Epidemiology

One in nine women will develop breast cancer at some point in her life. Approximately 1.4 million women were diagnosed with breast cancer worldwide in 2008, and an estimated 459,000 breast cancer-related deaths were recorded. Breast cancer represented 23% of all invasive cancers diagnosed among females that year. A comparison of regional incidences highlights that breast cancer ranks as the leading cancer among females in most regions, with the exception of several countries in Eastern and Western Africa, Central/South America and Southern Asia (where cervical cancer rates prevailed). Yet breast cancer incidences are anticipated to increase within low- and middle-income countries, in line with the adoption of western lifestyle choices. As a result of the rising incidence, coupled with resource and infrastructural limitations, breast cancer has become a key cause of premature death in less developed regions. This assertion is supported by the projection that two thirds of the 3.2 million breast cancer cases predicted to develop by 2050 will occur in developing countries.

The importance of early diagnosis

Diagnosis of breast cancer in the earlier stages of the disease pathway has been positively associated with a decrease in breast cancer mortality, and improved prognosis. Breast cancer control programmes should ensure diagnosis at the earliest possible stage, where treatment is more effective. The main objective of early detection or secondary prevention through screening is to detect early stage cancers. Screening advances the time of diagnosis, and thus can improve patient prognosis. Early detection has been shown to be important due to the positive association between stage at diagnosis and survival rates. One of the most significant determinants of survival is stage at diagnosis, which takes into account factors including tumour size and whether the disease has spread to the lymph nodes. Countries such as Norway have high survival rates and a high proportion of patients diagnosed with early stage disease (90% of patients are diagnosed in Stage I or II). Such countries also typically have high rates of breast cancer screening programme participation. Although mammography screening is the most widely used tool for diagnosing breast cancer early, this screening method is not a plausible solution in every country, in light of socioeconomic constraints. However, it is important that there exists a symptomatic care pathway in every healthcare system—in order to detect breast cancer early, prevent metastasis and deliver effective treatment services. The goal of earlier detection in low-resource regions is to downstage symptomatic disease, by reinforcing the importance of seeking timely examinations and treatment.

It has been estimated that screening for breast cancer may avert the number of related deaths by up to 65%. Regular breast screening has been shown to be an effective way of improving patient prognosis. An analysis of a Swedish randomised screening trial indicated a 30% reduction in breast cancer mortality, attributable to breast screening. In 2012, an Independent United Kingdom Panel on Breast Cancer Screening reviewed the benefits of breast cancer screening in the UK. The Panel suggested there is a 20% reduction in mortality in women invited to participate in a screening programme over the course of twenty years. It was also estimated that breast screening programmes prevent approximately 1,300 breast cancer-related deaths every year, equating to 22,000 life-years saved. In the United States, breast cancer mortality fell by 24% between 1990 and 2000. Survival improvements have been attributed to early detection, by combining timely screening with treatments. These findings highlight the importance of prioritising early detection of breast cancer within public health policies.

Early diagnosis of breast cancer: a patient perspective

From a patient perspective, an important benefit of detecting and diagnosing breast cancer early is that the use of more complex, invasive interventions may be averted. For example, implementation of mammography screening programmes can lead to the earlier detection of smaller breast tumours. As a result, patients can be treated with minimally invasive interventions; avert the need for more invasive treatments such as radiotherapy, which can be both physically and emotionally detrimental to a woman’s health. Additionally earlier detection, followed by timely treatment, can increase the range of treatment options available to a patient, such as the opportunity for breast-conserving therapy. Subsequently, detection in the early phases of breast cancer is positively associated with higher survival rates, which can provide comfort to those who receive a timely diagnosis early in the disease pathway. An early diagnosis is important to patients at an emotional level, as well as clinically improving prognosis, as the psychological state of the patient has been shown to affect prognosis and a person’s ability to cope with cancer. A meta-analysis conducted by Satin et al. in 2009 estimates a 26% greater mortality rate among patients experiencing depressive symptoms, and a 39% higher mortality rate among those diagnosed with major depression.

The economic case for prioritising early diagnosis of breast cancer

In 2009, the global cost of new breast cancer incidences was estimated to amount to almost $29 billion. Productivity losses accounted for approximately $7 billion of this total, medical costs contributed to just over $13 billion, and non-medical costs represented approximately $7 billion of the total cost of new breast cancer cases in 2009. Whilst breast cancer is not the leading global cause of death, it remains one of the costliest diseases to manage.

Direct costs: A University of Oxford report highlights the economic burden of cancer compared to other non-communicable diseases. One patient with heart disease costs the UK economy £3,455 (USD$5,508) per year, while a cancer patient represents a cost of £5,999 (USD$9,564) per year on average. More specifically, the economic cost of breast cancer to the UK is £1.5 billion per year. The annual European cost of breast cancer is estimated to be 6 billion euros (approximately USD$8.1 billion), accounting for 13% of the total cancer healthcare costs in the European Union. A recent report has identified the average cost per breast cancer case across several countries. Inpatient costs per case in China amount to approximately 1,000 euros (USD$1,214); direct healthcare costs in Turkey are approximately 3,000 euros (USD$3,643), and Mexico reported that direct costs per case in 2003 totalled 4,000 euros (USD$4,858). The comparison highlights the wide economic disparities across regions: Germany, for example, reported average costs per patient of over 30,000 euros (USD$40,366) in 2006. In the United States, the lifetime per patient costs of breast cancer range from USD$20,000 to $100,000, with higher costs associated with managing patients with advanced breast cancer. These statistics emphasise the extent of the economic challenge posed by the global prevalence of breast cancer and non-communicable diseases in general, and the importance of early diagnosis.

Indirect costs: A Swedish cost of illness study demonstrates that the indirect costs of breast cancer are more than twice as large as the direct costs. An Oxford University study supports these findings, highlighting that premature death, absences from work and unpaid care by friends/family accounts for 64% of all cancer costs. An analysis of the economic impact of non-communicable diseases in China and India show that non-communicable diseases bear a high, indirect economic cost; and alongside diabetes and cardiovascular disease, breast cancer also represents a high indirect cost.
Cost-effectiveness of early diagnosis: Later stage breast cancer has been shown to be more costly to treat, which may be attributed to the reality that more intensive and invasive interventions are required to treat advanced cancer. A study of breast cancer interventions across Africa, North America and Asia found that treatment of stage I patients comprised the most cost-effective intervention, whilst stage IV treatment was the least cost-effective option. In Africa and Asia, treatment of stages I, II and III costs less than USD$390 per Disability-Adjusted Life Years (DALY) averted; whilst treatment at stage IV costs more than USD$3,500 per DALY averted. Furthermore, a UK NHS Department of Health report reveals that earlier diagnosis of breast cancer could provide a population benefit of 319,000 life-years gained, and an average cost per life saved of £2,329 (USD$3,734). Alongside the positive association between survival rates and stage of diagnosis, these figures indicate that treating stage I breast cancer is the most cost-effective intervention, and that early detection of breast cancer should be prioritised within national cancer programmes.

Educational interventions and basic clinical tools can also prove economical. Awareness campaigns can encourage women to understand the importance of early preventative detection measures, and present at an earlier stage. Subsequently, women will be more likely to receive earlier referrals for tests, leading to earlier detection and the administration of basic treatment at an affordable cost. Actively publicising the correlation between modifiable risk factors and non-communicable diseases could incur huge savings: a GE Healthcare press release dated July 2013 shows that a reduction in bad habits could save global healthcare systems up to USD$25 billion annually.

Policy Developments
- World Health Assembly Resolution on Cancer Prevention and Control in May 2005. Called on Member States to intensify action against cancer by developing cancer strategies.
- In high-income countries, mammography screening coverage is now over 70%.

National/regional screening guidelines and developments
- Australia: The national policy, “BreastScreen Australia,” entails the provision of mammography screening at minimal/no charge to women over the age of forty. The policy requires the provision of a comprehensive pathway, including follow-up assessments and treatment referrals. An evaluation reveals that the programme achieved the objective of reducing breast cancer mortality, by approximately 21–28%.
- Brazil: In March 2011, the Brazilian government committed USD$2.8 billion to strengthen actions for breast and cervical cancer prevention, diagnosis and treatment. The strategy includes strengthening primary healthcare, running public awareness campaigns, and supporting the public health system network.
- China: In 2008, a government-funded initiative to screen more than half a million women, with the aim to provide screening to women living in rural areas, was launched. Additionally GE Healthcare partnered an outreach programme, launched in 2011 in the Beijing and Guangdong province. The programme was designed to raise awareness of (and compliance with) screening procedures, with the intention of educating women on the importance of early diagnosis.
- Europe: In 2003, the European Parliament adopted a Resolution (A5-0159/2003) to effectively address breast cancer, stating “every woman should have access to high-quality screening treatment, and any disparities in access should be minimised.” The European Parliament sought to reduce the European breast cancer mortality burden by 25%. A more recent Resolution (2006) calls on Member States to ensure nationwide provision of specialist breast cancer units in accordance with EU guidelines by 2016.
- Mexico: In 2005, the Mexico City government initiated the first voluntary mammography screening programme for women over the age of forty. The “Instituto de Enfermedades de la Mama” (FUCAM) conducts over 50,000 screening mammograms annually, with six mobile units. In 2007, the extension of the Popular Health Insurance to cover all Mexicans diagnosed with breast cancer means that resources are available to provide a package of services to women, even if they do not have health insurance. It was reported in 2010 that data systems and cancer registries are now being designed and implemented in Mexico.
- South Africa: The number of mobile mammography units to help improve the rates of mammography screening for cancer is increasing.
- USA: In 2002, the U.S. Preventative Services Task Force recommended screening mammography, with or without clinical breast examinations, for women aged 40 and over. However the USPSTF 2009 recommendations advise against routine screening mammography in women aged 40 to 49 years, instead recommending biennial screening mammography for women between the ages of 50 and 74 years. These guidelines were received controversially: it was reported that the mammography screening rate among women aged 40 to 49 fell by almost 8% in the period following the publication of the guidelines. In the two year period after the release of the recommendations, the mammography screening rate remained approximately 5% lower than the baseline level. In 2011, the Breast Density and Mammography Reporting Act was introduced, requiring every mammography summary delivered to a patient to contain information regarding breast density. Summaries are also required to communicate that individuals with more dense breasts may benefit from supplemental screening tests.


The initiative focuses on improved access and timely diagnosis of breast cancer. GE Healthcare has worked alongside the Saudi Ministry of Health to design, plan, and launch the programme (March 31, 2013) in Riyadh. The total number of patients screened since the programme launch is over 5,000. The programme entails: a primary assessment conducted over the phone by Ministry of Health staff; validated by a physical examination; mammography screening at one of three mobile clinics in Riyadh, linked to a tertiary hub for reading and diagnosis, and tailored care pathways. Key outcomes and messages from the Phase I launch include: screening was well-received by the Saudi population; mobile clinics are better received when located within the community rather than at primary healthcare centers; and the need to create a talent pool of qualified mammographers to sustain programme growth.
Policy Challenges

Infrastructural challenges: Although mammography screening is recognised as the primary evidence-based early detection method, there can be challenges to adopting nationwide strategies to address breast cancer using this detection method in light of infrastructure limitations, and competing demand for resources (particularly in low- and middle-income countries). For example, a mere 5% of the global resources for cancer research and treatments are invested in developing countries. This creates a barrier to diagnosis: and it has been estimated that 75% of women with breast cancer in developing countries are diagnosed in clinical stages III and IV. It is important to note that before an early detection (screening) program is implemented, facilities for adequate diagnosis and treatment must already be present. This challenge can be met by: increasing government investment in infrastructure to accommodate screening equipment, or using ultrasound technologies as a complementary strategy.

Socioeconomic challenges: Several studies have demonstrated that household income and socioeconomic status constitutes a significant determinant of access to screening. This assertion is not limited to low- and middle-income countries: researchers have concluded that women who live in deprived areas of London are less likely to attend their first routine breast cancer screening appointment. Individuals located in low-resource areas such as India lack access to breast screening programmes, and subsequently the majority of breast cancers are diagnosed at a later stage.

Limited information/data: There is limited international data available on breast cancer statistics, particularly in relation to economic costs. Additionally, there is a limitation as to the availability of data on incidence rates in low- and middle-income countries, and rural areas. Incidence figures are typically pooled and extrapolated to large regions, and so reports tend to reflect only those women who are easiest to reach. This means that the global figures may not truly reflect the underlying socioeconomic and cultural diversities driving incidence and mortality rates. This issue is further exacerbated by the reality that statistics tend to diverge for various ethnic groups: for example, black, Asian and Hispanic populations have diverse cancer incidences and survival rates. GE Healthcare “#GetFit” consumer research results highlight that in the majority of regions, lack of knowledge and information regarding risk factors and lifestyle choices is a major contributor to the general reluctance to change lifestyle factors associated with breast cancer. It is thus vital to address the information gaps.

Cultural barriers: In many countries, there exist cultural barriers to clinical examinations and breast screening. This may be in relation to fear, embarrassment, and the stigma associated with being formally diagnosed with breast cancer. In developing countries with indigenous populations, there often exists the belief that breast cancer is caused by social misbehaviour and that if a woman develops breast cancer she will be divorced by her husband and rejected by the community. A study has also found that in the district of Gaza, misconceptions were frequent, such as the belief that breast cancer is uncommon, and that the disease can be contagious. In light of these cultural stigmas and barriers, women tend to hide symptoms at early stages—when treatment is typically most effective.

Recommendations

Developing countries

- Prioritise public health awareness to encourage breast self-examinations. Although a study conducted by Le Geyte et al. demonstrates a positive association between tumour stage at presentation and breast self-examination, randomised controlled studies have not shown that breast self-examination is effective in down-staging disease. Nonetheless, breast self-examination is a useful tool for maintaining public awareness of breast cancer.

- Guidelines for the implementation of community breast health awareness educational programmes, specific to individual country needs. Knowledge of the value of early detection is an important element of early diagnosis: an analysis of the Cairo Breast Screening Trial indicates that community education to increase breast cancer awareness may contribute to earlier presentation of symptomatic breast cancer. An example could be a targeted outreach programme, emphasising the importance of early stage diagnosis and encouraging clinical breast examinations for those at high risk of developing breast cancer.

- Clinical guidelines outlining a symptomatic care pathway, which provides a clear point of contact for patients, followed by a timely diagnosis and treatment should be developed. The guidelines should emphasise the importance of recognising symptoms, and seeking timely examinations.

- Government investment allocated to the implementation of sufficient infrastructure and facilities, in order to provide a foundation for early detection programmes.

- Guidelines for every country to have national cancer registries, in order to ascertain the magnitude of the disease prevalence, and gather vital statistical information. This will contribute to ensuring that the extent of the disease is recognised, so governments are able to allocate resources according to actual need, rather than general, anticipated healthcare needs.

- Country-specific economic cost data would provide useful information to policy makers and non-governmental organisations, to develop specific strategies to address the disease. The extent of the disease burden would be clearer, providing a foundation for addressing this global economic issue.

Developed countries

- Guidelines to promote early diagnosis, such as annual breast screening for the at-risk population, will enable earlier interventions and improve patient outcomes.

- Prioritise national awareness campaigns, and collaborate with the national media to ensure maximum impact.

- Clinical guidelines outlining a symptomatic care pathway, which provides a clear point of contact for patients, followed by a timely diagnosis and treatment should be developed. The guidelines should emphasise the importance of recognising symptoms, and seeking timely examinations.

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GE Healthcare provides transformational medical technologies and services to meet the demand for increased access, enhanced quality and more affordable healthcare around the world. GE (NYSE: GE) works on things that matter – great people and technologies taking on tough challenges. From medical imaging, software & IT, patient monitoring and diagnostics to drug discovery, biopharmaceutical manufacturing technologies and performance improved solutions, GE Healthcare helps medical professionals deliver great healthcare to their patients.

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