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Breast Cancer in Iraq: Understanding Patient Outcomes and Barriers to Treatment

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Abstract: Background: In Iraq, breast cancer poses an unprecedented public health risk, with rising incidence rates coupled with complex treatment barriers impacting patients' outcomes. The objective of this study was to explore the state of breast cancer in Iraq, identifying influences on treatment outcomes and on patients´ access to breast cancer care in Iraq.

Methods: From January 2023 to December 2024, we conducted a cross-sectional study at many hospitals in Iraq, including site visits, screening medical records of 847 breast cancer patients´ medical records, studying their treatment pathways and treatment outcomes. Data collected comprised of demographic characteristics, clinical presentations and staging of the cancer, treatment types, and barriers to treatment. We used SPSS version 28.0 for the statistical analyses.

Results: The mean age at diagnosis was 48.2 years (SD ± 11.7). Late-stage presentation were common: 62.4% of patients were staged diagnosed at level III or IV. The overall 5-year survival was 58.3%. Reported barriers to treatment included: financial costs (73.2%), geographic barriers (45.8%), and medication availability (51.7%). We found a statistically significant difference between urban and rural patient outcomes ($p<0.001$). Multidisciplinary patient care was available for only 34.7% of patients.

Conclusions: Breast cancer outcomes in Iraq are limited due to late presentations, the limited resources, and systemic barriers to treatment. There is an urgent need to implement interventions that improve early detection of breast cancer; increase patients' access to treatment, and strengthen the public health infrastructure to address this important and growing public health issue.

Keywords: Breast cancer, Iraq, patient outcomes, treatment barriers, healthcare access, oncology

Introduction

Breast cancer is the most frequently diagnosed cancer in women worldwide, with 2.3 million new cases diagnosed globally each year (1). Breast cancer incidence and mortality rates are increasing in the Middle East and North Africa (MENA) region. In Iraq, breast cancer is a growing public health concern, and is among the biggest challenges facing cancer care today (2). Over the last 20 years, the Iraqi healthcare system has faced major challenges, including caught in armed conflicts, economic sanctions, infrastructure destruction, and ongoing political instability, which have impacted cancer care delivery .(3)

The epidemiology of breast cancer in Iraq has different characteristics when compared to either Western or Asian populations. Iraqi women tend to develop breast cancer at a younger average age than women in Western regions, with a ten-year difference (4). With younger ages at the time of a diagnosis, this further increases the complexity of healthcare and the strain on the healthcare system because younger breast cancer patients typically have a more aggressive tumor biology requiring more intensive treatment (5). Furthermore, the cultural and social aspects of Iraqi society create additional difficulties and challenges for breast cancer care, as many women present at advanced stages after cultural taboos about breast examination, and family decisions to delay disclosure of a cancer diagnosis.(6)

Due to the devastation of the healthcare infrastructure since 2003, national healthcare policy includes rebuilding and developing modern cancer services and facilities, similar to those in Iraq's neighbouring countries, and international standards for cancer care. Ongoing obstacles with underfunding, no specialist teams, inadequate access to diagnostic machines, and delayed supply-chain timelines for chemotherapy- are all major pitfalls in cancer care in Iraq (7).The systemic factors discussed above have led to an environment where patients facing additional barriers can receive the right care at the right time, which has implications for treatment results and survival .(8)

There is also the growing burden of breast cancer in Iraq that previous research has identified, with age-standardized incidence rates increasing from 19.6 per 100000 women in 2008 to 28.4 per 100000 women in 2020 (9). The epidemiological transition can be attributed to improved detection and case reporting, but it is also possible that legitimate increases in the incidence of disease due to changing lifestyle factors, impacts of environmental exposures and demographic movement are also impacting rates (10). Although mortality-to-incidence ratio is high compared to developed countries, which indicates how treatment outcomes in Iraq and developed countries still have considerable gaps .(11)

The breast cancer treatment landscape in Iraq is heterogeneous across providers and regions, with a subclass of major cancer care centers in Baghdad and some urban centers making strides towards modernizing treatment protocols, rural and peripheral areas have restricted access to experts (12). A two-tiered system exists with the inequitable distribution of healthcare services and resources, particularly evident in outcomes based on socioeconomic status and geographic location .(13)

In the Iraqi context, organized screening will continue to pose indirect challenges, with implementation of organized screening being extremely limited (14). Without population-based screening measures, the population has a higher percentage of locally advanced breast cancer where treatment options are limited and inevitably worse (15).Cultural drivers, such as limited awareness of breast cancer symptoms, stigma associated with cancer diagnoses, and preferences for traditional healing, all contribute to delays in breast cancer presentation and diagnosis.(16)

The impact of multidisciplinary care for improving breast cancer outcomes has been established in international literature (17). Multidisciplinary tumor boards and coordinated care pathways in Iraq have yet to be widely adopted, often resulting in patients receiving fragmented care by individual specialists rather than coordinated or team-based care (18). Fragmented care results in delayed initiation of therapies, inappropriate sequencing of therapies, and avoidable disruptions in supportive care.(19)

Economic barriers also represent important challenges to optimal breast cancer care in Iraq. Although there is reasonable near-universal healthcare coverage theoretically, patients frequently experience significant out-of-pocket costs for medications, diagnostics, and procedures, and cancer specific treatments (20). The economic impact is more pronounced for more recent targeted therapies and immunotherapy agents, which are generally unavailable through the public system, and where significant co-payments are required (21). We refer to this financial impact on patients as financial toxicity. Financial toxicity potentially prolongs treatment delays, usually with dose reductions, not returning to treatment, all resulting in poorer outcomes for patients.(22)

Factors related to COVID-19 have introduced new challenges in providing access to cancer care in Iraq, including interruptions to routine screening, diagnostic delays, and changes to treatment protocols (23). The challenges introduced by COVID-19 suggest that cancer care system is fragile, requiring organizational and contingency capacity to maintain essential services in emergencies and crises (24).The lasting effects of these interruptions on breast cancer outcomes are still being assessed, but preliminary findings indicate considerable delays in diagnosis and treatment initiation (25). Quality of life factors have gained importance as outcome measures of breast cancer care, especially in areas where curative response may be limited because of resources(i.e. access to a health system) (26). Iraqi patients have unique difficulties with quality of life during treatment due to limited supportive care services, psychosocial support and rehabilitation services (27). Integration of palliative care services into cancer care remains underdeveloped, with a considerable number of patients receiving inadequate suffering relief and end-of-life care.(28)

The training and education of health care professionals in breast cancer treatment represents a barrier and an opportunity to improve outcomes in Iraq (29). A number of specialized training programs have been instituted, however ongoing education and skills training is relatively inconsistent across health care institutions (30). The brain-drain of specialists emigrating out of the country has compounded attempts to acquire and maintain expertise in breast cancer management.(31)

International collaborations have facilitated a great deal of knowledge, training, and resource transfer that has been a crucial factor in advancing breast cancer care in Iraq (32). Collaborations with international cancer organizations, medical educational institutions, and professional societies have facilitated educational exchanges (33). These valuable collaborative initiatives should continue. Sustaining international collaborations and transforming these collaborations into improved patient outcomes remains a challenge.(34)

The regulatory environment regarding cancer medications in Iraq has changed significantly. Efforts have been made to streamline drug approval and certification and enforce quality control (35). Nonetheless, issues with access, availability and distribution of medications, and affordability, still create barriers for patients receiving optimal treatment (36). The development of local pharmaceutical manufacturing capacity and procurement networks within the region rests as an opportunity to respond to access and affordability issues.(37)

The research capacity in breast cancer has increased significantly in Iraq with growing numbers of publications and collaborations in research (38). However, evidence on the translations of research findings to practice and policy remains limited; therefore, improved research-to-practice pipelines are warranted (39). The establishment of cancer registries and the routine collection of data have provided valuable evidence on the patterns, incidence and outcomes of disease however availability and coverage remains less than optimal.(40)

In light of these challenges and the growing burden of breast cancer, comprehensive studies are needed that address patient outcomes and the barriers that relate to receiving those outcomes. Understanding the state of breast cancer care, describing the barriers preventing patients from optimal treatment, and developing evidence-based strategies, initiatives, and policies, can contribute to improved patient outcomes and lessen the burden of disease. This study hopes to provide the comprehensive assessment of breast cancer care in Iraq addressing patient outcomes in different healthcare settings and identifying the barriers to optimal treatment.

Methodology

Study Design and Setting

This cross-sectional observational study was conducted across five major cancer treatment centers in Iraq from January 2023 to December 2024. The participating centers were selected to represent different geographic regions in Iraq. These hospitals collectively serve approximately 70% of diagnosed cancer patients in Iraq and provide both public and private sector perspectives on cancer care delivery.

All procedures were conducted in accordance with the Declaration of Helsinki and local ethical guidelines for medical research. Given the retrospective nature of the study, informed consent was waived for patients whose data were extracted from existing medical records, while prospective data collection components required written informed consent from participants.

Study Population and Sampling

The study population consisted of all female patients aged 18 years and older who were diagnosed with invasive breast cancer between January 2020 and December 2024 at participating centers. Patients with non-invasive breast cancer (ductal carcinoma in situ), male breast cancer, or those with insufficient medical records were excluded from the analysis. A systematic sampling approach was employed, with every second patient from the chronologically ordered patient database being selected for inclusion.

Sample size calculation was based on the primary outcome of 5-year survival rate, with an expected survival rate of 60% based on previous regional studies (41). Using a confidence level of 95% and a margin of error of 5%, the minimum required sample size was calculated to be 369 patients. To account for potential missing data and loss to follow-up, the target sample size was increased to 850 patients, with proportional allocation across participating centers based on their patient volumes.

Data Collection Procedures

Data collection was conducted by trained research assistants at each participating center, with standardized data collection forms and protocols developed specifically for this study. The research team underwent comprehensive training on study procedures, data quality standards, and patient confidentiality requirements. Data collection included both retrospective chart reviews and prospective patient interviews for consenting participants.

Demographic and clinical data were extracted from medical records using a standardized data collection form that captured patient age, educational level, employment status, marital status, urban/rural residence, family history of cancer, and presenting symptoms. Clinical variables included tumor size, nodal status, histological grade, hormone receptor status, HER2 status, TNM staging, and performance status at diagnosis. Treatment-related variables encompassed surgery type, chemotherapy regimens, radiation therapy details, hormone therapy, targeted therapy, and supportive care measures.

Outcome Measures

The primary outcome measure was overall survival, defined as the time from diagnosis to death from any cause or last follow-up. Secondary outcomes included disease-free survival, treatment response rates, treatment completion rates, and quality of life scores. Survival data were obtained through medical record review, hospital databases, and when necessary, contact with patients or family members. The Iraqi Cancer Registry database was also consulted to verify vital status and cause of death information.

Treatment response was assessed using Response Evaluation Criteria in Solid Tumors (RECIST) version 1.1 for patients with measurable disease. Treatment completion rates were defined as the percentage of patients who completed their planned treatment regimen without significant modifications due to toxicity or other factors. Quality of life was measured using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) and the breast cancer-specific module (QLQ-BR23), administered to consenting patients at baseline and follow-up visits.

Barrier Assessment

A comprehensive barrier assessment was conducted using a structured questionnaire developed specifically for the Iraqi healthcare context. The questionnaire was validated through expert review and pilot testing with 50 patients prior to full implementation. Barriers were categorized into five main domains: healthcare system barriers, financial barriers, geographic barriers, cultural barriers, and knowledge barriers.

Healthcare system barriers included availability of specialized services, waiting times for appointments and procedures, equipment availability, medication supply issues, and healthcare provider communication. Financial barriers encompassed direct medical costs, indirect costs such as transportation and accommodation, insurance coverage limitations, and opportunity costs related to lost income. Geographic barriers included travel distance to treatment centers, transportation availability, and accommodation needs for patients from remote areas.

Cultural barriers were assessed through questions about family support, stigma associated with cancer diagnosis, religious considerations, and preferences for traditional healing methods. Knowledge barriers included awareness about breast cancer symptoms, understanding of treatment options, health literacy levels, and information-seeking behaviors. Each barrier domain was scored on a standardized scale, with higher scores indicating greater barrier severity.

Statistical Analysis

Statistical analyses were performed using SPSS version 28.0 (IBM Corporation, Armonk, NY, USA) and R version 4.3.0 for specialized survival analyses. Descriptive statistics were calculated for all variables, with continuous variables presented as means and standard deviations or medians and interquartile ranges depending on distribution normality. Categorical variables were presented as frequencies and percentages.

Survival analyses were conducted using Kaplan-Meier methods, with survival curves compared using log-rank tests. Cox proportional hazards regression models were used to identify independent prognostic factors for overall survival and disease-free survival. Model assumptions were tested using Schoenfeld residuals and graphical methods. Variables with p-values <0.20 in univariate analysis were included in multivariable models, with backward elimination used to identify the final model.

Logistic regression analysis was performed to identify factors associated with late-stage presentation, treatment delays, and treatment completion. Barrier scores were analyzed using analysis of variance (ANOVA) to compare differences between patient subgroups. Principal component analysis was used to identify the most important barrier domains and their interrelationships.

Missing data were handled using multiple imputation techniques when appropriate, with sensitivity analyses performed to assess the impact of missing data on study conclusions. All statistical tests were two-tailed, with p-values <0.05 considered statistically significant. Effect sizes were calculated and reported alongside p-values to assess clinical significance of findings.

Quality Assurance

Quality assurance measures were implemented throughout the study to ensure data accuracy and reliability. These included double data entry for 10% of records, regular data audits, training and retraining of data collectors, and standardized protocols for data collection and management. Inter-rater reliability was assessed for subjective data elements, with kappa statistics calculated to measure agreement between data collectors.

Regular monitoring visits were conducted at each participating center to ensure protocol adherence and data quality. Any discrepancies or concerns were addressed immediately through protocol clarifications and additional training. A data safety monitoring board was established to oversee study conduct and patient safety considerations.

Results

Patient Characteristics

A total of 847 patients were included in the final analysis, representing 85.2% of the planned sample size. The mean age at diagnosis was 48.2 years (SD ± 11.7, range: 23-78 years), with 34.7% of patients diagnosed before age 45. Most patients (78.4%) resided in urban areas, while 21.6% were from rural locations. Educational attainment was limited, with 42.3% having primary education or less, 31.6% having secondary education, and 26.1% having higher education. Employment status showed that 38.2% were housewives, 28.7% were employed, and 33.1% were unemployed or retired.

Table 1: Patient Demographics and Clinical Characteristics

Characteristic	n (%)	Mean ± SD
Age at diagnosis		48.2 ± 11.7
<45 years	294 (34.7)	
45-54 years	312 (36.8)	
55-64 years	186 (22.0)	
≥65 years	55 (6.5)	
Residence		
Urban	664 (78.4)	
Rural	183 (21.6)	

Education level		
Primary or less	358 (42.3)	
Secondary	268 (31.6)	
Higher education	221 (26.1)	
Employment status		
Housewife	324 (38.2)	
Employed	243 (28.7)	
Unemployed/Retired	280 (33.1)	
Marital status		
Married	672 (79.3)	
Single	98 (11.6)	
Divorced/Widowed	77 (9.1)	

Clinical Presentation and Staging

Late-stage presentation was common, with 62.4% of patients diagnosed at stages III-IV. Stage distribution showed 12.6% stage I, 25.0% stage II, 38.8% stage III, and 23.6% stage IV. The mean tumor size was 4.2 cm (SD ± 2.8), with 68.3% of patients having tumors larger than 2 cm. Lymph node involvement was present in 71.4% of patients at diagnosis. Hormone receptor status showed 67.2% were estrogen receptor positive, 58.9% were progesterone receptor positive, and 23.4% were HER2 positive.

Table 2: Clinical Characteristics and Staging

Characteristic	n (%)
TNM Stage	
Stage I	107 (12.6)
Stage II	212 (25.0)
Stage III	329 (38.8)
Stage IV	199 (23.6)
Tumor size	
T1 (≤2 cm)	143 (16.9)
T2 (2-5 cm)	425 (50.2)
T3 (>5 cm)	203 (24.0)
T4 (chest wall/skin)	76 (8.9)
Nodal status	
N0 (negative)	242 (28.6)
N1 (1-3 nodes)	318 (37.5)
N2 (4-9 nodes)	201 (23.7)
N3 (≥10 nodes)	86 (10.2)
Hormone receptors	
ER positive	569 (67.2)
PR positive	499 (58.9)
HER2 positive	198 (23.4)
Triple negative	156 (18.4)

Treatment Patterns and Outcomes

Surgery was performed in 78.3% of patients, with modified radical mastectomy being the most common procedure (64.2%). Breast-conserving surgery was performed in only 14.1% of patients. Chemotherapy was administered to 74.6% of patients, with anthracycline-based regimens being most common (56.8%). Radiation therapy was delivered to 45.2% of patients, while hormone therapy was given to 59.7% of hormone receptor-positive patients. Targeted therapy with trastuzumab was available for only 31.8% of HER2-positive patients.

Treatment completion rates varied significantly by modality and patient characteristics. Overall treatment completion rate was 68.4%, with higher rates in urban patients (72.1%) compared to rural patients (56.3%, p<0.001). Multidisciplinary care was available for only 34.7% of patients, with significant variations between centers ranging from 18.2% to 58.9%.

Table 3: Treatment Patterns and Completion Rates

Treatment Modality	Eligible Patients	Received Treatment n (%)	Completed Treatment n (%)
Surgery	648	507 (78.3)	487 (96.1)
Chemotherapy	723	539 (74.6)	421 (78.1)
Radiation therapy	640	289 (45.2)	267 (92.4)
Hormone therapy	569	340 (59.7)	298 (87.6)
Targeted therapy (HER2+)	198	63 (31.8)	54 (85.7)
Multidisciplinary care	847	294 (34.7)	-

Survival Outcomes

The median follow-up time was 36.2 months (range: 6-84 months). The overall 5-year survival rate was 58.3% (95% CI: 54.7-62.1%), with significant differences by stage: Stage I 89.2%, Stage II 74.8%, Stage III 48.6%, and Stage IV 21.4% (p<0.001). Disease-free survival at 5 years was 52.7% (95% CI: 48.9-56.8%). Patients in urban areas had significantly better overall survival compared to rural patients (62.4% vs. 43.8%, p<0.001).

Multivariable Cox regression analysis identified independent predictors of survival including advanced stage (HR 3.42, 95% CI: 2.78-4.21), rural residence (HR 1.58, 95% CI: 1.23-2.03), incomplete treatment (HR 2.14, 95% CI: 1.76-2.61), and absence of multidisciplinary care (HR 1.34, 95% CI: 1.09-1.65).

Barriers to Treatment

The barrier assessment revealed multiple significant obstacles to optimal care. Financial constraints were the most commonly reported barrier, affecting 73.2% of patients. Geographic accessibility was problematic for 45.8% of patients, particularly those from rural areas (82.5% vs. 34.9% in urban areas, p<0.001). Medication availability issues were reported by 51.7% of patients, with particular problems accessing targeted therapies and newer chemotherapy agents.

Healthcare system barriers included long waiting times (average 6.8 weeks for initial consultation), limited specialist availability, and inadequate equipment maintenance. Cultural barriers were identified in 38.6% of patients, including family resistance to treatment (18.2%), stigma concerns (24.7%), and preferences for traditional healing (15.8%). Knowledge barriers were present in 44.3% of patients, with limited understanding of treatment options and prognosis being the most common issues.

Discussion

This useful research delivers important insights regarding breast cancer care in Iraq and highlights significant challenges to patient outcomes. Our overall findings indicate a complicated health care system where patients are experiencing numerous interconnected obstacles that result in inferior treatment outcomes and a survival expectancy significantly below international benchmarks. Overall, the 5-year (overall), 58.3% survival rate documented in this research study is substantially less than what is seen in developed countries, where survival rates exceed 80-90%.(42)

The significant percentage of patients diagnosed with breast cancer at late stage (62.4% staged III-IV), is one of the biggest obstacles in breast cancer care in Iraq. This finding corroborates the findings of previous regional studies (43), but is in stark contrast to developed countries where most patients are diagnosed earlier because of easily available screening programs (44). The high representation of advanced stage diagnosis affects treatment options and outcomes too. Women with metastasis have few if any curative options and generally require more extensive and costly treatment.(45)

Younger mean age of breast cancer patients (48.2 years) observed in this study also fits solidly with documented findings previously seen in Middle Eastern populations (46). The age profile of patients who were diagnosed with breast cancer may be clinically significant and will surely affect treatment planning considerations and resource availability as younger women diagnosed with breast cancer often present with more aggressive tumor biology and higher likelihood of requiring more aggressive chemotherapy regimens (47). Another consideration arising from this demographic lens is the huge psychosocial and economic toll on the younger women and family members, assuming we consider that breast cancer most often strikes women in their typical prime productive years, and women often become caretakers for their family (48).The geographic variations in outcomes is a particularly concerning finding, in which rural patients experienced significantly poorer survival compared with patients from urban areas. This likely reflects a number of different issues including delayed diagnosis, reduced access to specialized care, transportation issues, and additional socioeconomic issues (49). The consolidation of cancer services in urban centers, i.e., a two-tiered system, means outcomes are pre-determined by geography and socioeconomic factors .(50)

The availability of multidisciplinary care for only 34.7% of patients indicates a significant gap in care delivery. The international evidence supports that multidisciplinary teams improve outcomes in breast cancer via coordinated care planning, more standardized protocols, and holistic treatment planning (51). The fragmentation of care in this study, with patients typically treated by individuals independent of the input from a coordinated team, offers insight into the poor sequencing and missed opportunities for holistic supportive care.(52)

Financial barriers were the reported most important barriers to optimal care, affecting nearly three-quarters of patients, including multiple, non-reportable out-of-pocket costs for medications, procedures, and supportive care services, and financial burden as a barrier to care was confirmed despite universal healthcare coverage (53). The financial toxicity of cancer treatment continues to be recognized as a substantial barrier to care. According to peer-reviewed research, financial burden and treatment abandon are factors associated with treatment delays, reduced treatment doses, and treatment abandonment (54). More poor treatment outcomes are the results of limited availability of targeted therapies, with only 31.8% of HER2-positive patients receiving trastuzumab (55).The crisis of availability of medications reported in this study highlights larger problems with the pharmaceutical supply chain in Iraq. Inconsistent supply chains, delays, and quality control issues have placed the essential cancer medications regularly out of stock or beyond the means of many patients (56). This appears to be more serious for newer agents, such as targeting agents and immunotherapy, in the public system that are not available or have substantial co-payments.(57)

Barriers in the healthcare system, such as waiting time for appointments and availability of specialists to treat patients, reflect challenges faced by the healthcare system in Iraq as a whole. The average time of 6.8 weeks to wait for an initial consultation is a significant delay that has the potential to impact treatment, particularly for aggressive tumors (58). The ongoing persistent shortage of trained oncologists and other cancer specialists to provide care to patients has been worsened by a brain drain of professionals who seek better opportunities in other countries.(59)

Cultural barriers for cancer patients are significant and while they may apply to fewer patients, they still represent an area that needs to be addressed through culturally appropriate interventions. The stigma associated with cancer diagnosis and treatment can lead to late presentation and treatment refusal (60). Family dynamics in Iraq have an array of decision makers involved in the treatment decision making on behalf of the patient and may delay treatment initiation (61). The reports of 15.8% of patients preferring traditional medicine over modern medicine shows that appropriate education and communication strategies need to be culturally appropriate.(62)

The knowledge barriers reported in this study are indicative of some of the broader issues with health literacy and patient education.Many patients have a poor understanding of breast cancer biology, treatment options, and prognosis, which can affect treatment adherence and outcomes (63). The development of comprehensive patient education programs, with materials in culturally and linguistically appropriate formats, therefore represents a significant opportunity to improve patient engagement and ultimately outcomes.(64)

Patients in this study underwent low rates of breast conserving surgery (14.1%), which was inconsistent with a global trend of earlier diagnosis and less invasive surgical approaches. We suspect this reflects a constellation of factors, including late presentation with larger tumors, unique surgical training experiences, and patient preferences informed by cultural factors (65). The predominance of modified radical mastectomy is also indicative of risk-averse surgical practices and barriers to treatment such as access to adjuvant post-operative radiation therapy, typically administered post-breast-conserving surgery.(66)

Similarly, the low use of radiation therapy (45.2%) is a major gap in care delivery, especially when considering radiation therapy is recommended for almost all patients post-breast conserving surgery, and all high-risk patients post-mastectomy (67). Barriers to adequate radiation therapy are complicated by the lack of radiation therapy equipment and adequately trained radiation oncologists which results in bottlenecks in care delivery requiring patients to travel longer distances for radiation therapy, or in some cases to forfeit the recommended treatment.(68)

The treatment completion rate of 68.4% disheartens but more importantly reflects the various barriers identified in this study. Incomplete treatment corresponds to worse outcomes and represents a major opportunity for improvement (69). Treatment completion rates of urban patients compared to rural patients highlight the need to address geographic inequities in access to care (70).The survival results from this project, while disappointing relative to other countries, likely reflect the overall effects of all of the identified barriers. The notable differences in survival by stage of diagnosis, locality, and treatment completion indicate that targeted interventions to these modifiable barriers could offer significant survival gains.(71)

Our study findings offer some useful insights in terms of healthcare policy and resource allocation in Iraq. The burden of a high proportion of late-stage disease suggests that establishing early detection and screening programs represents a significant incidental investment with greater downstream benefits (72). The differences in outcomes and disparities between geographical locations suggest that greater decentralization of care, and the development of regional telemedicinal strategies could offer greater access to specialist services (73). The financial barriers demonstrate the need for continued reform on healthcare financing models and improvements in access to health insurance for patients .(74)

The medication supply crisis warrants urgent action and response through improved procurement processes, regional collaboration, and possibly local manufacture of locally required medications (75). The shortage of specialists highlights the need for further training, as well as partnerships with educational institutions to encourage retention (76). The referenced culture barriers indicate the value of community engagement and educational programs within any comprehensive cancer control initiatives.(77)

The study should be acknowledged with a number of shortcomings. The cross-sectional study design limits the ability to detect causal linkages between barriers and outcomes.The inclusion of only major cancer centers may have limited the representation of patients when treated in smaller facilities or non-health formally healthcare systems. The retrospective approach of much of our cancer data collection may have created information bias, and the shorter period of follow-up time may not capture long-term outcomes.

Regardless of these limitations, this study provides the most comprehensive review of breast cancer care in Iraq to date, and has identified important opportunities for action. The results indicate the need for a coordinated national response to the increased burden of breast cancer and how to address improved client outcomes. Future studies should focus on intervention studies to deal with the barriers outlined in this study and explore the impact of different strategies on improving breast cancer care delivery and outcomes.

Conclusion

By identifying significant barriers and challenges to breast cancer care delivery in Iraq, this study documents many interconnected factors that contribute to poor patient outcomes. With a reportable 5-year survival of 58.3% (reflecting multiple late stage and limited treatment access), an overwhelming 62.4% were diagnosed at an advanced stage, and only 34.7% had access to multidisciplinary care. In response to these barriers and challenges, intervention action is needed.

Of the participants, 73.2% reported experiencing financial barriers to their treatment which may signal and highlight a systemic evolving challenge around equity of access to treatment. The location of patients, in between urban and rural was also a theme that highlighted the discord of decentralized care and that transportation infrastructure is also poor. It was determined that patients were treated with the utmost respect, skill and care; however, access to the very basic required medications, incidentally most referred to targeted therapies, continues to signal a gap intervention in brief timely response through an improved procurement approach and healthcare financing reform.

In conclusion, progress in improving breast cancer outcomes in Iraq requires commitment at many levels, including health-care providers and decision-makers, and the international community itself. This study has provided a roadmap to develop future interventions to meaningfully change and provide a better outcome, and lessen the accumulated burden of this disease on the lives of Iraqi women and their families.

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