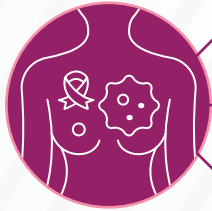# Breast Cancer Epidemiology and Clinical Considerations in the Asia-Pacific Region

Comprehensive insights into the incidence, risk factor detection, and preventive measures

Epidemiology of breast cancer

Breast cancer[1]

- Occurs when a mutation causes uncontrollable growth of breast cells
- Broadly classified into different types depending on the affected cell
- Often originates in the ducts or lobules and may metastasise through blood vessels and the lymphatic system

Global breast cancer incidence and mortality

In 2018[2]
>2.1 million new cases
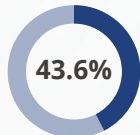~626,000 deaths

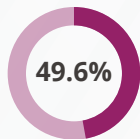**In 2020[3]**
~2.3 million new cases
~685,000 deaths

Affects 1 in 20 globally and 1 in 8 in high-income countries[4]

Varying global burden of breast cancer among countries

Prevalence of breast cancer in the Asia-Pacific region[2–4]

43.6%
- The incidence of breast cancer is increasing in Asia
  >43.6% of new breast cancer cases reported worldwide in 2018

49.6%
- Close to half of the 2.3 million cases diagnosed in 2020 were from Asia
  >49.6% of breast cancer deaths worldwide

- Australia had lower incidence (0.9%) and mortality rates (0.5%) (as of 2020)
- High-income countries have higher breast cancer incidence and lower mortality rates
- Disease burden is lower than that in South Asia

Comparison of global age-standardised incidence rates (ASIR)[3,4]

- As of 2020, Asia has the lowest ASIR (36.8 per 100,000 women), while North America has the highest (89.4)
- Developed countries such as Belgium, Australia, Denmark, the USA, Italy, and the UK have higher incidence rates
- Developing countries such as Iran, Mexico, China, Costa Rica, and Cameroon have lower incidence rates

Global age-specific incidence rates for breast cancer[3]
- Low for females <25 years
- Increased drastically in women >25 years

Ethnic or racial differences in biology[3]
The peak age of breast cancer diagnosis in a few Asian and African countries was >10 years earlier than in European or American countries

Age-specific incidence rates[3]
- In South Korea, a significant increase was seen in the 70–79 years age group (AAPC* 8.4%, $p < 0.001$)
- In China and the UK, an increase was observed in the 60–69 age group (AAPC 3.8%, $p < 0.001$ vs 1.7%, $p < 0.001$)
- A significant decrease was seen in the 50–59 years age group (AAPC 1.8%, $p < 0.001$) in the USA

*AAPC: Average annual per cent change

Visit https://breastcancer.apac.knowledgehub.wiley.com for additional resources

# Factors affecting the incidence of breast cancer

Genetic[5]
Breast cancer 1 (*BRCA1*) and 2 (*BRCA2*)
- Most common breast cancer susceptibility genes
- Involved in the repair of DNA

Other susceptibility genes associated with breast cancer[5]
- *CDH1*: Cadherin-1
- *PTEN*: Phosphatase and tensin homolog
- *TK11*: Serine/threonine kinase 11
- *P53*: Tumour protein p53
- *CHEK2*: Checkpoint kinase 2
- *ATM*: Ataxia telangiectasia mutated
- *NBN*: Nibrin
- *PALB2*: Partner and localizer of BRCA2
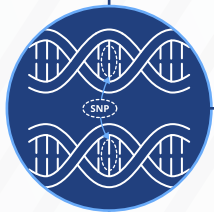
Single-nucleotide polymorphisms (SNPs)[5]
- The individual risks due to SNPs are low
- The combined effect of multiple SNPs referred to as polygenic risk scores (PRS) can be significant
- SNP-based PRS can be used together with other risk factors to predict the incidence of breast cancer
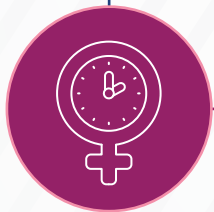
Non-genetic[5]

Age of menarche and menopause
- Increased relative risk (RR) at an early age of menarche
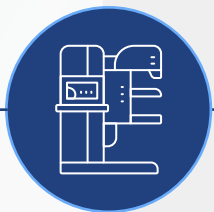- Older age in menopause is linked to an increased RR

Childbearing
- Giving birth to fewer children increases the risk
- Having children prior to the age of 35 provides long-term protection against breast cancer

Breastfeeding
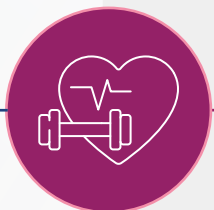- RR reduction by ~4% for every 12 months of breastfeeding

Mammographic density (MD)
- MD is an independent indicator of risk for breast cancer
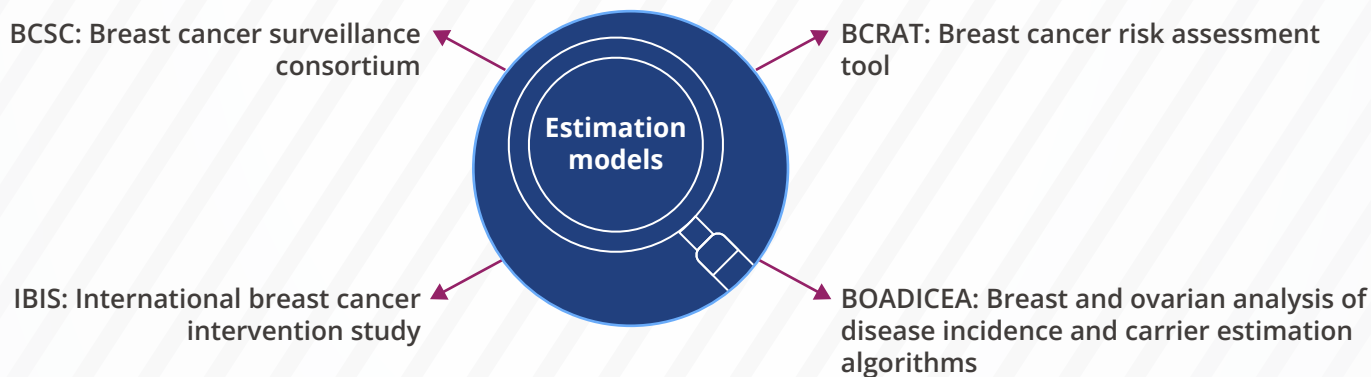- MD can be developed as a preventive biomarker

Lifestyle-linked factors
- Obesity, physical inactivity, and alcohol consumption are associated with an increased risk of breast cancer

Visit https://breastcancer.apac.knowledgehub.wiley.com for additional resources

Prediction of breast cancer risk

The accurate estimation of a woman's breast cancer risk is important[5]

BCSC: Breast cancer surveillance consortium

BCRAT: Breast cancer risk assessment tool

Estimation models

IBIS: International breast cancer intervention study

BOADICEA: Breast and ovarian analysis of disease incidence and carrier estimation algorithms

Advantages[5]

The estimation models provide evidence-based prevention interventions according to personal risk levels

They also enable the calculation of absolute risk reduction due to preventive interventions

Limitations[5]

Lack of clear guidelines for the selection of the most appropriate risk model

Lack of discriminatory accuracy in estimating risks for women of different ethnicities
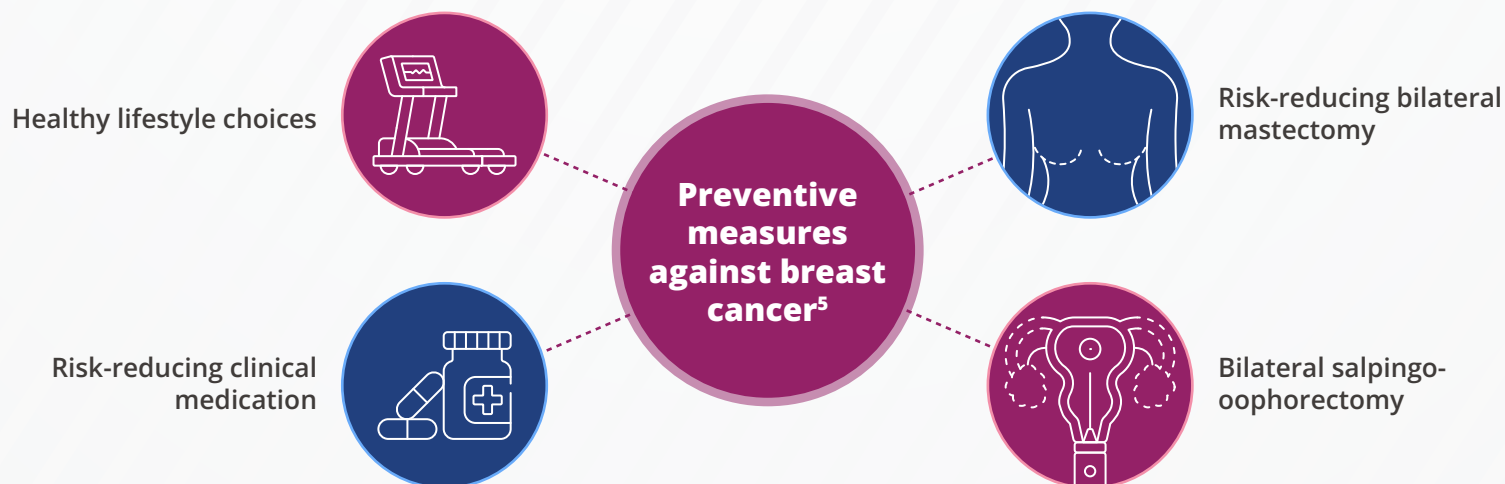
Lack of a personalised cancer treatment strategy

Usage is often affected by complicated user interfaces

Lack of inclusion of modifiable risk factors (such as alcohol, hormonal contraception use, physical activity, or time since the last pregnancy) in the commonly used risk prediction models

Healthy lifestyle choices

Risk-reducing bilateral mastectomy

Preventive measures against breast cancer[5]

Risk-reducing clinical medication

Bilateral salpingo-oophorectomy

Why early detection of breast cancer is imperative[4,6]

Early cancer detection and diagnosis, followed by treatment, increase the chances of survival by manifold[6]

Common screening approaches[4]

Breast self-examination, clinical breast examination, magnetic resonance imaging, ultrasound, and mammography

The gold standard for breast screening is mammography, a low-dose X-ray of the breast

Mammography[4]

- High sensitivity (77% to 95%) and high specificity (94% to 97%) in detecting breast abnormalities
- In women with dense breasts, sensitivity is alarmingly low
- Ethnicity and age can affect the accuracy of mammography screening
- Mammographic evaluation in Asian women is difficult due to higher breast density

Downsides of mammography screening[4]

- Low accuracy levels
- False positive findings
- Overtreatment of small tumours
- Missed cancers
- Overdiagnosis
- Lead time bias

Barriers to breast cancer screening in Asia[4]

- Personal beliefs
- Fatalism
- Religion
- Financial constraints
- Fear of pain and embarrassment
- Lack of support from loved ones
- Sociodemographic factors

Common challenges to early diagnosis[6]

- Lack of understanding of the biology and behaviour of early disease
- Determining the risk of developing cancer
- Identifying and validating biomarkers of early cancer
- Technological barriers such as the lack of powerful molecular analytical, imaging, and histopathological methods
- Evaluating early detection approaches

Sustained and interdisciplinary research efforts, funding programs, and business initiatives by pharmaceutical industries can help address the challenges in the early diagnosis of cancer[6]

Clinical considerations for the Asia-Pacific region[4]

- Tailored screening for Asian populations
- Improving the cost-effectiveness of mammography
- Ensuring high-quality screening examination
- Using genetic and non-genetic risk factors for a comprehensive risk classification

Key messages

- Early diagnosis of breast cancer can significantly improve patient survival
- Stratified screening can help identify high-risk patients and overcome barriers to early detection of the disease

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6. Crosby, D., Bhatia, S., Brindle, K. M., Coussens, L. M., Dive, C., Emberton, M., ... & Balasubramanian, S. (2022). Early detection of cancer. *Science, 375*(6586), eaay9040.