

# Breast cancer

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Interventions included are:

1. Treatment of breast cancer: Confirmatory breast cancer diagnostics and staging
2. Treatment of early-stage breast cancer: Stage I & Stage II
3. Palliative care for late-stage breast cancer: Stage III & Stage IV

## Description of condition and intervention

Breast cancer is a disease in which malignant (cancer) cells form in the tissues of the breast. Breast cancer is the most frequently diagnosed cancer in women and ranks second among causes for cancer related death in women (1). Metastatic breast cancer is also classified as Stage 4 breast cancer. The cancer spread to other parts of the body. This usually includes the lungs, liver, bones, or brain (2). Family history of breast cancer can increase the risk of breast cancer. In 2020, there were 2.3 million women diagnosed with breast cancer and 685 000 deaths globally. At the end of 2020, there were 7.8 million women alive who were diagnosed with breast cancer in the past 5 years, making it the world's most prevalent cancer (WHO, 2021).

Early detection includes doing monthly breast self-examination and scheduling regular clinical breast exams and mammograms. Breast cancer can be diagnosed through multiple tests, including a diagnostic mammogram, ultrasound, MRI, and biopsy). Stages I and II breast cancers are usually treated with breast-conserving surgery and radiation therapy. Sentinel lymph node biopsy is considered for most breast cancers with clinically negative axillary lymph nodes. In general, node-positive breast cancer is treated systemically with chemotherapy, endocrine therapy (for hormone receptor-positive cancer), and trastuzumab

(for cancer overexpressing ERBB2). Anthracycline- and taxeme-containing chemotherapeutic regimens are active against breast cancer. Stage III breast cancer typically requires induction chemotherapy to reduce the tumour for facilitating breast-conserving surgery. Inflammatory breast cancer, although considered stage III, is aggressive and requires induction chemotherapy followed by mastectomy, rather than breast conserving surgery, as well as axillary lymph node dissection and chest wall radiation (Maughan, Lutterbie, Ham 2010).

## International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings

## Intervention attributes

### Type of interventions

Breast cancer diagnostics is a type of diagnostic intervention. The rest of the interventions are considered as curative category.

### Delivery platform

The interventions involving treatment of breast cancer may be delivered at referral and specialty hospital.

### Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD

represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Moderate level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

Treated population: All incident cases of breast cancer in the age-group 30 to 69 years are the treated population. The treated fraction is 0.236 for early stages of breast cancer and 1 for palliative care-late stages of breast cancer.

Affected population: In the event of no active screening programs in place for breast cancer detection, the likely distribution of various stages of breast cancer in the target population is as follows: Stage 1 (9.4%), Stage 2 (14.2%), Stage 3 (58%) and Stage 4 (18.4%). The proportion of yearly deaths expected from stage 1 and 2 as a proportion of all breast cancer deaths were modelled with the help of simplified Markov trace and stagewise distribution of the disease. Time dependency in the affected fraction was estimated using the geometric mean as a yearly estimate. Based on these calculations, mean affected fraction over time came out to be 9.5%. The affected population age is taken as 30 to 69 years. Source: NCD Countdown appendix

Disease state addressed

The included interventions target breast cancer.

Intervention effect and safety

Table 1: Effectiveness and safety of treatment for breast cancer

Effect of intervention		Certainty of evidence
Mortality (due to condition) Stage 1	95.7% decrease	See appendix

Stage 2 Stage 3 Stage 4	78.3% decrease 59.6% decrease 46.0% decrease The mortality reduction is the weighted effect of stage 1 and 2 effect sizes: $95.7\% \times (9.4\% / (9.4\% + 14.2\%)) + 78.3\% \times (14.2\% / (9.4\% + 14.2\%)) = 85.2\%$ RRR = $85.2\% \times 9.5\% = 8.1\%$ (Source: NCD Countdown Appendix)	
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## Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Intervention		
<b>Cost calculation</b>		
Treated population	Incidence of breast cancer	Global Burden of Disease Study 2019
Gender	Female	
Age	30-69 years	
Treated fraction Early-stage breast cancer Palliative care	0.236 1	
<b>Effect calculation</b>		
Affected population	Those with condition	
Affected gender	Female	
Affected fraction age	30 to 69 years	
Affected fraction	0.095	
Comparison	No intervention	
Mortality Reduction (RRR) Early-stage cancer treatment	0.081	Sources listed in Table 1
Non-health benefits for palliative care	End of life care Pain relief	Not modelled

## Intervention cost

The cost for screening for breast cancer using clinical breast examination, breast cancer diagnostics, and annual breast cancer treatment: stage I and stage II is estimated to be \$3.06, \$6.6, (L H Nguyen et al., 2013) and \$195 per woman consecutively in 2008 USD in Vietnam (NCD Countdown appendix). The cost for palliative care was estimated to be 64.36 USD per capita in 2016 in low-income countries (LIC) (Source: CDP3 Volume 9).

## References

WHO 2021: <https://www.who.int/news-room/fact-sheets/detail/breast-cancer>

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Johansson KA 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

Nguyen LH, Laohasiriwong W, Stewart JF, Wright P, Nguyen YTB, Coyte PC. Cost-Effectiveness Analysis of a Screening Program for Breast Cancer in Vietnam. Value Health Reg Issues. 2013 May;2(1):21-28. doi: 10.1016/j.vhri.2013.02.004. Epub 2013 Apr 30. PMID: 29702847.

## Appendix

### Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, metaanalysis, systematic review, clinical practice guidelines).