

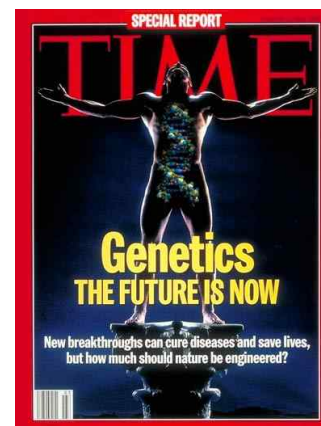
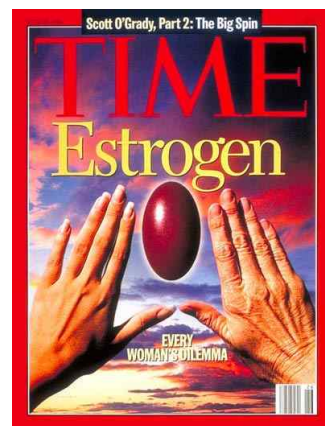
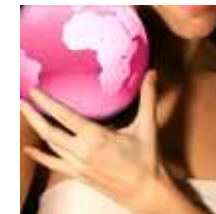
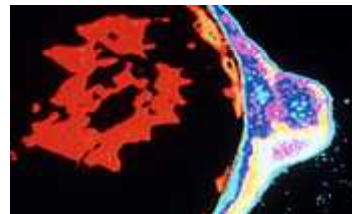
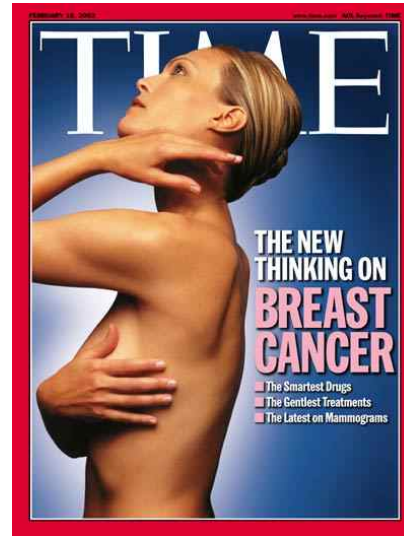
# Breast Cancer Disparity in Asian Women

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**Department of Health, Behavior, & Society**



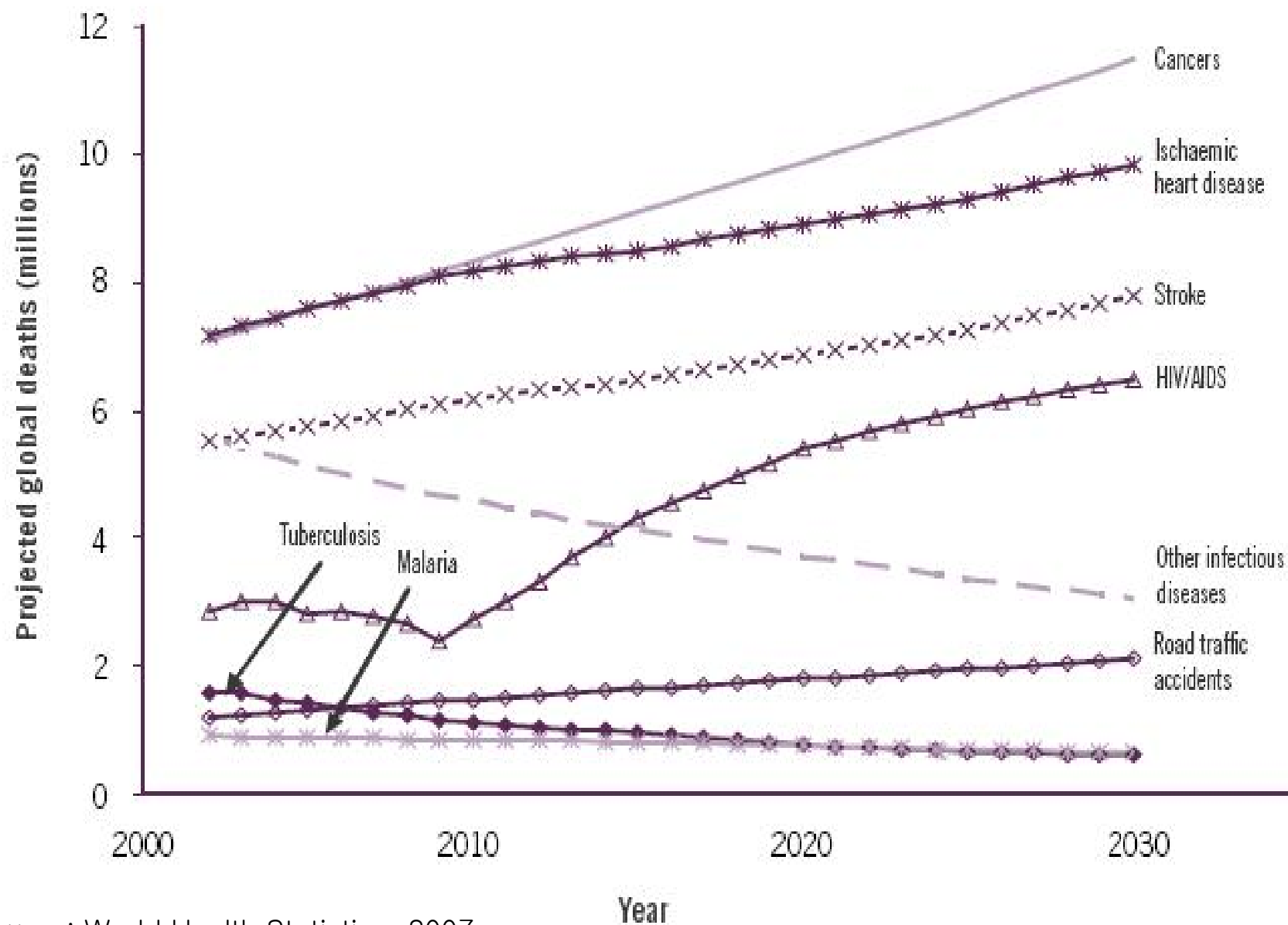
*2009 Global Breast Cancer Conference*  
*Seoul, Korea*  
*October 8-10, 2009*



## **Topics to be covered**

- **Breast cancer burdens in Asia**
- **Hereditary Breast Cancer in Asia**
- **Breast Cancer Control in Asia**
- **Future directions**

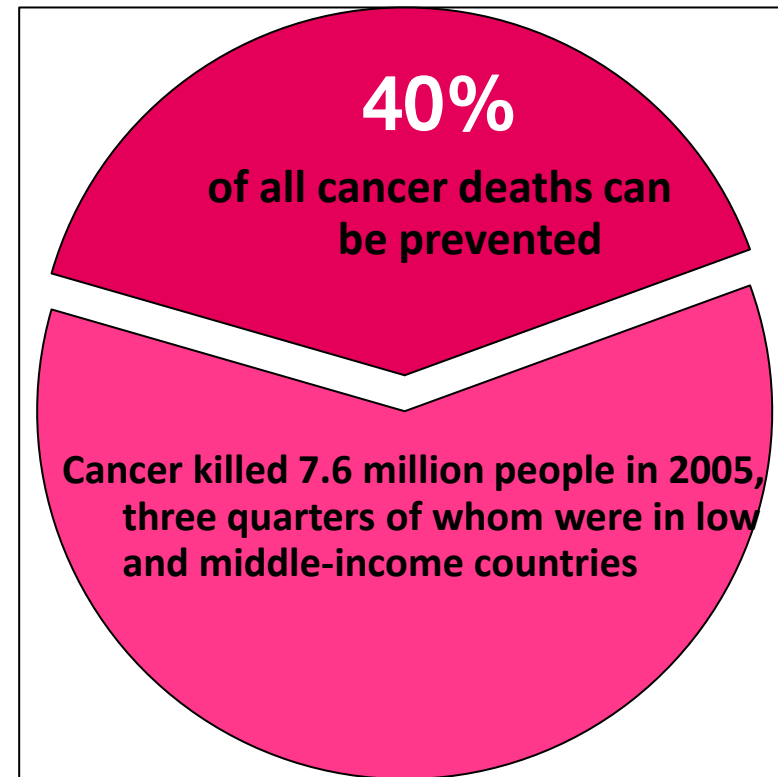
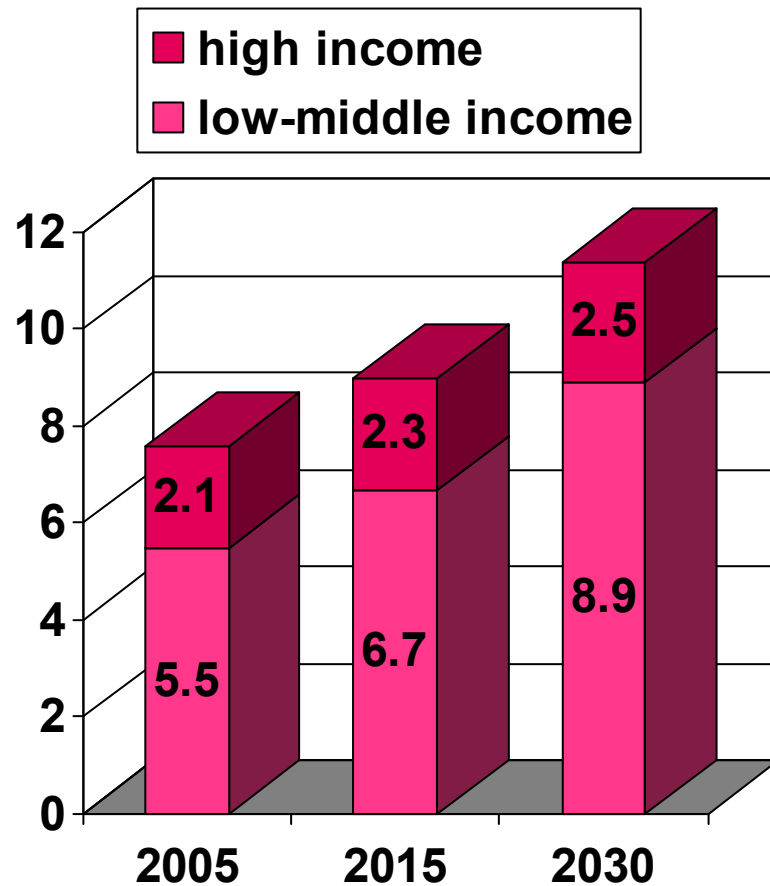
## Projected global deaths for selected causes of death, 2002–2030<sup>15</sup>



Source: World Health Statistics, 2007

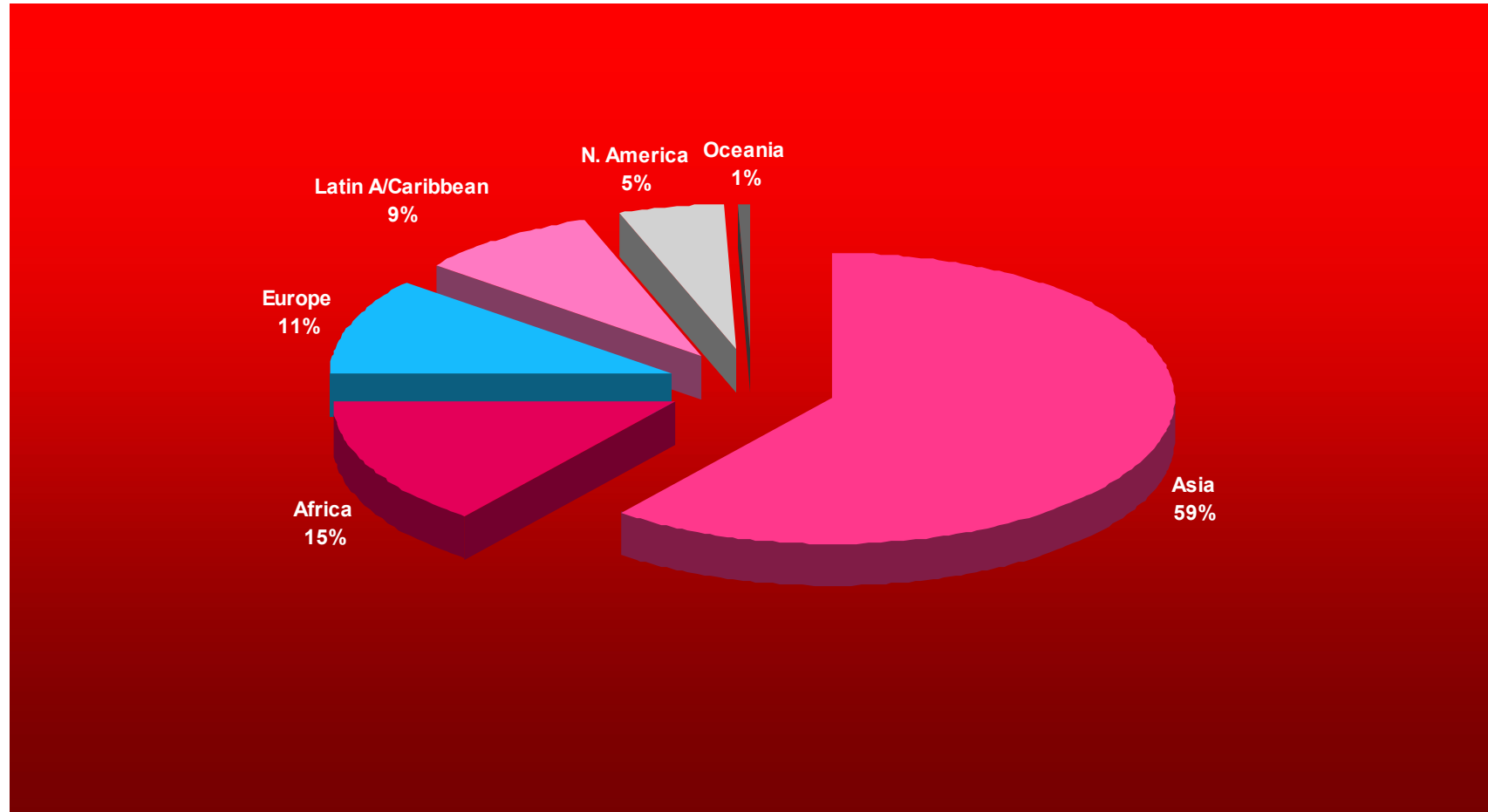
# Projections of Cancer Mortality

WHO projects worldwide



# World Population in 2008

(total: 6,707 millions)



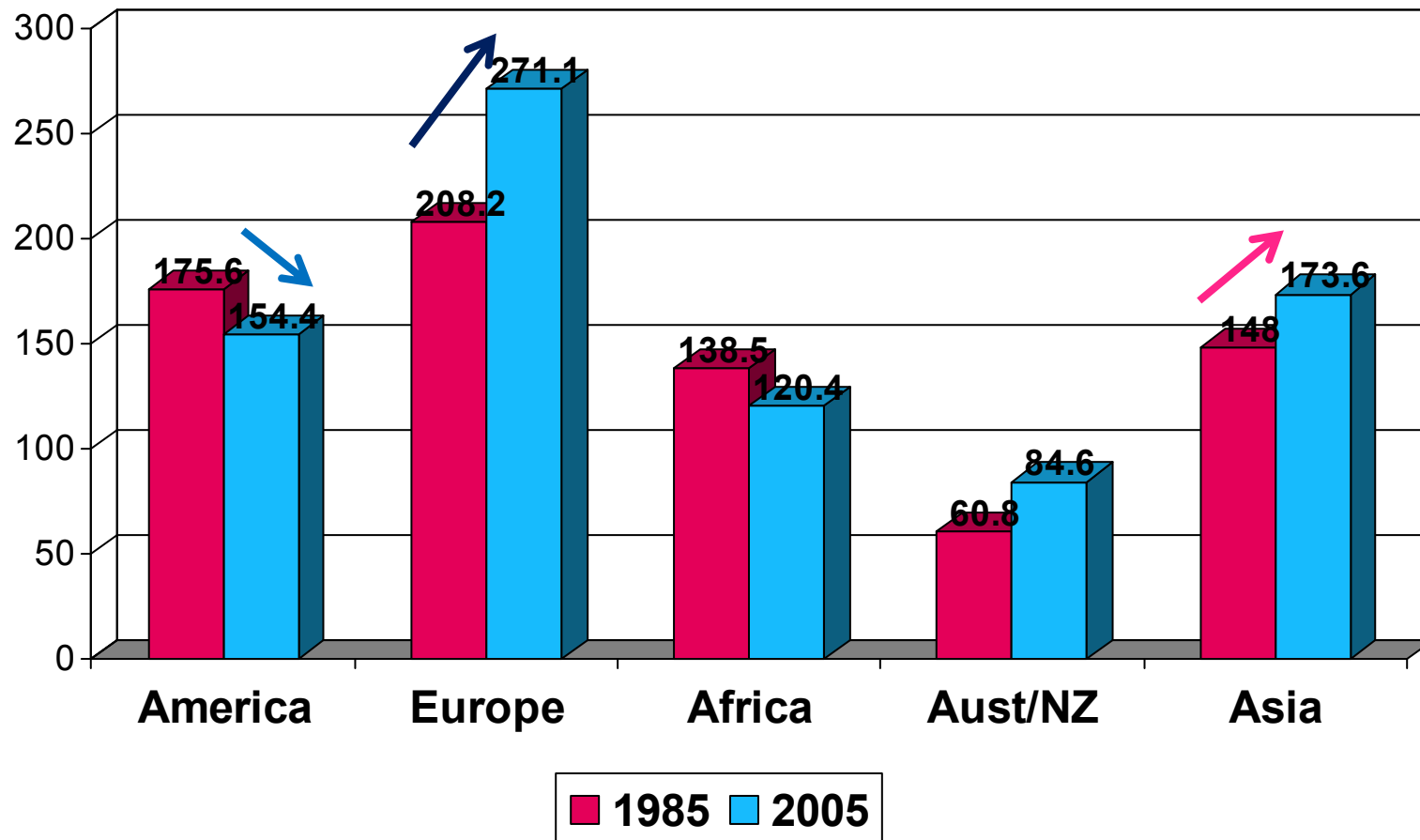
Source: UN Report 2004 data

# Breast Cancer Statistics

## Worldwide

- Breast cancer is the most common diagnosed cancer among women.
- More than 1.1 million women are newly diagnosed with breast cancer annually.
  - This represents about 10% of all new cancer cases and 23% of all females cancers
- With more than 410,000 deaths each year, breast cancer accounts for about 14% of all female cancer deaths.
- An estimated 4.4 million breast cancer patients diagnosed within the last five years.

## Comparison of age-standardized breast cancer incidence, 1985 to 2005

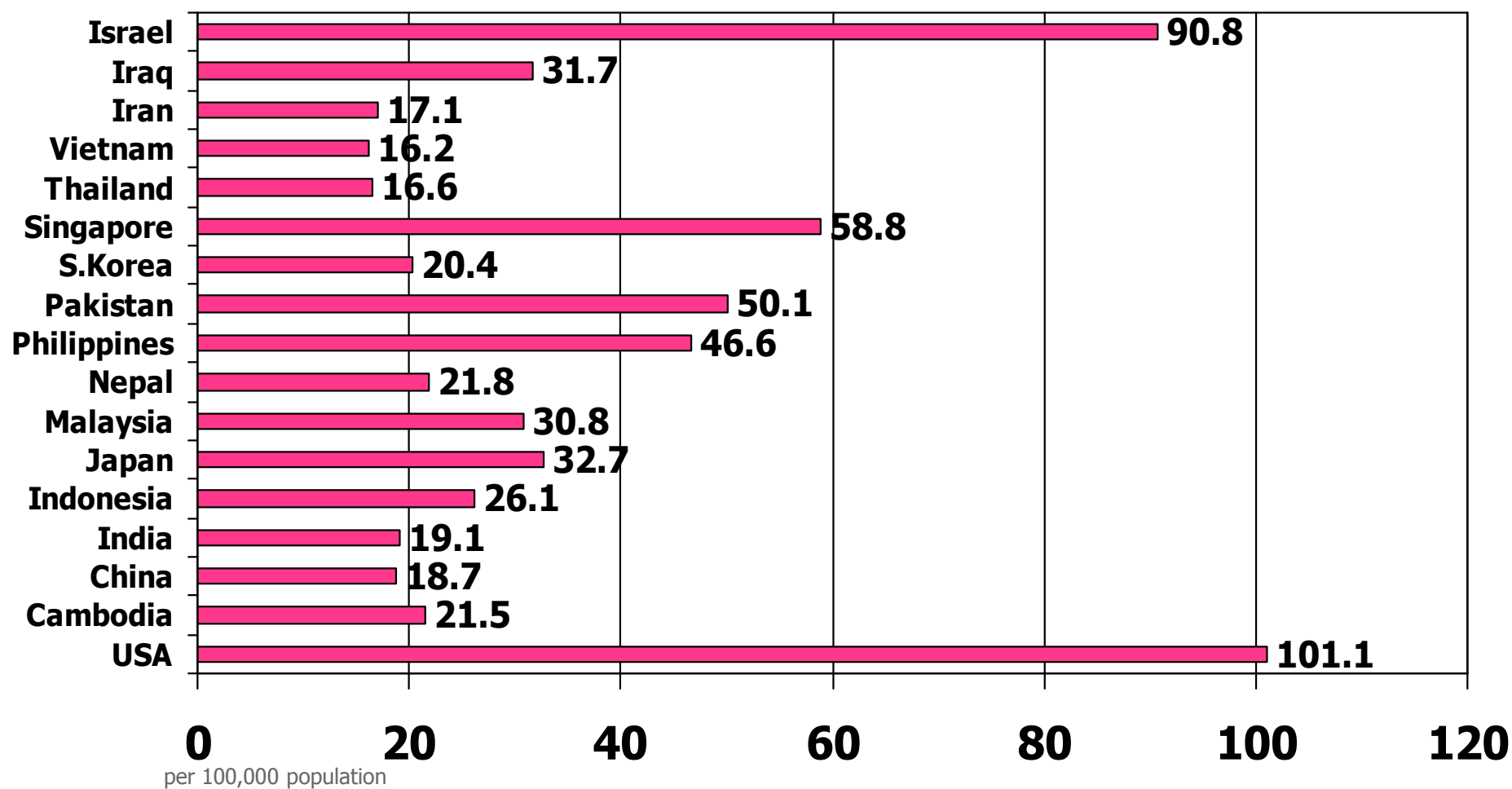


Parkin et al. (1993). Estimates of worldwide incidence of eighteen major cancers in 1985. *Int J Cancer*, 54: 594-606

Parkin et al. (2005). Global Cancer Statistics, 2002. *CA Cancer J Clin*, 55,74-108

# Age-standardized breast cancer incidence, 2002

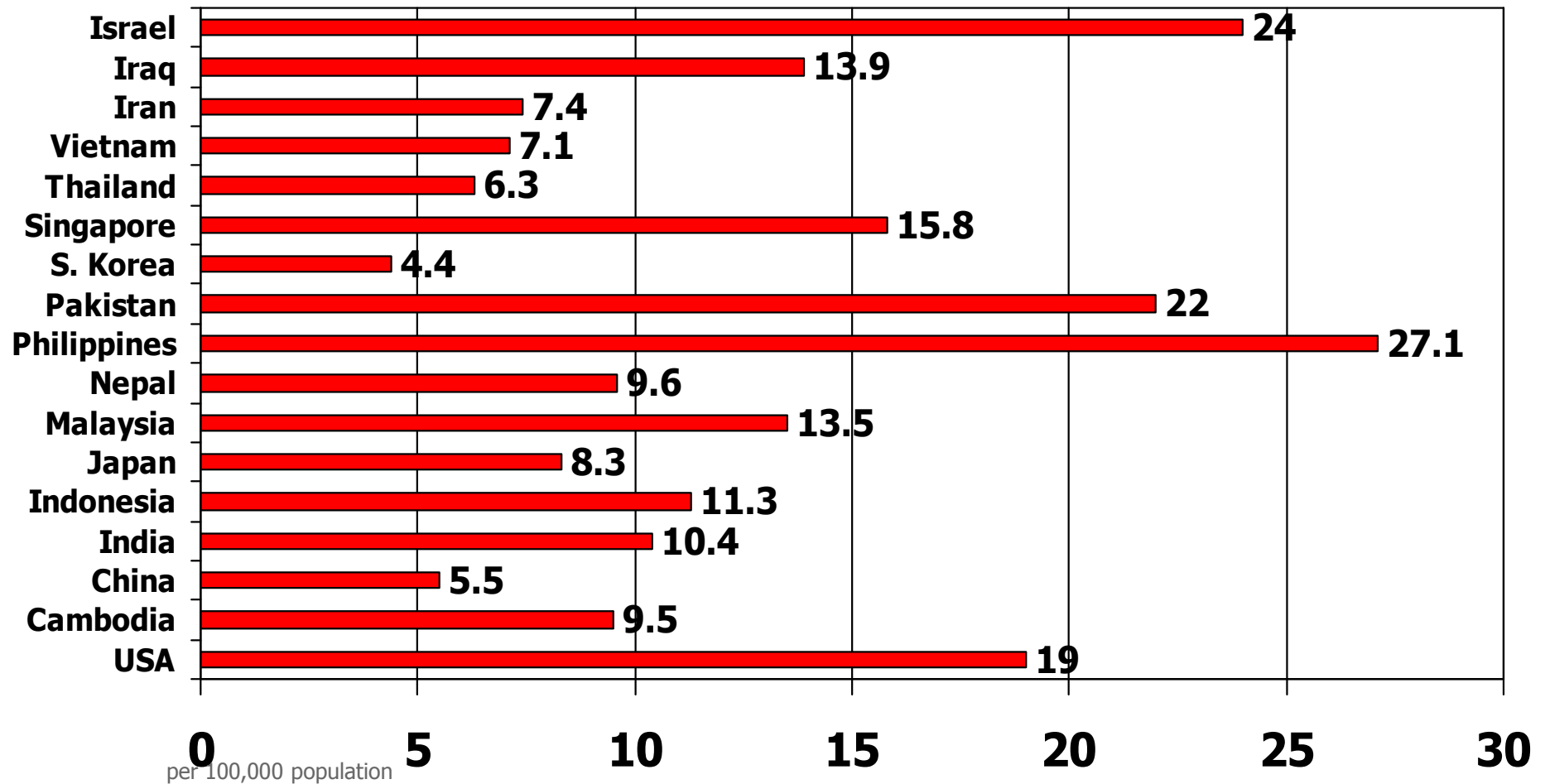
Selected countries of Asia



Source: International Agency for Research on Cancer, 2007

# Age-standardized breast cancer mortality, 2002

Selected countries of Asia



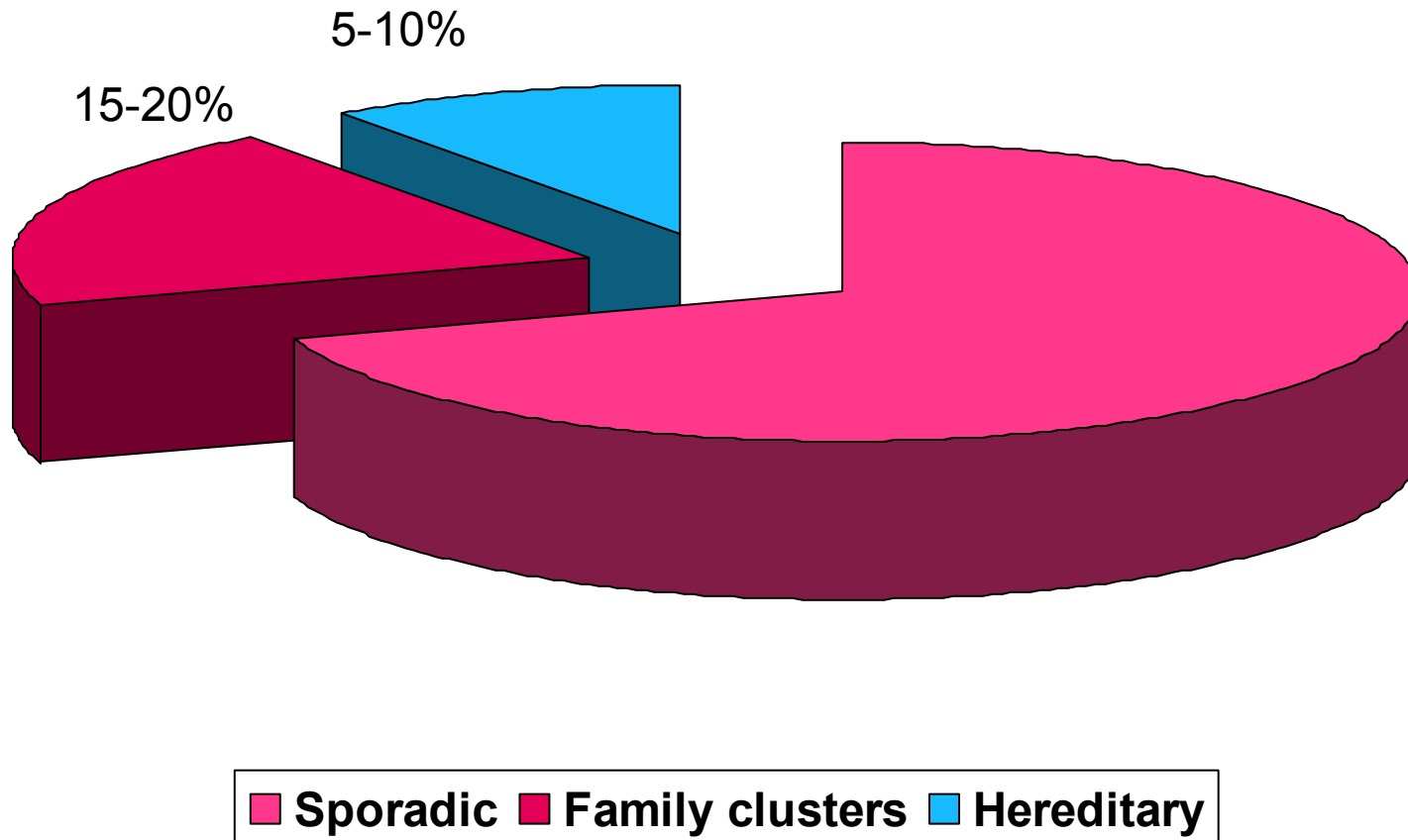
Source: WHO Statistical Information System (WHOSIS), 2007

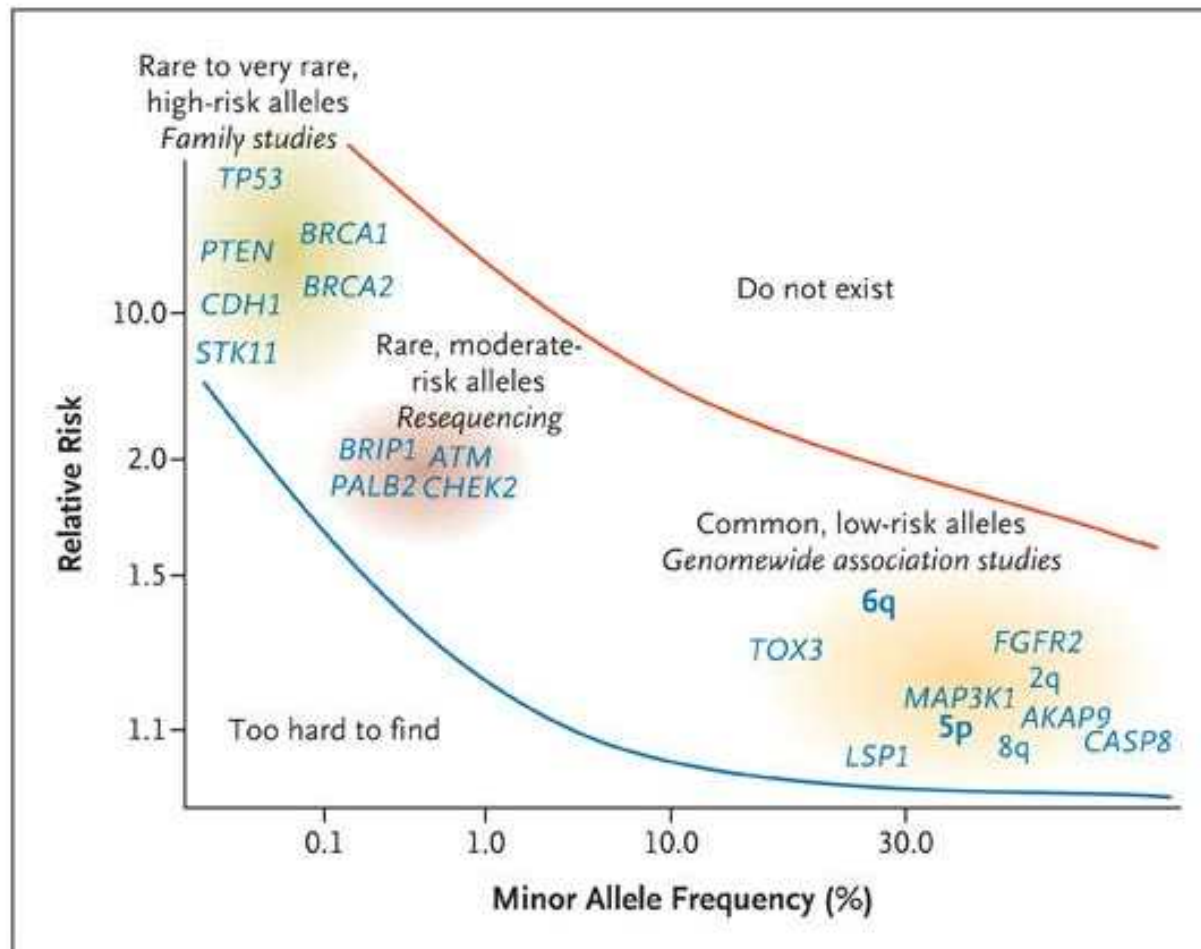
# Breast Cancer Disparity in Asia

- By 2020, 70% of all breast cancer cases worldwide will be in developing countries (IARC 2002)
- Low breast cancer incidence but high breast cancer mortality
- Early age-of-onset
  - Increased incidence in young age group in Asia
  - Mean age is around 50 years, and prevalent age group is 40-49 years old

# BREAST CANCER GENETICS

# How much breast cancer is hereditary?





Foulkes, WN. (2008). Inherited susceptibility to common cancers. The New England Journal of Medicine, 359, 20, 2143-2153

# Causes of hereditary susceptibility to breast cancer

*Gene*

*Contribution to hereditary Breast Cancer*

BRCA1	~30%	} ~50%
BRCA2	~20%	
TP53	<1%	
PTEN	<1%	
Undiscovered genes	~50%	

# BRCA1 & BRCA2

- BRCA1

- Tumor suppressor gene on chromosome 17
- Autosomal dominant transmission
- Protein has role in genomic stability
- ~500 different mutation reported
- 50%- 85% lifetime risk of breast cancer (often early age onset)

- BRCA2

- Tumor suppressor gene on chromosome 13
- Autosomal dominant transmission
- Protein has role in genomic stability
- ~300 different mutation reported
- 50%- 85% lifetime risk of breast cancer

# Prevalence of BRCA mutations

- 2-4% Breast Cancer due to BRCA1/BRCA2 in N. America, Europe, Israel, Australia (all ages)
  - Malone et al., 2006; Newman et al., 1998; John et al., 2007
- Higher prevalence of BRCA mutations for younger age (<35 years old): 3.5% to 7.2%
- Data on BRCA mutations in Asian patients with breast cancer are sparse.
  - Prevalence of BRCA1 among Chinese early onset breast cancer: 7 to 8 % (Sng et al., 2000; Ho et al., 2000; Suter et al., 2004)

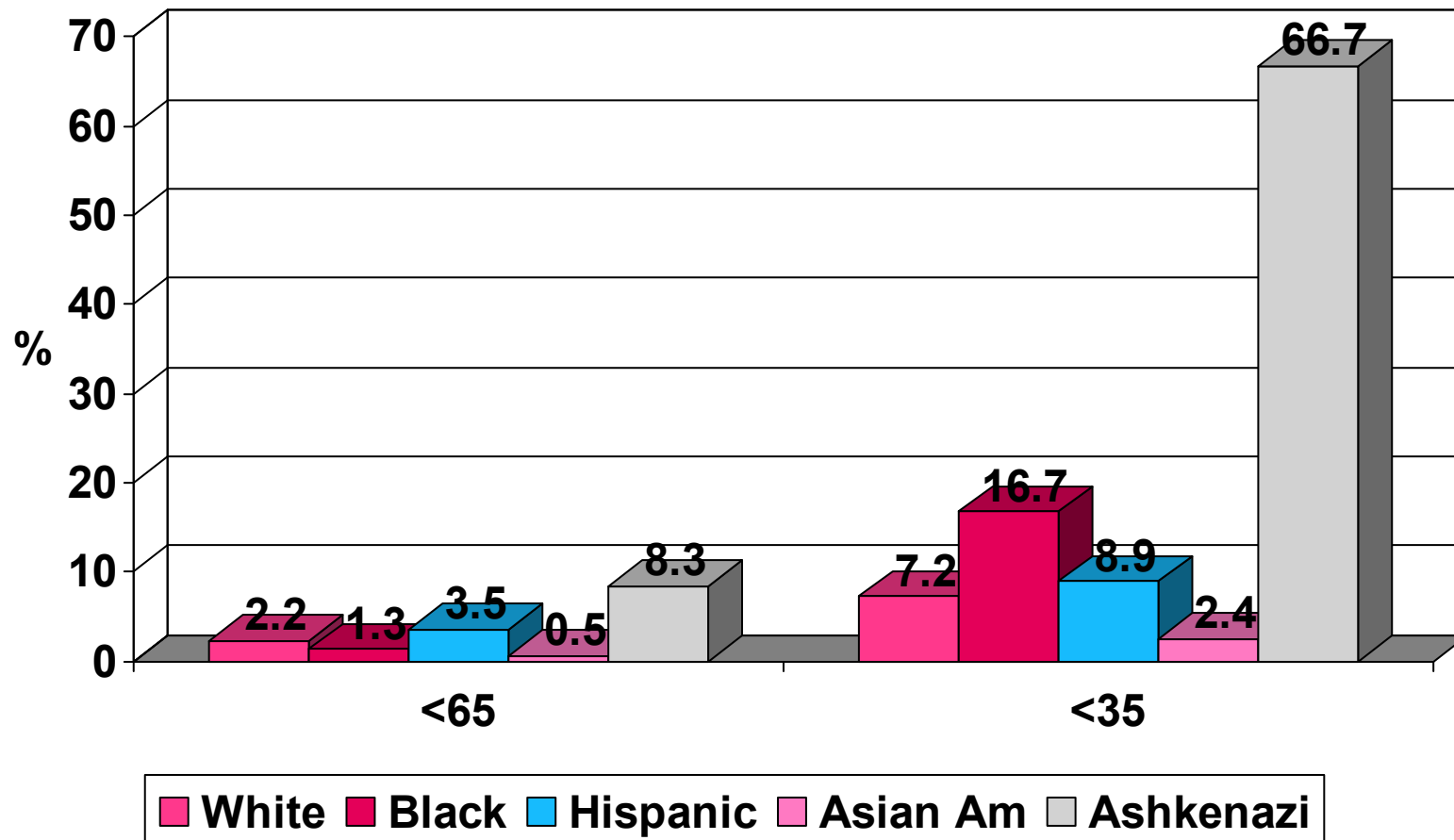
# Prevalence of BRCA1 mutation by race

- Northern California Breast Cancer Family Registry, 1996-2005
- Population-based female breast cancer patients younger than 65 years old at diagnosis
- Estimate BRCA1 carrier prevalence by 5 racial/ethnic group in the US

Source: John et al., (2007). Prevalence of pathogenic BRCA1 mutation carriers in 5 US racial/ethnic groups. JAMA, 298(24): 2869-2876.

# Prevalence of BRCA1 mutation by ethnicity

(n=3,181)



Source: John et al. Prevalence of pathogenic BRCA1 mutations carriers in 5 US racial/ethnic groups. JAMA. 2007; 298(24): 2869-2876

# Risk of breast cancer mutations underestimated for Asian women

- To test BRCA mutation prediction models in Asian Americans: BRCAPRO & Myriad II
- 200 Asian women and 200 matched whites
- Under-predicted the true number of clinically important mutations among Asians

## Comparison

	White	Asian American
BRCAPRO	24/25	25/49
MyriadII	25/25	26/49
P-value	>.69	<3x10 <sup>-7</sup>

Source: Kurian et al. (2008). Performance of BRCA1/2 mutation prediction models. Journal of Clinical Oncology. 26(29), 4752-4758.

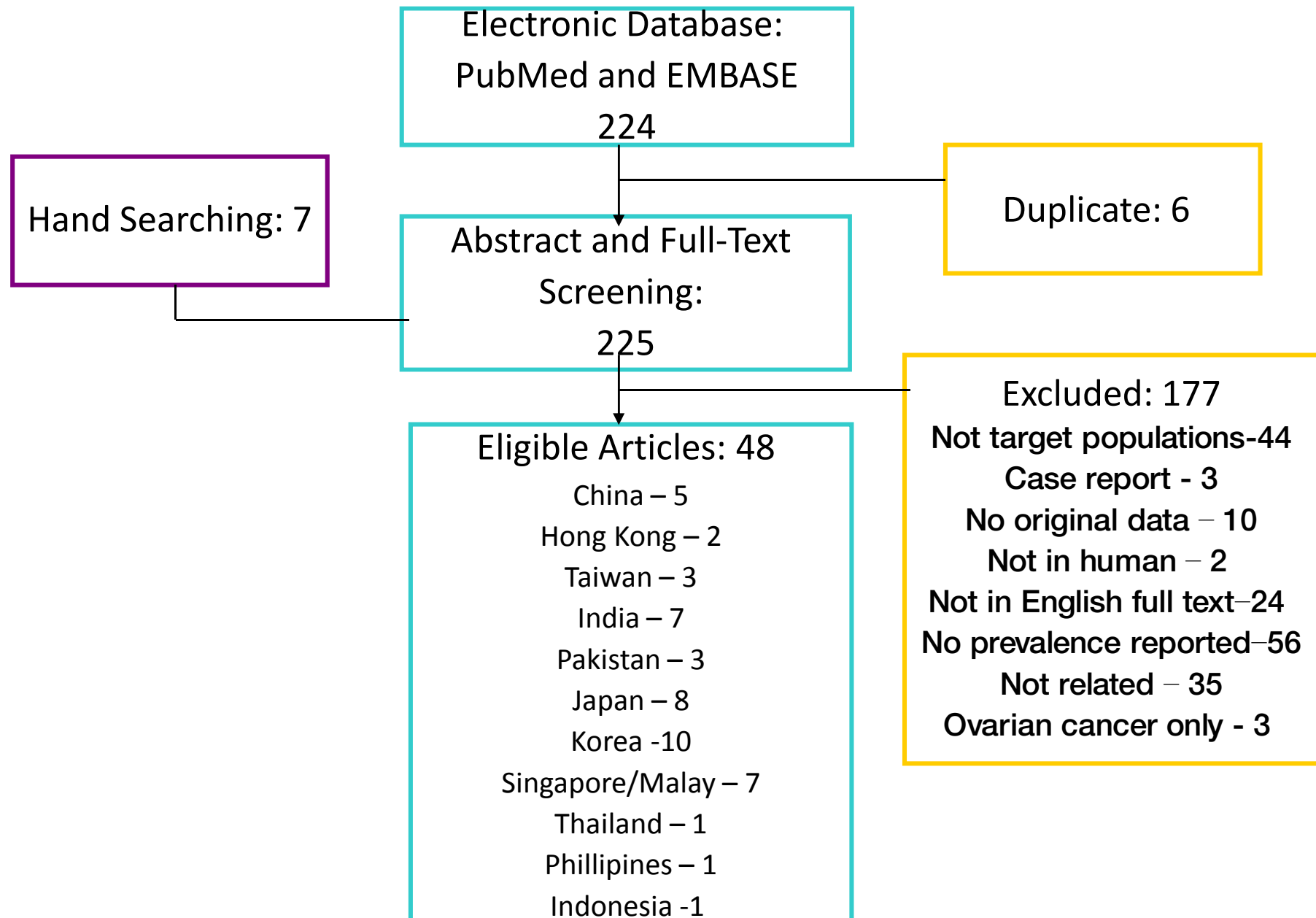
# **Prevalence of BRCA1 and BRCA2 Germline Mutations for Women with Breast Cancer in Asia**

- We assessed the prevalence of BRCA1 and BRCA2 germline mutations in women with breast cancer in Asian countries.
- Systematic literature review of BRCA1 and BRCA2 in Asia from 8 studies (Liede & Narod, 2002)
- We extended this systematic review
- We conducted meta-analysis.

# Literature Search

- Searched PubMed and EMBASE
  - English publications after 1990
  - Keyword search
    - BRCA1 or BRCA2
    - Asia
    - breast cancer
  - Focused on East, South, and Southeast Asian countries

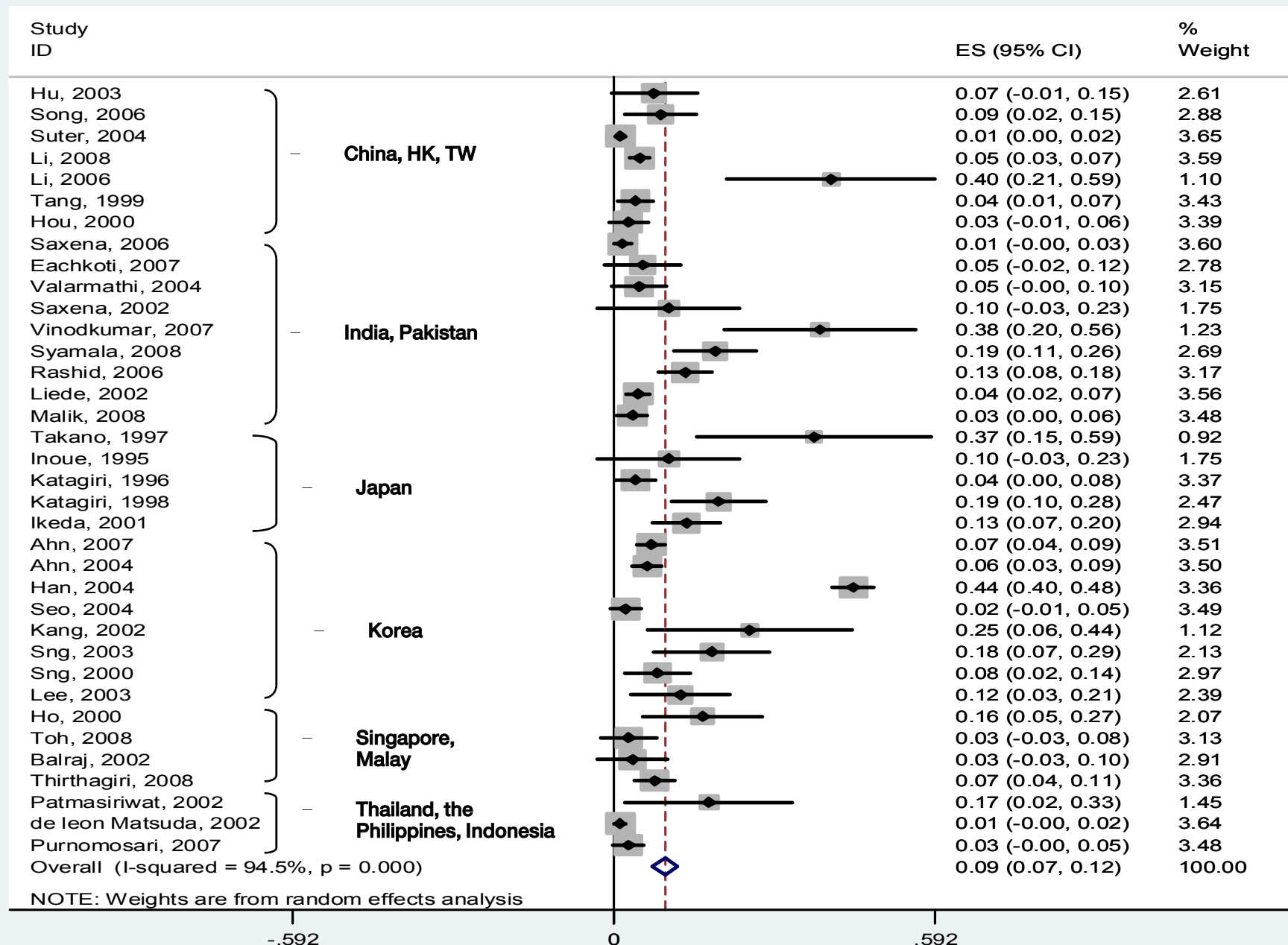
# Summary of Search and Screening Process



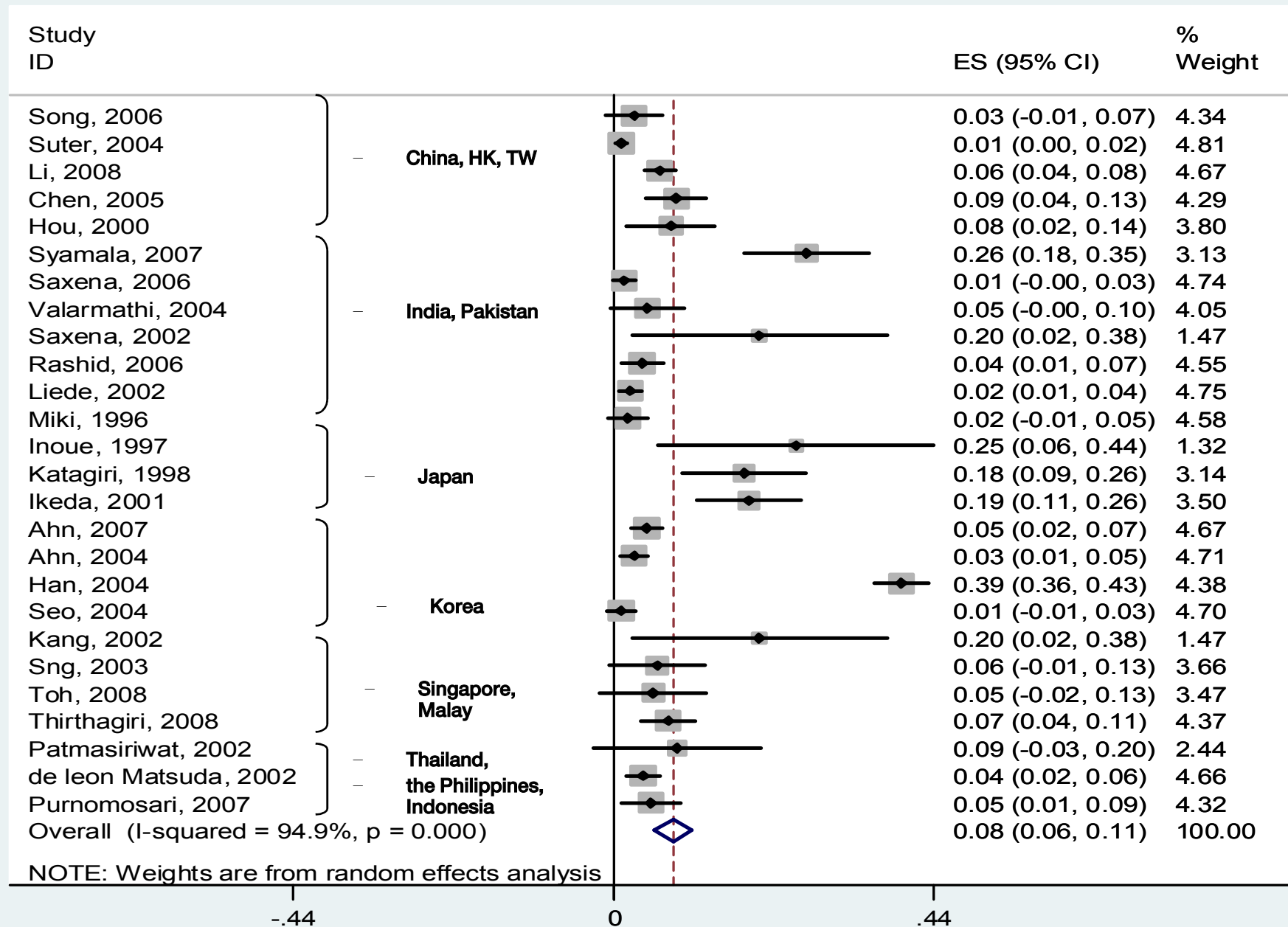
# Meta-Analysis

- Extracted the prevalence data
  - Overall analysis by gene types (e.g., BRCA1, BRCA2)
  - Subgroup analysis
    - By age of early onset
    - By family history
- Random effect meta-analysis:
  - To get pooled prevalence of germline mutations for BRCA1, BRCA2 and BRCA1 and BRCA2
  - Used DerSimonian and Laird method
  - Used STATA10 (metan command)

# Prevalence of **BRCA1** Germline Mutations among Breast Cancer Women in Asia



## Prevalence of **BRCA2** Germline Mutations among Breast Cancer Women in Asia

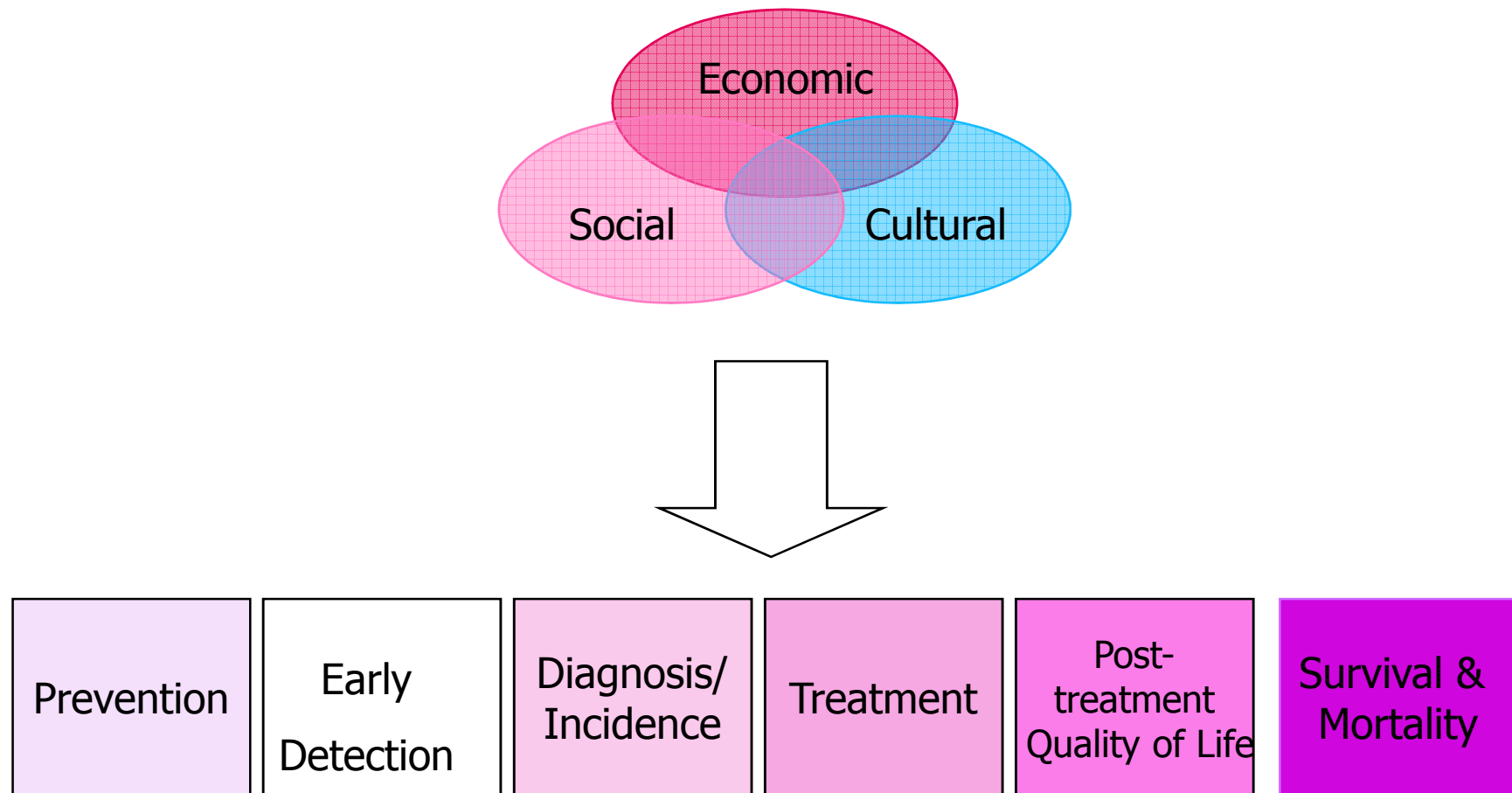


## Summary

- Pooled prevalence of Asian population (8%-10%) is higher than U.S. population (2%-4%)
  - May be due to higher proportion of high risk population included in this review
  - More population-based studies are needed
- This BRCA mutation estimation is important for counselors and clinicians to provide most evidence-based and ethically sound approach to the women with high risk of breast cancer.

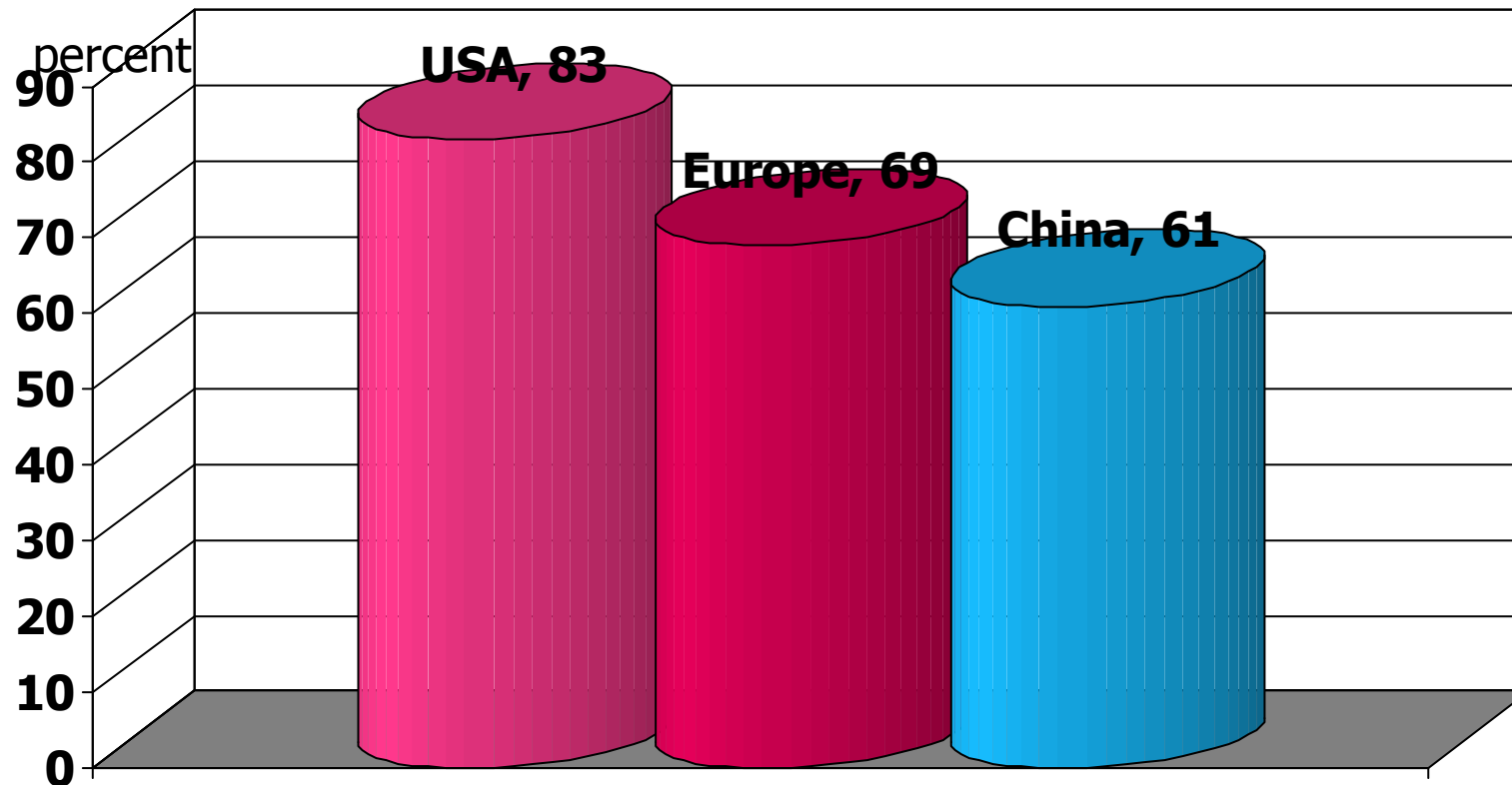
# BREAST CANCER CONTROL

# Comprehensive Breast Cancer Care



Source: Adapted Institute of Medicine

## 5-year breast cancer survival rates



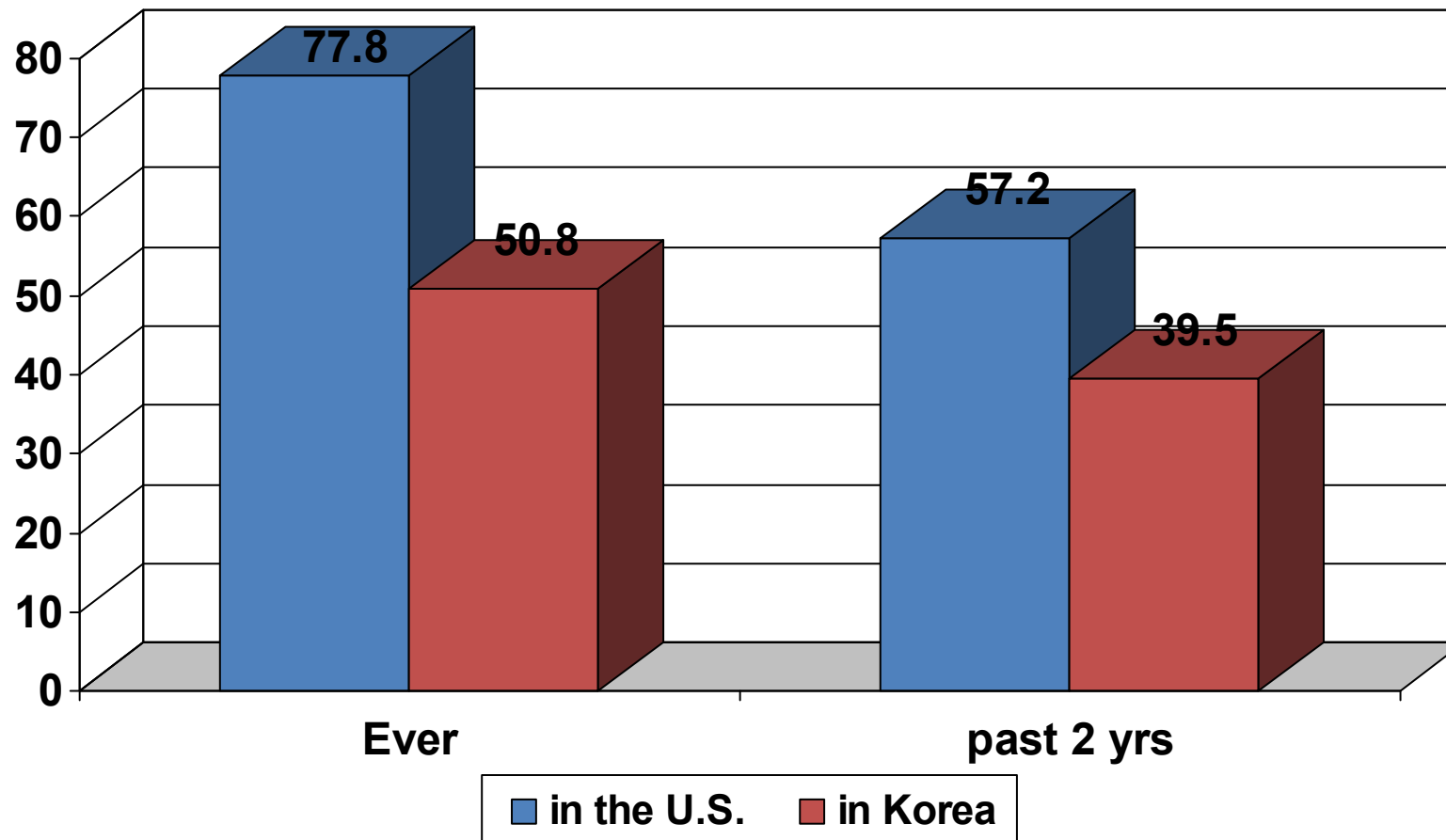
Source: International Agency for Research on Cancer, 1998

## Stage of Breast Cancer Diagnosis in Asia

- In Asia (India, Malaysia, China, Iran), about 50 to 60% women diagnosed at stage 3 and 4 (late stage)
- In Japan, 90% diagnosed at stages 0 to 2 (early stage)
- In South Korea, 45.2% diagnosed at stages 0 to 1 (early stage).

# Comparison of having a mammogram:

Korean American women and Korean women in Korea (40 years+)



Source: 2005 California Health Interview Survey; 2005 National Survey at Korea National Cancer Center

Choi et al. (in press). Comparison of breast cancer screening rates between Korean American women and Korean women in Korea: what makes these differ? Journal of Women's Health

## **Challenges of Breast Cancer Control in Asia**

- Low public awareness of breast cancer and BC prevention
- Social norm and taboo about cancer or breast
- Limited resources on breast health
- Low screening rates
- Late stage at diagnosis
- Lack of surveillance program for reliable data

# **Future Direction for Global Breast Cancer Control Strategy**

- Systematic & comprehensive cancer control
  - Every country should have cancer control plan
- Surveillance program through cancer registry
  - To generate reliable data on the magnitude and patterns of breast cancer
- Prevention will play a pivotal role in the countries with limited resources
  - Best practices with limited resources

*- Saving lives - Millions at a time*



JOHNS HOPKINS  
BLOOMBERG  
SCHOOL of PUBLIC HEALTH

**Thank you**