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Review Article

Breast Cancer in Iraq: A Comprehensive Review of Disease Burden, Risk Factors, and Healthcare Response

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Abstract: The most common cancer that has been diagnosed and one of the major causes of cancer related deaths among women in Iraq is breast cancer. This review paper focuses on the burden, determinants, and healthcare response to breast cancer through national registry data, peer-reviewed literature and recent reports of the Ministry of Health (2010-2025). The results indicate a gradual increase in incidence, especially in women aged 40-49 years, and the majority of the cases occurring at advanced stages (III-IV). Comparatively high mortality rates and low survival rates can be attributed to late diagnosis, low rates of screening coverage and regional differences in diagnostic and treatment potential. Hormonal and reproductive patterns, obesity, sedentary lifestyle and limited awareness coupled by the sociocultural barriers and conflict related disruptions constitute the risk factors. Although data systems and oncology infrastructure have improved, there still exist large gaps, particularly in the areas of pathology services, radiotherapy access, workforce training, and psychosocial and palliative care. The WHO, IAEA, EMPHNET and NGOs have been able to enhance completeness of registries and pilot early-detection programs, but there is uneven implementation. Improving early-detection measures, decentralization of treatment and diagnostic centers, maintaining constant availability of drugs and incorporation of psychological support is an issue of emergency. The review concludes with the fact that long-term investment, policy coordination, and capacity-building can be needed to attain equitable breast cancer control and enhance the survival rate and quality of life of Iraqi women.

Keywords: Breast Cancer, Iraq, Epidemiology, Risk Factors, Late-Stage Diagnosis, Healthcare Response, Cancer Registry, Screening Programs, Treatment Infrastructure, Psychosocial Support.

INTRODUCTION

Breast cancer is the most prevalent cancer to be diagnosed all over the world and one of the major causes of cancer deaths in women. In 2020 alone, it was estimated that 2.3 million women were diagnosed with breast cancer and hundreds of thousands died, with the latest updates of GLOBOCAN and global analyses showing increasing number of cases due to population growth, aging, and changes in risk factor distributions (Arnold *et al*., 2022; Bray *et al*., 2024). These trends are masked by significant variation across the world: high-income areas are reporting the highest incidence rates, in part due to robust screening initiatives and improving life expectancy, and many low- and middle-income areas are reporting lower incidence yet a disproportionately large death toll due to late diagnosis and poor access to the best treatment (Arnold *et al*., 2022).

The epidemiologic characteristics of the MENA region are quite different: breast cancer is the most commonly diagnosed cancer among women in most MENA countries; and most countries have a high percentage of cases diagnosed at an advanced stage and with poorer prognosis compared to high-income countries (Batran 2025). The age-standardized mortality rates are also usually high despite lower crude incidence rates in some regions of MENA, which include diagnostic delays, differences in screening coverage, and unequal access to diagnostic and therapeutic services (Zahwe *et al*., 2025; Batran *et al*., 2025). A number of recent regional reviews and modelling studies also caution that the absolute count of breast cancer incidence and fatality in MENA will increase significantly within the next several decades, without

positive changes in the infrastructure ensuring the detection and treatment of the disease at its initial stages (Bowser *et al*., 2017; Elghazaly *et al*., 2021; Manzano *et al*., 2024).

Breast cancer is the most frequent cancer in women in Iraq and is a significant public-health problem. The data of the national registries and peer-reviewed reviews record increasing incidences of breast cancer diagnosis over the first half of the 21st century, a large percentage of women reporting their diagnosis with advanced disease, and significant stakes in the geographic and health-system imbalances of diagnostic and treatment potential (Al-Hashimi, 2021). The recent national reports and the Iraqi Cancer Registry highlight the fact that to reduce deaths caused by breast cancer and improve the quality of life of survivors, the following should be improved: early detection, strengthening the branch of pathology and imaging services, multimodality treatment (surgery, systemic therapy and radiotherapy), and the ease of penalty on the patient in terms of social and economic factors. Since the number of young females in Iraq is large and increasing, the absence of intervention will be converted into the number of cases and preventable deaths (Iraq Family Health Survey Study Group, 2008; Hills and Wasfi, 2010; Hagopian *et al*., 2013; Alhiraki *et al*., 2022).

This review is a synthesis of the recent evidence on the burden of breast cancer among women in Iraq, and the responsiveness of the healthcare system which includes surveillance and registry data, the awareness and screening programs, diagnostic and treatment infrastructure, work force and training, and the supportive/palliative care programs. The specific objectives are to (1) synthesize incidence, stage at diagnosis, mortality and survival trends in national registry and peer-reviewed data; (2) describe risk factors and determinants that are especially relevant to Iraqi women; (3) review the availability and distribution of diagnostic and treatment resources and policy efforts; and (4) identify gaps in the evidence and gaps in data, service delivery and research with a conclusion to provide evidence based recommendations to enhance Iraq response to breast cancer. The review focuses on peer-reviewed articles, official reports of the Ministry of Health of Iraq registries and current regional analyses in order to have an evidence-based foundation for policy and practice.

METHODOLOGY

The review took a narrative synthesis approach to compile and assess the existing evidence on the epidemiology of breast cancer, risk factors, healthcare response and policy situation in Iraq amongst women in Iraq. The procedure took place in January 2025 through October 2025 as per the available guidelines on integrative and narrative reviews.

Search Strategy

A literature search was conducted in PubMed, Scopus, Web of science, WHO Global health library and Google scholar using a combination of both Medical Subject Headings (MeSH) and free text search terms such as; *breast cancer, female, Iraq, epidemiology, risk factors, registry, treatment, screening, palliative care* and *health policy*. Other sources were located in the official publications of the Ministry of Health and Environment of Iraq, reports of WHO Eastern Mediterranean Regional Office (EMRO) reports and databases of international agencies (i.e. IARC CanScreen5, IAEA DIRAC, EMPHNET, and UNITAR). The reference lists of the relevant papers and grey literature were also searched manually to obtain unpublished data and national reports that are recent.

Inclusion and Exclusion Criteria

The studies that were part of this review had to include data on breast cancer in Iraq, or subpopulations living in Iraq, and have to be a peer-reviewed study, a national cancer registry report, a WHO or IAEA assessment, or any other relevant grey literature, published within the time frame of 2010 and 2025. The eligible studies had to have information about incidence, mortality, survival, risk factors, diagnostic or treatment capacity, psychosocial support or health policy response concerning breast cancer in Iraq. On the other hand, the articles were filtered out because they did not have identifiable Iraqi data, were case reports, editorials or opinion papers which lacked empirical evidence, or were not about breast cancer, and thus were not directly relevant to the study objectives.

Analysis and Transfer of Data

The methodological quality and relevancy of all the included sources were thoroughly checked. The data from these sources covered various important aspects. They included the disease occurrence measures such as incidence, prevalence, mortality and survival; also, clinical features like stage, age at diagnosis and risk factors, which started from genetic ones and went through hormonal, lifestyle, environmental and sociocultural. Besides that, information on health-system drivers such as diagnostic capacity, treatment access, human resources and policy frameworks were collected as well to understand the breast cancer burden and healthcare response in Iraq. Thematically, the data were narratively synthesized and clustered into thematic domains, which included epidemiology, risk factors, diagnosis and treatment infrastructure, psychosocial support, and policy response. The summarization of the quantitative data was performed descriptively first referencing to the latest Iraqi Cancer registry and peer-reviewed data. Contextual and implementation studies were combined into a single qualitative study to offer the interpretation of the systems.

Quality Assurance

The review was concentrated on official national data sources (e.g., *Republic of Iraq Ministry of Health and Environment Annual Reports, 2021-2024*), recent peer-reviewed articles (e.g., *Al-Hashimi 2021; Al-Alwan 2022; Mahmood 2024*), and recognized regional or international institutional reports (*WHO EMRO, IAEA, EMPHNET, UNITAR*) to ensure rigour. The data presented in these sources were triangulated to verify the consistency as well as the gaps in knowledge.

Ethical Considerations

The study utilized secondary data in the form of published materials and journals; hence, there was no need for ethical approval or informed consent.

FINDINGS AND DISCUSSION

Epidemiology of Breast Cancer in Iraq

a) Incidence and Prevalence

The population-based studies and national registry data point to the constant rise in breast cancer incidence in Iraq in recent decades. Al-Hashimi published 72,022 breast cancer cases and a statistically significant rising trend in the age-standardized incidence rate (ASIR) of 37.88 per 100,000 on the basis of the Iraqi Cancer Registry data of 2000–2019 (Al-Hashimi 2021). In Iraq, breast cancer remains the most prevalent cancer among women to date, and the reports provided by the National Registries of Cancer in the country indicate that thousands of new cases of breast cancer are reported in the recent publications of the report (Alwan, 2016; Aljubori, 2018; Alrawi, 2022). The recent provincial and hospital series also report increasing numbers of cases in several governorates, in line with real increases as well as better case ascertainment as registry systems attain maturity (Al-Hashimi 2021; Harbi, 2021; Mansour *et al*., 2021; Bin Ishaq, 2004).

Iraq ASIR has largely been classified as moderate when compared to other lower-incidence countries in Sub-Saharan Africa but also compared to many countries with high-income and widespread screening approaches (Al-Hashimi 2021; Bray *et al*. 2022). Female breast cancer is the most commonly diagnosed cancer globally (GLOBOCAN), and although the crude and age-standardized incidence rates in Iraq are not highest in the Middle East, the country has much in common with many other countries in the region in terms of the worrying trend of relatively high mortality and late diagnosis (Bray *et al*., 2022; Al-Shamsi et., 2023; Manzano *et al*., 2024; Elhawary *et al*., 2025; Zahwe *et al*., 20.

Geographic heterogeneity is significant on the subnational level. Reported rates of incidence on the registry and hospital are higher in certain urbanized governorates and the Kurdistan Region (Kurdi *et al*., 2021; Khanali and Kolahi, 2021; Soleimani and Chiti, 2025). Research was compared to multiple southern and central provinces - variations were probably caused by both actual epidemiologic differences and population structure (age distribution), as well as unequal diagnostic/registration capacity (Luthander, 2020; Khoshnaw *et al*., 2022). As an illustration, localized studies indicate local pockets with increased apparent incidence of cancer in Iraqi Kurdistan in cancer registry and population studies of Sulaymaniyah and Erbil in the 2000s10s (Khoshnaw *et al*., 2022; Al-Asadi, 2025). Apparent urban rural disparities in the number of reported cases are also due to the fact that screening and tertiary care is more readily available in urban centres (Republic of Iraq, Ministry of Health and Environment, 2023).

b) Age and Stage at Diagnosis

Iraqi statistics depict that the middle-aged women are more concentrated when it comes to breast cancer cases. The joinpoint analysis of the 2000–2019 registry data by Al-Hashimi revealed that incidence increased especially rapidly in women aged 40-49, 50-59 and older, with the 40-49 age group of many cases of incidents in most cases (Al-Hashimi *et al*., 2021). Various series of hospitals (Nineveh, Mosul, Najaf and others) document the modal age of presentation in the 40s - less than the median age of presentation (when the median presentation age is in the 60s) in many high-income countries (Al-Hashimi *et al*., 2021).

The disturbing point that keeps reoccurring in Iraqi series and regional surveys is the prevalence of women with locally advanced disease or metastatic disease. Multiple studies with hospitals and registries report that a significant portion of patients, usually between 40 and 60 percent or higher, are diagnosed with stage III and IV, although proportions fluctuate as of the time and location (Ellrodt *et al*., 2013; Ellrodt *et al*., 2013; Booth *et al*., 2019). Similar systematic evaluations between Arab countries also rank Iraq as one of the countries with a high number of late-stage diagnoses, which means that it has limited opportunities to detect the disease early and screen the population and diagnostic capacities (Zendehdel *et al*., 2022; Maallah *et al*., 2022; Mansour *et al*., 2024).

The problem of delayed presentation in Iraq is multi-factorial: lack of knowledge of breast symptoms and screening, cultural stigma and fear of cancer, economic and transport access to diagnostic facilities (particularly among women in the rural population), gaps in the primary-care recognition and referral pathway, and limited access to diagnostic imaging and pathology services outside the major urban centres (Al-Alwan *et al*., 2014). Disruption to health services and

population displacement of some of the population in the country due to conflict have also posed barriers to accessing timely diagnosis by some women (Amodu *et al*., 2020; Ekezie *et al*., 2020; Rahamtalla *et al*., 2025).

c) Mortality Rates and Survival Rates

Despite increasing incidence, mortality data indicate that Iraq has relatively high breast cancer mortality relative to its incidence, which is common across most of the low- and middle-income environments where late-stage diagnosis and inadequate access to the best multi-modality treatment contribute to an increased fatality of the cases (Alwan, 2016; Al-Hashimi *et al*., 2021; Alrawi, 2022). Breast cancer is in the national registry reports as one of the major causes of cancer deaths amongst women and periodic analysis suggests that case-fatality has not dropped as much as it has been done in most of the high-income countries with long running screening and treatment initiatives.

Complete follow-up has been missing in some registry data, but complete follow-up indicates five-year survival below that of high-income countries by the use of robust and nationally representative five-year survival estimates, and by the use of hospital-based cohorts and regional studies. The stage at diagnosis, the presence of and the timeliness of surgery, access to and the use of anthracycline/taxane regimens, endocrine therapy, radiotherapy, and supportive care are strong predictors of survival as well as co-morbidities and socioeconomic factors (Galukande *et al*., 2015; Girardi, 2021; Gil *et al*., 2022; Fatani, 2023). In some governorates, there has been an improvement in diagnostic and treatment facilities, which have seen improvements in the result, but the overall survival nationwide is still lower than the international standards.

Iraq has lower survival rates than high-income nations (where screen-detected breast cancer survival usually surpasses 80 90 per cent), and other middle-income societies in the region, which do not have universal and systematic screening and have limited and substandard oncology services (Bray *et al*., 2022; Lim *et al*., 2022). Among the MENA countries, there are significant differences in survival and mortality rates between countries, with those countries that have invested previously in established screening, pathology networks, and cancer infrastructure reporting better outcomes (Manzano *et al*., 2024; Shukla *et al*., 2024; Mansour *et al*., 2024). This survival gap in Iraq will be resolved only with a concerted effort to enhance the early detection, the accuracy of staging, the timeliness of multimodal treatment and equal access to care between provinces.

Risk Factors and Determinants

a) Genetic and Biological Factors

The hereditary vulnerability adds a quantifiable, although minor, proportion of breast cancer within the Iraqi series. Clinical cohort and regional registry-based genetic studies have found pathogenic variants of BRCA1 and BRCA2 in a number of Iraqi patients, and BRCA1 alterations were more common than BRCA2 in at least some hospital-based samples (Wege *et al*., 2018; Farra *et al*., 2019; Hassan *et al*., 2024; Hassan, 2024; Zayed, 2024). These investigations indicate, predominantly small-to-moderate in scale and many of them confined to tertiary referral services, that hereditary breast cancer (BRCA-based and otherwise) occurs in Iraq in levels that are generally similar to those of other populations in the area, though that population-level level of prevalence is not well known due to a lack of systematic genetic screening and incidence of family-history ascertainment. Genetic counselling and testing access has been low outside large urban centres and limiting access to cascade testing, risk-reducing choices and targeted screening of women at increased risk (Farra *et al*., 2019; (Evans and Manchanda, 2020; Evans *et al*., 2020; Wilke *et al*., 2024).

Like in the rest of the world, there are known hormonal and reproductive risk factors that play out in Iraq. Iraqi-based research of hospitals and primary-care groups links earlier menarche, nulliparity or low parity, late age at first full-term pregnancy, and shorter period of breastfeeding with increased risk of breast-cancer-studies in line with the overall evidence of an association between lifetime exposure to endogenous ovarian hormones and risk (Abdulla *et al*., 2020). A shift in fertility trends and reproductive behaviour (reducing fertility rates and later age of childbearing in certain areas of Iraq) can consequently be adding to increasing incidence over time (Ghalib *et al*., 2019; Al-Hashimi *et al*., 2021). Moreover, the distribution of proportion of subtypes of hormone-receptor (ER/PR/HER2) in case series in Iraq is generally similar to those internationally, but specific country-specific, national subtype data are scarce as yet (Ghalib *et al*., 2019; Al Zobair *et al*., 2020; Al-Mosawe *et al*., 2024; Yousef *et al*., 2025).

b) Environment and Lifestyle Factors

There is plausible importance of population-level changes in diet and physical activity as the causes of breast-cancer risk in Iraq. The data on national nutrition and NCD surveillance show that overweight and obesity are rather high and increasing among adult Iraqi individuals, especially women, rates that are higher than those in the region in several reports and fundamentally correlated with post-menopausal breast-cancer risks (Sadida *et al*., 2024). Social and structural factors are also causing Iraqi women to engage in physical inactivity, and surveys focusing on the region and Kurdistan in particular have reported extensive obstacles to physical activity (no safe places to exercise, cultural restrictions, time and caregiving responsibilities) which contribute to increasing sedentary behaviour and predisposing to obesity, both of which are important risk factors as to breast cancer. The importance of obesity prevention and management approaches and

physical activity as a prevention tool of breast-cancer approaches can thus be asserted to be relevant components of the prevention approach (Shrimpton and Rokx, 2012; Meenakshi, 2016; Saxena *et al*., 2025).

Some studies indicate that tobacco smoking is a well-known, though moderately, risk factor of several cancers such as post-menopausal breast cancer; although alcohol is a well-established breast-carcinogen at low-to-moderate consumption. The cultural and legal factors predispose women in Iraq to low levels of alcohol use, and tobacco use (including waterpipe/hookah) and exposure to secondhand smoke are both of concern, especially in some subgroups (WHO Study Group on Tobacco Product Regulation, 2015). Smoking is enumerated as one of several modifiable risk factors observed in hospital studies and regional reviews among Iraqi breast-cancer patients but strong, population-level, accomplishment of the quantifiable risk due to smoking and alcohol in Iraq is scanty. Tobacco control and substance-use prevention based in the realm of public-health also, however, are still relevant, albeit due to slightly different causes than in high-consumption environments (Cardenas, 2015; Hussain and Anwarulhaq, 2020; Mjali *et al*., 2021).

Iraq has been postulated to have environmental exposures, some of which are due to decades of war. Surveys of uranium and other war-related contaminants in Iraqi patients have found that some groups of cancer patients have a higher level of these contaminants, and analyses of the evidence state that there are probable ways through which depleted uranium (DU) and other war-related pollutants may affect cancer risk in the long term (Ahmed 2022; Surdyk 2021). But the epidemiologic data directly supporting the relationships between DU exposure and breast cancer in Iraq are inconsistent and difficult to methodologically follow: numerous studies are constrained by small sample sizes, ecological or cross-sectional design, possible misclassification of exposure and confounding. The existing expert syntheses thus regard a causal relationship between DU and breast cancer as unestablished at the moment, including further and strictly designed exposure-assessment and cohort studies instead of condemnation (Bharadwaj and Stafford, 2010; National Academies of Sciences, Engineering, and Medicine, 2018; Li *et al*., 2025; Ahmed *et al*., 2022).

Socioeconomic and Cultural Determinants

In Iraq, the risk factors and the outcome of breast-cancer are significantly influenced by socioeconomic factors. Inadequate educational levels and health literacy are associated with worse symptom identification, reduced involvement in early-detection processes, and later diagnosis in several studies carried out in Iraq and the region. There is also an economic constraint in treatment decision-making and persistence of care, where out-of-pocket expenses of diagnostics, medication, and travelling to the tertiary centres serve as a barrier to lower-income women. The enhancement of health education and financial risk insurance is thus of importance in fair control activities (Al-Hashimi, 2021).

Stigma and cultural beliefs significantly contribute to the postponement of seeking breast symptoms. Iraqi governorate and Kurdish qualitative and survey research report fear of social consequences, modesty issues, lack of understanding about cancer (fatalism, cancer is always deadly or infectious), and hesitation to have breast examination or radiography, particularly by male medical personnel. These causes decrease the rate of uptake of clinical breast examination and diagnostic follow-up, and they make delays larger even where services are provided. These barriers have been proposed to be overcome by conducting community-specific awareness campaigns, providing screening services that are female friendly and involving local leaders and women groups (Shabu *et al*., 2023).

Many women are not able to attend to timely diagnosis and treatment due to gendered patterns of mobility, household duties, and power in making decisions. In her certain environment women need family consent to travel or safety and transport issues and lack of workforce among female healthcare providers further limits comfort and access. These gendered limitations are crossed over socioeconomic status and geography to generate stage at diagnosis and outcome disparities; to mitigate them, health-system and social interventions beyond solely medical provision (community outreach, decentralization of diagnostic services, and support of transport and childcare) are necessary (Shabu *et al*., 2023).

Diagnosis and Treatment Infrastructure

This part is a synthesis of recent findings on the Iraqi ability to diagnose and treat breast cancer combining the national registry findings, peer-reviewed articles, and foreign evaluations. Key themes include unremitting gaps in diagnostic capability and standardisation, disproportionate access to multimodality treatment (surgery, systemic therapy, radiotherapy), workforce scarcity and training requirements, and system level constraints - such as ineffective referral pathways, high out of pocket payments, and supply-chain disruptions in access to essential oncology medicines.

a) Diagnostic Capacity

There is an increase in the basic diagnostic services in few tertiary centres in Iraq, but the access is not evenly distributed across the governorates. Cancer Registry of Iraq (2024) records the increase in the reported rates of histopathology confirmation but reports a wide provincial range of morphologic confirmations and the percentage of cases with full stage information due to the lack of capacity to perform pathology in smaller hospitals (Republic of Iraq, Ministry of Health and Environment, 2024). Various field reports and reviews indicate that in many provinces, hospitals do not have

a reliable mammography service, ultrasound with trained breast sonographers, image-guided core-biopsy facility, or timely histopathology reporting - patients referred to central centres to have their diagnosis accomplished (Al-Alwan *et al*., 2022; Al-Ibraheem *et al*., 2022). These loopholes postpone the definite diagnosis and staging of diseases and cause failure in the timely commencement of treatment.

Diagnostic pathways (clinical breast examination, relevant imaging algorithms, ultrasound/mammography triage, core biopsy with receptor testing) have not been standardized. A number of hospital-based audits and national reports indicate the inconsistency of utilisation of guideline-advocated protocols, inconsistent tumour receptor status (ER/PR/HER2) reporting, and immunohistochemistry (IHC) turnaround delays (Republic of Iraq, Ministry of Health and Environment 2024; Al-Alwan *et al*., 2022). In resource-constrained and conflict afflicted environments in Iraq, laboratories tend to have few reagents, periodic quality-control interventions, and little external proficiency testing, which adds to diagnostic uncertainty and delay of treatment (Al-Ibraheem *et al*., 2022).

b) Treatment Modalities

Some tertiary centres offer surgical oncology (breast-conserving surgery through modified radical mastectomy) to breast cancer patients, which has improved over the past few years in terms of technique, but there is an uneven distribution of capacity (Mahmood 2024). A bottleneck is radiotherapy capacity: The IAEA DIRAC statistics and national evaluations show that radiotherapy installations and up-to-date planning are concentrated in a few centres, and a long queue forms, as well as a significant number of patients outside large cities cannot receive radiotherapy (IAEA 2022; Republic of Iraq, Ministry of Health and Environment 2024). Chemotherapy is offered both in government and private hospitals, though research data and surveys among clinicians claim that the supply of most cytotoxic agents and supportive drugs is interrupted frequently, which compels to change the standard regimen or postpones the cycles (Al-Shaybaany 2025; Al-Alwan 2022).

Hormonal treatments (tamoxifen, aromatase inhibitors) are intellectually available and included in the regimen of hormone-receptor-positive disease but inadequate availability of endocrine suppressants, missing support of adherence, and incomplete testing of receptors limit their utilization in vast quantities (Republic of Iraq, Ministry of Health and Environment 2024). Specialized treatments, including trastuzumab to treat HER2-positive disease, are offered in a select number of tertiary centres and through private acquisition or by restricted government schemes, yet they are expensive, not always available at any given time, and disadvantageous patients will either receive treatment later or not at all (Al-Alwan 2022; Access to Medicine Foundation 2024).

The common trend is that the highly developed diagnostics and treatments are concentrated in cities: patients of the rural governorates regularly visit Baghdad, Erbil, Sulaymaniyah, or other regional centres to have an imaging procedure, pathology, surgery, radiotherapy, and systemic therapy done. This urban rural divide generates inequities in timeliness of care, stage of presentation and outcomes (Skelton *et al*., 2023; Republic of Iraq, Ministry of Health and Environment 2024). In the few cases where local capacity has been rebuilt following conflict it has yielded better results, however, in many cases there remains no consistent access to the entire range of suggested care.

c) Human Resource and Training

The shortage of the workforce in the oncology team limits service delivery. National and international surveys record small populations of medical oncologists, clinical oncologists (radiation oncologists), educated breast surgeons, specialized oncology nurses, medical physicists and histopathologists compared to population requirement (IAEA 2022; Al-Alwan 2022). Long absence and dependence on a small group of specialists dealing with huge caseloads are reported in a few provinces, thereby adding wait times to the problem of burnout. Further training (continued professional development, subspecialty training (breast surgical oncology, onco-pathology, radiation physics), multidisciplinary team practice) is not mandatory. Capacity building has been assisted by the IAEA and regional partners, and institutional, nationwide training curricula, mentorships, and dedicated time in multidisciplinary tumour boards are few (IAEA 2022; Al-Alwan 2022). Enhancing in-country postgraduate education, short-course credentials to certified oncology nursing and radiotherapy technologists, and telemedicine connections to foreign centres are over time listed as top priorities.

d) Health System Challenges

Fragmentation in the primary, secondary, and tertiary care is hindered by irregular referral procedures and missing electronic medical records, which hinder effective patient navigation. There are various handovers and duplication of diagnosis and lack of follow-up between care pathway steps (Mohsin 2024; Al-Ibraheem 2022). It is essential to build clear and practical referral algorithms and patient navigation services to minimize the time interval of diagnosis and treatment. Although the public health system is comprehensive in the range of services provided to the Iraqi population, a significant part of the costs associated with its usage is still paid out of pocket by patients, as they have to travel and stay in other regions to get the treatment that is not yet available in the local hospitals. These expenses cause some families to stop treatment or even give up (Hameed 2022; Al-Shaybaany 2025). Poor affordability and continuity are also reduced by the

limited mechanisms of overall financial protection, and fragmented procurement set-ups. Shortages in the supply of essential oncology drugs, consumables, and laboratory reagents have been common in both qualitative researches conducted by clinicians and national data on pharmacy surveillance (Al-Shaybaany 2025; Access to Medicine Foundation 2024). These inadequacies either require the use of other non-equivalent regimens, dose assignations or postponements, which may undermine survival. Poor procurement systems, emergency buying dependency, cold-chain capacity of biologics, and global markets constraints are all part of the repetitive supply issues.

Psychosocial and Supportive Care

Breast cancer is a major psychological and social stressor among women and their families in Iraq where anxiety, depression, fear of death, body image, and marital relationships concerns are widely reported. According to recent Iraqi research, emotion-focused coping ranks most commonly among survivors and the lower the quality of life the higher the symptom burden, the more advanced the stage of diagnosis, and the weaker the social support networks (Alsdfan 2025; Ali 2025). Studies in qualitative inquiries in Iraqi contexts indicate that women often juggle the intensive caregiving functions, financial stress, and social stigma whilst negotiating diagnosis and therapy- things that augment distress and can erode treatment adherence. Displacement associated with conflicts and dysfunction of households also contribute to the added psychosocial vulnerability in the affected governorates, overloading caregivers and reducing informal sources of support (Mohammed-Alsdfan *et al*., 2025).

In Iraq, formal psychosocial services and palliative-care programs are still low and disproportionately distributed. Surveys of national services and reviews of service provision have shown that specialized palliative-care units are limited (two oncology palliative units have been reported in national summaries), located in the major cities and are often understaffed and lack resources; pain management and basic supportive therapies are common, but multidisciplinary palliative services (psychosocial counseling, spiritual care, and rehabilitative support) are not yet well established into oncology routes (ICPCN 2023). Inconsistent access to trained psycho-oncology practitioners and lack of routine referral to counseling also appear in several recent hospital- and registry-linked reports (so that many patients prefer to use family networks instead of professional psychosocial care) (Republic of Iraq, Ministry of Health and Environment 2024; Skelton *et al*., 2023). In areas with palliative and counseling (such as tertiary centres and some NGO-provided services), they have reduced symptoms and patient satisfaction but these services should be decentralized and scaled down to reach women in semi-urban and rural governorates.

The role of non-governmental and community organization on raising awareness, psychosocial support, and practical support to women with breast cancer in Iraq is visible and increasing. University and student campaigns in Kurdistan (IFMSA-Kurdistan), community awareness campaigns with UNITAR partnerships, grassroots breast-cancer societies provide the same services: health education, early detection, periodic screening days, and some financial or navigational support to patients (IFMSA-Kurdistan 2023; UNITAR 2024). Complementary services to conflict-affected regions, such as mental-health and psychosocial support (MHPSS), surgical and post-operative care, and rehabilitation, are offered by larger humanitarian actors (such as Médecins Sans Frontières and national branches of the Red Crescent), which indirectly benefit oncology patients in the absence of dedicated oncology services or when such services are interrupted (MSF 2018; Iraqi Red Crescent 2024). However, NGOs are sporadic, project-oriented, and require external funding-reducing sustainability and regular coverage. Improved collaborations between the Ministry of Health and the cancer centres with NGOs (with explicit referral routes and training) would enhance the scope of counseling, peer-support groups, transport or accommodation, and community-based palliative care.

Governmental and Policy Response

Formal Iraqi cancer control efforts have a history over ten years long: in 2010, the Iraqi Cancer Board and the Ministry of Health and Environment laid the basis of early National Cancer Control Program (NCCP) and have operated the Iraqi Cancer Registry since that time as the heart of surveillance (Iraqi Cancer Board 2010; Republic of Iraq, Ministry of Health and Environment, 2024). Later country-level planning documents and expert country reports report on the gradual process of revising the national strategy - expanding goals beyond registration and treatment to prevention, early detection, palliative care, and system strengthening (Al Alwan *et al*., 2022; Republic of Iraq, Ministry of Health and Environment 2024). As policy objectives, the evidence-related goals of the registry include national reports and ministry publications that focus on the improvement of data systems, decentralization of diagnostic services, and the scaling of radiotherapy and pathology capacity in 2022–2024 (Republic of Iraq, Ministry of Health and Environment 2024; Mahmood 2024).

Policy formulation, registry stewardship and coordination of public oncology services are the major functions of the Federal Ministry of Health (this time via the Iraqi Cancer Board), which have necessitated and still necessitate significant external technical and financial collaborations to implement. The coordination of the use of technical assistance to plan cancer-controlling efforts has been achieved through direct work of the World Health Organization (WHO) Regional Office for the Eastern Mediterranean with the Federal and the Kurdistan health authorities to strengthen health information systems, contribute to early-detection campaigns, and coordinate planning (WHO EMRO 2023). Specific

inputs have been made by multilateral and technical partners (such as IAEA (radiotherapy capacity test and imPACT reviews), IARC, EMPHNET (projects that address women cancers), and non-governmental actors (imPACT/IAEA 2023; EMPHNET 2024). This type of cooperation has served to support concrete upgrades (e.g., radiotherapy improvements and training activities recommended by imPACT) and project-level reinforcement of screening, referral, and awareness initiatives, and NGOs and humanitarian organizations have been used to fill service gaps, particularly in conflict-affected governorates, by offering temporary clinical, psychosocial, and logistic support (IAEA 2023; Skelton *et al*. 2023).

Implementation evaluation indicators are mixed. Independent reviews and IAEA/IARC imPACT follow-up note some areas as improvements, such as a better completeness of the registry, restored or new radiotherapy capacity in several centres, and pilotized early-detection operations, but continue to record shortcomings in service coverage in the country, workforce adequacy, supply-chain resilience, and long-term funding (IAEA 2023; Al Alwan 2022). The 2022 WHO EMRO reporting emphasizes the health information system strengthening and reevaluation of the evidence-based planning, yet it points out that most initiatives are still pilot or provincial in scale, as compared to the sustainable national coverage (WHO EMRO 2023). According to project briefs by regional public-health partners (EMPHNET), academic reviews, and opinion leaders, traditional, fragmented projects based on piecemeal projects funded primarily by donors have yielded valuable local outcomes but can easily get disjointed unless integrated into funded national implementation plans with explicit governance, recurring budget lines, and monitoring indicators (EMPHNET 2024; Skelton *et al*. 2023).

Sustainability is hampered by three structural problems: (1) financing and procurement systems that expose key medicines and technologies to stockouts and abrupt funding deficits; (2) human-resource gaps and unbalanced in-country training pipelines that limit scale-up of standard multidisciplinary care; and (3) a governance system and a referral system confined between federal, regional (Kurdistan), and provincial actors that complicate the uniform implementation of national protocols (Republic of Iraq, Ministry of Health and Environment 2024; Mahmood 2 It has been advised that pragmatic scale and sustain measures include: consolidate registry and data benefits into a national monitoring-and evaluation platform; ring-fence recurrent finances on critical oncology pharmaceuticals and radiotherapy upkeep; increase oncology personnel training and retention incentives; and institutionalize partner-supported projects (NGO, IAEA, WHO, EMPHNET) into ministry-led plans in order to provide continuity at the end of the project (IAEA 2023; WHO EMRO, 2023; EMPHNET, 2024).

According to recent reviews and implementation assessments, the following short-term priorities that are frequently mentioned in the Ministry and partners involve: formalizing an updated, costed NCCP with achievable stage-shift and survival targets; decentralization of basic diagnostic services to selected provincial hubs; continuity of supply lines of core list of chemotherapy and endocrine agents; a national training program of breast cancer multidisciplinary teams; and a national dashboard based on the Cancer Registry to monitor progress (Al Alwan 2022; Republic of Iraq, Ministry of Health and Environment 20 The recommended key indicators to be monitored are the completeness of the registry (percent morphologically checked), the median time interval between first presentation and treatment, the number of radiotherapy machines per million population and machine uptime, and the proportion of all eligible HER2+ patients receiving trastuzumab within 3 months of diagnosis (EMPHNET 2024; Mahmood 2024).

Future Directions and Recommendations

a) Strengthening Screening and Awareness Campaigns

Detection of cancer at an early stage is still the number one way to reduce breast cancer death in Iraq; therefore, the main focus should be on scaling up the awareness campaigns which are culturally sensitive and screening programs that are a mix of community health workers, mass media, and targeted outreach to underserved governorates. Several educational interventions which concentrate on CBE, mammography where available, and BSE have changed the level of knowledge and the number of early presentations in various Iraqi studies and pilot projects, however, gaps that also exist in awareness among young women and the university communities show that there is still a need for a repeat of the tailored messages and education at the school/university level (Hassan, 2023; Al-Asadi, 2025) (Hassan 2023).

The Ministry of Health is advised to conduct a nationwide early detection communication campaign that is based on research and is socially and linguistically adapted to the needs of the rural areas, the internally displaced people, and the communities with a low level of literacy. These awareness communications should become a part of the routine primary healthcare visits and maternal health check-ups to assure continuous community involvement and message reinforcement. Examples from UNITAR projects and local pilot programs demonstrate the feasibility and impact of such culturally tailored interventions. Besides, there should be an effort to develop both mobile and permanent screening facilities with the help of registry data that will guide resource allocation by determining which governorates with a higher age-standardized incidence rate should be given priority. National awareness campaigns—especially during outreach months such as October—should be used to promote mobile mammography and patient navigation services in order to reduce loss to follow-up and increase screening uptake (Al-Shamsi and Abyad, 2024; Shorbagi and Ramadan, 2024).

b) Increasing Healthcare Infrastructure and Capacity Building

Enhancements to early detection must go hand in hand with the development of diagnostic capabilities (mammography, ultrasound, pathology, FNAC), establishment of multidisciplinary oncology units, and referral pathways — these being the areas where, according to the registry and WHO strategy reports, significant progress has been made but still there is a challenge of unevenness across Iraq's governorates. One of the ways to cut down the time it takes for proper diagnoses and consequently increase the use of guidelines for treatment is to train the diagnostic staff (radiologists, pathologists, oncology nurses, and oncology surgeons) through accredited in-country instruction and regional fellowship links (Iraq Ministry/WHO reports) (Al Juboori, 2024; Ali and Hameed, 2024; Soori *et al*., 2025). Healthcare facilities can do much better in cancer diagnosis and treatment through the upgrade of diagnostic equipment and the proper maintenance of these machines. A digital mammography introduction is one of the new technologies that facilities may consider investing in if the conditions are suitable. These spends should not be alone in the field; their partners must be strong quality assurance and maintenance contracts alongside the targeted training nurse technicians and radiographers to ensure the good use and the longevity of the equipment. The changes mentioned above should have a direct influence on the enhancement of oncology nursing and pathology capacity through short professional courses, telepathology collaborations with regional centres, and structured mentorship programs aimed at improving diagnostic turnaround times and treatment safety. Universities can use worldwide or regional programs like EMPHNET and WHO to get technical support and promote a sustainable workforce (Nwokolo *et al*., 2023; van de Pas, *et al*., 2023; Khader *et al*., 2025).

c) Integrating Psychosocial Support and Community-Based Programs

As per several recent studies conducted in Iraq, one can realize that the psychosocial burden is high and the coping mechanism depended on most of the time is emotion-focused among cancer survivors, thus million are the unmet needs for counseling, palliative care, and survivorship services (Alsdfan *et al*., 2025; Ali 2025). There is a great need for the introduction of psychosocial support as a regular practice in oncology care that involves routine distress screening, community support groups, family-oriented counseling, and linkages with faith- and community-based networks to reduce isolation, improve adherence, and enhance the quality of life (Alsdfan *et al*., 2025). Healthcare institutions are best positioned to implement the psychosocial screening of patients through short and simple validated tools used at the time of diagnosis and at key treatment milestones. This strategy ought to have the backing of referral pathways to certified counselors and support groups in hospitals and governorate clinics (Alsdfan *et al*., 2025). Also, peer-support networks and community-based survivorship programs, which could be either face-to-face or virtual, must be created in such a way that they honor cultural standards and local sensitivities. Working with nursing schools, NGOs, and survivor advocates in the co-design of these services will not only help ensure that the interventions are relevant, sustainable, and effective in improving coping skills and general welfare, but also that there is a better engagement with the target population (Ali and Al-Qazaz, 2025).

d) Enhancing Research, Data Management, and Regional Collaboration

Accurate and up-to-date cancer data are essential for planning — The national cancer registry in Iraq has been able to report with more details both in terms of numbers and geography, however, it is still necessary to continue the investment in revalidation, digitization, and the use of the registry data for service planning at the local level and research (Cancer Registry of Iraq reports). Strengthening operational research (screening implementation, health systems, survivorship outcomes, and genetic-risk awareness) as well as the building of collaborative research networks across the Middle East will not only expedite locally relevant evidence generation but also the capacity building (Ewa Szumacher *et al*., 2019; Ateia *et al*., 2023; Valerio *et al*., 2025). The government of Iraq may enhance breast cancer control measures by modernizing the national cancer registry through real-time electronic data capture, periodic data quality audits, and subnational analyses (Chopra *et al*., 2024). Making de-identified datasets available to approved researchers via platforms such as *storage.moh.gov.iq* would be a great facilitator of planning and resource allocation on the basis of evidence. Besides that, the nation should put a premium on implementation research to uncover most suitable solutions for each context. For example, randomized or operational trials that compare community-based clinical breast examinations (CBE) and mobile mammography in neglected governorates may yield the actionable insights necessary for efficient screening strategies. The formation of regional research consortia could serve as a vehicle for the sharing of protocols, training, and data standards, besides the possibility of strengthening alliances with WHO, EMPHNET, and academic institutions that, in turn, could ensure both the provision of funds and technical know-how.

CONCLUSION

Iraq breast cancer situation is turning out to be one of the leading public health problems in the country. It shows increasing number of cases, mostly advanced-stage presentations, and poor access to proper diagnosis and treatment in due time. The developments in cancer registration and the partial spread of oncology services have been commendable. However, the district-level radiotherapy and screening coverage and the shortage of skilled staff still pose significant challenges to the outcomes. The delays in care due to sociocultural barriers, economic factors, and regional inequalities have become even worse. Besides these, early detection needs to be strengthened by implementing culturally appropriate information dissemination campaigns. It is very important to decentralize the diagnostic and treatment facilities and also

to provide a constant supply of essential oncology medicines. The provision of psychosocial and palliative care services will be facilitated by the national cancer control plan and these will contribute to patient quality of life. It will require concerted policy action and continuous funding to bring about the reduction of mortality and the increase of survival rates in Iraqi women.

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