and diagnostic services, defined as the alignment between the quantity and variety of existing resources and the actual needs of at-risk populations, and the scale of demand in LMICs. In these settings, health systems frequently lack even basic diagnostic and treatment capacities, such as surgery, radiotherapy, and systemic therapy, resulting in late-stage presentation and poor survival outcomes.[74] In contrast, HICs operate within systems where core diagnostic services are sufficiently available to meet population needs. This is evident in women's expressed preferences for rapid result delivery and efficient diagnostic pathways, expectations that inherently presume baseline service availability.[72] Thus, while LMICs face a fundamental deficit in service availability, HICs focus on optimizing the responsiveness and efficiency of an already functional system.

A notable finding of this study reveals that the perceived unacceptability of breast cancer services significantly reduces timely diagnosis. This phenomenon, observed in both HICs and LMICs, is frequently associated with patient-provider relational mismatches, including distrust, cultural incongruence, and concerns about stigma or judgment. In HICs, qualitative evidence highlights how Black women's reluctance to disclose symptoms stems from embarrassment, fear of being dismissed, or perceived lack of cultural competence among providers.[10] While some older studies suggested a potential role for fatalism or religiosity in shaping care-seeking behaviors, the evidence remains inconclusive.[10] In LMICs, these acceptability challenges are compounded by gender norms, modesty concerns, and limited provider-patient communication, which further deter women from engaging with diagnostic services.[75] Ultimately, the current review underscores the need for culturally and contextually tailored interventions that enhance the acceptability of breast cancer care across diverse settings.

Another significant finding of the present study underscores financial constraints as a major impediment to the timely diagnosis of breast cancer in LMICs. This contrasts with HICs, where financial barriers, though present among marginalized populations such as African American and Hispanic women, are not systemic but rather intersect with psychosocial and structural inequities.[9, 10] Critically, a recent global systematic review and meta-analysis of over 2.4 million women across 81 countries demonstrated that the proportion of metastatic breast cancer at diagnosis was significantly higher in LMICs and among populations with lower socioeconomic status, directly linking national income level and resource availability to early detection capacity.[7] These disparities reflect not only limited access to screening but also fragmented diagnostic pathways and inadequate treatment infrastructure in resource-constrained settings.[74] Therefore, context-specific strategies, such as subsidized transportation, local health insurance schemes, and point-of-care financial support, may be essential to mitigate the impact of economic barriers on timely diagnosis in LMICs.

Furthermore, this study revealed deficits in system accommodation, referring to the misalignment between healthcare structures and patients' practical, temporal, and communicative needs. This finding resonates with evidence from high-income settings, where women express strong preferences for rapid diagnostic pathways, timely result delivery, and clear communication, viewing these as essential components of trustworthy and responsive care.[72] In contrast, in LMICs, such accommodation is often absent: fragile health systems struggle to provide even basic diagnostic continuity, leading to prolonged delays and late-stage presentation.[7, 74] The global disparity in stage at diagnosis, markedly worse in resource-constrained settings, reflects not only limited access but also a fundamental lack of system adaptability to patient needs, including wait times, information clarity, and care coordination.

A critical gap in women's awareness of breast cancer symptoms, particularly atypical or non-lump presentations, and limited understanding of personal risk factors significantly contribute to delayed diagnosis, a pattern consistently observed across diverse settings. Scoping and systematic reviews have identified low symptom recognition as a key predictor of prolonged patient intervals in both LMICs and among marginalized populations in high-income contexts, including Black, Hispanic, and Chinese women.[8, 10, 76] Evidence from the United Kingdom further demonstrates that breast cancer awareness campaigns can effectively increase screening uptake and timely help-seeking behavior, underscoring the global relevance of health literacy as a determinant of early diagnosis.[77]

Misdiagnosis or failure to recognize breast cancer symptoms by frontline health providers emerged as a key contributor to diagnostic delays in the present study, a finding consistent with evidence from resource-constrained settings where healthcare workers often lack specialized training in early cancer detection. In LMICs, fragile health systems frequently operate with limited oncology expertise, resulting in missed or delayed diagnoses, particularly when atypical symptoms are presented.[74] Even in upper-middle-income regions, disparities in provider knowledge, such as inconsistent use of biomarker testing or staging protocols, highlight the gaps in clinical capacity that compromise diagnostic accuracy.[73] These system-level deficiencies underscore improvement in knowledge base and diagnostic competencies of primary care providers.

The current study identified ‘competing priorities’ as a significant factor contributing to diagnostic delays, a finding supported by other review studies. For example, an integrated literature review examining delays in breast cancer presentation, diagnosis, and treatment among Chinese women found that competing priorities, such as household tasks, employment, and childcare, contributed to delays in care-seeking.[76] Similarly, another review highlighted that those social priorities, such as prioritizing education, also influenced these delays, particularly among educated women. Furthermore, research has indicated that competing priorities and concerns about partner abandonment can hinder early presentation and diagnosis.[10] A mixed-methods systematic review also identified caregiving responsibilities for unwell or frail spouses as a significant competing priority affecting symptom appraisal and help-seeking among older adults with suspected cancer.[78] These findings suggest that policy interventions should incorporate a comprehensive range of support services to mitigate the impact of these competing priorities on timely diagnosis and encourage patients to pursue prompt follow-up and diagnosis.

The final finding of the present study is the ‘personal factors’ variable, which plays a significant role in delayed breast cancer diagnosis. The importance of this finding is underscored by its corroboration in other review studies, which have highlighted patient-related variables such as migrant status, ethnicity, education, and demographics as influential factors in the diagnostic process.[8, 79] Given that this result appears to be more pronounced in LMICs, it is suggested that future research should focus on interventions which aim at addressing and mitigating cultural and socioeconomic disparities to facilitate earlier patient diagnosis.

This scoping review has limitations, including potential language bias due to the focus on English and Persian articles, and instances where necessary data points were not reported in the reviewed studies, leading to incomplete data extraction. However, its strengths lie in its sensitive search strategy and comprehensive coverage of LMIC studies. Future research should investigate the specific mechanisms through which personal factors influence diagnostic delays and develop culturally sensitive interventions. Additionally, future reviews should consider including studies in a wider range of languages to ensure a more comprehensive understanding of the issue.

CONCLUSION

Delayed breast cancer diagnosis significantly impacts patient recovery and survival, making it crucial to understand the underlying causes. This scoping review identified the key factors contributing to diagnostic delays, categorized into nine areas: accessibility, availability, acceptability, affordability, accommodation, awareness, misdiagnosis, competing priorities, and personal factors. These categories provide a valuable framework for future research and interventions. While this review offers a comprehensive overview of the landscape, further investigation is needed to understand the complex interplay between these factors. Policy recommendations stemming from this research should focus on improving each of the nine identified areas. Future research should also prioritize longitudinal studies to track the impact of interventions and identify best practices for timely breast cancer diagnosis. Furthermore, comparative studies across different regions and healthcare systems could shed light on the most effective strategies for reducing diagnostic delays and improving patient outcomes.

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Authors' Contribution

RN, ML, RL, and MJ contributed substantially to the study conception and design. MJ carried out data collection. RN, ML, RL, and MJ conducted data analysis and interpretation. MJ drafted the manuscript, and all authors (RN, ML, RL, and MJ) participated in critically revising it for important intellectual content. All authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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Conflict of Interest

None declared.

Declaration on the use of AI

The authors used Google Gemini (web interface, accessed via https://gemini.google.com/ at time of writing) solely as a language editing assistant to improve the clarity, grammar, and style of certain paragraphs originally written by the authors. The authors take full responsibility for the integrity and accuracy of the manuscript.

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