

## 3. SCREENING PROGRAMMES

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### 3.1 Determinants of participation in screening

Participation in breast cancer screening is not distributed equally. In this section, the personal, socioeconomic, and cultural factors that influence participation are presented, and the issues related to information and informed choice are described and discussed. Finally, the psychological consequences of mammography screening are addressed. This information may be more or less relevant for organized screening or opportunistic screening, depending on the context of the screening programme or practice.

#### 3.1.1 Personal and socioeconomic factors

There are numerous known socioeconomic factors that influence participation in breast cancer screening ([Edgar et al., 2013](#)). Lower income, lower educational status, lack of health insurance, and unemployment are all factors associated with lower levels of participation. These factors may also be associated with less knowledge of breast cancer screening, in terms of both benefits and adverse effects. Socioeconomic differences in screening practices tend to decrease when participation is promoted, cultural and economic barriers are reduced, and social support is offered ([Segnan, 1997](#)).

#### (a) *Income, education level, and socioeconomic status*

Income and education level are significant factors that influence participation in breast cancer screening ([George, 2000](#)). Higher income and education level are associated with higher participation in mammography screening ([Katz et al., 2000](#); [Chamot et al., 2001](#); [Samah & Ahmadian, 2012](#)). Fear of costs has been reported as a barrier to participation among women with low incomes, and having health insurance is associated with not perceiving cost as a barrier ([Fayanju et al., 2014](#)). In Japan, providing screening free of charge does not influence participation rates ([Sano et al., 2014](#)). Having an organized screening programme also appeared to attract women of lower socioeconomic status who would not usually undergo mammography screening ([Chamot et al., 2007](#)). In a study in Sweden, education level did not predict participation, but women in the highest income quartile were less likely to be non-attenders compared with those in the lowest income quartile ([Zackrisson et al., 2007](#)). In contrast, a study in Denmark found that education level was associated with a bell-shaped pattern in participation, where women in the middle range of the educational scale were the most faithful participants ([von Euler-Chelpin et al., 2008](#)). In Colombia, education level, income, and having health insurance have been shown to increase the probability of undergoing mammography screening ([Charry et al., 2008](#); [Avila et al., 2014](#)). These tendencies

were also found in a randomized controlled trial in India that explored determinants of participation ([Dinshaw et al., 2007](#)). Moreover, in Colombia, illiteracy was associated with a lower probability of undergoing mammography screening ([Charry et al., 2008](#)).

(b) *Rural and urban residence*

A meta-analysis of 28 studies found that the proportion of women who had ever had a mammogram was higher in the urban population than in the rural population in Australia, Canada, and the USA; there were contrasting findings in Northern Ireland and the Republic of Korea ([Leung et al., 2014](#)). Even in countries with screening programmes, their availability is not equally distributed among geographical districts, which may influence participation rates. Studies from both the Republic of Korea and the USA found that among rural women, recommendation by health professionals plays a key role in having a mammogram ([Hur et al., 2005](#); [Davis et al., 2012](#)). In a study in Sweden, area-level factors, such as rates of employment and of immigration, were important determinants of neighbourhood rates of non-attendance in an urban mammography screening programme ([Zackrisson et al., 2007](#)).

Distance between the residence and the screening unit may also influence participation. A British study found a small decrease in participation with increasing distance to the screening unit ([Maheswaran et al., 2006](#)). In a study in Quebec, distance from the screening unit affected participation, but the distance at which the decrease started varied according to a rural–urban classification: for women living in small cities, reductions in participation were observed for distances of 12.5 km or more, whereas for women in rural areas, a clear reduction in participation was first seen for distances of 50 km or more ([St-Jacques et al., 2013](#)). In low- and middle-income countries, limited access to screening is a major challenge.

(c) *Age*

The influence of age on participation in screening has to be understood in the context of the screening system, or the lack thereof. Findings on whether age is a predictor of attendance in mammography screening are controversial. Several studies were conducted in women in different age ranges attending opportunistic screening. The younger women were more likely to have a mammogram, in a group of women older than 60 years in the USA ([Michielutte et al., 1999](#)), in women within the age range 50–75 years in Canada ([Black et al., 2001](#)), or in a group of women older than 65 years in the United Kingdom ([Edwards & Jones, 2000](#)). A review about Latinas in the USA found that in general women aged 50–64 years, and particularly in the age range 55–59 years, were more likely to have a mammogram than women aged 40–49 years ([Wells & Roetzheim, 2007](#)). Another study in the USA showed that women aged 51–64 years were more likely to have a mammogram than either younger or older women ([Rutledge et al., 2001](#)). A further study in the USA suggested that participation in mammography screening is higher in older women; for instance, African-American women aged 70 years and older were less likely to miss their mammography appointments compared with women in their forties ([Crump et al., 2000](#)). Other studies concluded that age is not indicative of non-attendance ([Banks et al., 2002](#); [Bulliard et al., 2004](#)). [The cut-off age of screening programmes could potentially also explain why some age groups have higher participation rates in specific countries.]

(d) *Health and disability*

Poor health may inhibit women from participating in breast cancer screening, and lead to lower participation rates compared with women who have fewer health problems ([Lostao & Joiner, 2001](#)). However, women with diabetes have been found to have similar screening rates to women

without diabetes ([Giroux et al., 2000](#)). Barriers such as sociability limitations and physical disabilities ([Graham et al., 1998](#); [Ahmed et al., 2009](#); [Andresen et al., 2013](#)) or intellectual disabilities ([Taggart et al., 2011](#); [Wilkinson et al., 2011](#)) have been shown to decrease participation in screening. Also, obese women may face barriers to participation ([Wee et al., 2000](#)).

Mental health issues may also be a barrier to participation. One study found that non-attenders were significantly more depressed on the Hospital Anxiety and Depression Scale ([Burton et al., 1998](#)), and another showed that psychological distress was one of the strongest negative predictors of participation in breast cancer screening ([O'Donnell et al., 2010](#)) (see below).

#### (e) *Social support and networks*

Social networks may influence women's decision-making about mammography screening, among all socioeconomic groups ([Stamler et al., 2000](#); [Fowler, 2006](#)). Different social settings may influence different groups of women. In a study in the USA, African-American women aged 65 years and older who had had a mammogram in the previous year, compared with those who had not, were more likely to have living children and grandchildren and to participate in social activities more frequently ([Zhu et al., 2000](#)).

In one study, co-workers were identified as having a strong influence for women older than 50 years, whereas friends and family were identified as being more influential for women in the younger age groups ([Stamler et al., 2000](#)). Data from a survey of 260 Samoan women aged 50 years and older in Los Angeles County, USA, over a 20-year period suggested that interpersonal networks may have accounted for the dramatic increase in the rate of adoption of screening within the 5 years preceding the survey ([Levy-Storms & Wallace, 2003](#)). Being part of a church-based health communication network appeared to increase the likelihood of having had a recent mammogram ([Fox et al., 1998](#); [Levy-Storms &](#)

[Wallace, 2003](#)). Also, among working Muslim Iranian women, there were suggestions of a link between religious involvement and increased participation in mammography screening ([Hatefnia et al., 2010](#)).

#### (f) *Health-care services*

Several factors within the health-care service system may influence participation in breast cancer screening. In a study in Canada among three age groups (< 30 years, 30–49 years, and ≥ 50 years), the physician was the most important influence for the different modalities of breast cancer screening in all age groups ([Stamler et al., 2000](#)).

In a study in the USA, women who had had a mammogram in the previous year, compared with those who had not, were 3 times as likely to have a regular doctor and about 6 times as likely to have a doctor's recommendation for a mammogram ([Zhu et al., 2000](#)).

Satisfaction with services could influence participation in screening. A study in the USA among 397 women undergoing a screening mammogram at three university-affiliated radiology clinics showed the importance of four major components: satisfaction with clinical services, physical experience, psychological experience, and communication with clinical personnel ([Tang et al., 2009](#)).

#### (g) *Other barriers*

Practical problems, such as being busy at work or at home, forgetting the appointment, or having other more pertinent tasks, may influence participation ([Crump et al., 2000](#); [Aro et al., 2001](#); [Tsunematsu et al., 2013](#)). This could affect women in either organized screening or opportunistic screening.

Experiencing or fearing pain during the mammography examination is a barrier to participation for some women ([Aro et al., 2001](#); [Papap & Klassen, 2005](#); [Fayanju et al., 2014](#)).

### 3.1.2 Cultural factors

Cultural understanding of breast cancer and breast cancer screening has been shown to influence women's decisions about participation in screening ([Garbers & Chiasson, 2004](#); [Pfeffer, 2004](#); [Yu et al., 2005](#)). Some women's cultural understanding of screening may be contrary to that of health professionals, and may be given priority over medical advice ([Rajaram & Rashidi, 1998](#)). In the USA, among 321 inner-city African-Americans, women who were more knowledgeable about cancer and its prevention were more likely to have been appropriately screened ([Sung et al., 1997](#)). Lack of knowledge about breast cancer could be related to socioeconomic group and could be a barrier to screening ([McDonald et al., 1999](#); [Farmer et al., 2007](#)). However, studies from different cultural contexts as diverse as Nigeria, Turkey, and Chinese immigrants in the USA indicate that more knowledge about breast cancer does not automatically increase screening rates ([Yu et al., 2005](#); [Canbulat & Uzun, 2008](#); [Bello et al., 2011](#)). A study among 58 Latinas participating in focus-group interviews showed that women generally perceived breast cancer screening as a risky behaviour because of the many personal and interpersonal consequences associated with the detection of breast cancer ([Borrayo et al., 2005](#)).

Strong cultural beliefs of fatalism have been identified as a barrier to screening for Latinas (in Mexico and in the USA). In a literature review of 11 studies, most of them (64%) reported a statistically significant association between fatalism and non-use of cancer screening services among Latinas ([Espinosa de Los Monteros & Gallo, 2011](#)). Studies from Israel, Kenya, and the USA have all found that fatalism could be a barrier to screening ([Mayo et al., 2001](#); [Peek et al., 2008](#); [Baron-Epel, 2010](#); [Muthoni & Miller, 2010](#)). If cancer is seen as a disease that is curable when detected early, screening can be perceived as worthwhile, but if cancer is seen as always fatal, early diagnosis

might be seen as having no value ([Straughan & Seow, 2000](#); [Pfeffer, 2004](#)). Moreover, women may experience fear of mastectomy as a barrier to screening participation because loss of a breast might have social consequences ([Peek et al., 2008](#); [Bodapati & Babu, 2013](#)).

In late modern societies, discourses on women's participation in mammography screening have been characterized by morality, responsibility, and obligation to participate in available medical examinations ([Kaufert, 1996](#); [Klawiter, 2008](#); [Willis, 2008](#); [Solbjør et al., 2012a](#)).

#### (a) *Minority groups and acculturation*

Ethnic background itself is not an independent predictor of attendance in mammography screening, but differences in participation have been found between ethnic groups ([Consedine, 2012](#); [Edgar et al., 2013](#)). Results about the effect of ethnicity on breast cancer screening are ambiguous. A study from the USA suggested that even when controlling for education and income, some differences exist with ethnicity ([Rawl et al., 2000](#)). However, ethnicity is connected to culture, and cultural values and beliefs partially explain differences between ethnic groups. Moreover, the social situation in which women live is often also associated with ethnicity ([Lindén-Boström et al., 2010](#); [Flores et al., 2013](#)).

Among immigrant women, the degree of acculturation to the culture into which they have moved could predict health status. Language acculturation has been found to be of specific importance for participation in mammography screening, among immigrant women to the USA from the former Soviet Union ([Ivanov et al., 2010](#)) and among Mexican-American women ([Suarez & Pulley, 1995](#)). Acculturation was associated with a higher likelihood of having had a recent mammogram, but this effect was not significant when controlling for sociodemographic factors ([Abraído-Lanza et al., 2005](#)). Period of residence in the country of immigration influences rates of

screening ([Ivanov et al., 2010](#)). For Iraqi refugee women, psychosocial aspects, culturally mediated beliefs, and health consequences of war were identified as major barriers to their ability and motivation to obtain breast cancer screening ([Saadi et al., 2012](#)).

#### (b) *Worry and perceived risk*

There is an association between worry about breast cancer or perceived risk of breast cancer and participation in mammography screening. A meta-analysis of 12 prospective studies that measured worry about breast cancer and screening behaviour among 3342 women concluded that there is a positive relationship between worry about cancer and screening behaviour ([Hay et al., 2006](#)). A meta-analysis of 42 studies found an association between perceived risk and mammography screening ([Katapodi et al., 2004](#)). Another study found that worry about breast cancer risk appears to be associated with mammography use in a bell-shaped pattern, where women reporting moderate levels of worry were more likely to participate in mammography annually than those who were either mildly or severely worried ([Andersen et al., 2003](#)).

### 3.1.3 *Information and understanding*

This section addresses the issue of information provided by screening providers to women who are potential participants in screening, and how it may influence screening participation. In many countries, the mass media covers issues related to breast cancer screening and potentially contributes to communicating information on screening to the general public, but it is not included in this section (see Section 3.2 for region-specific data).

#### (a) *Informed decision-making*

Breast cancer screening programmes invite women who are presumably free of symptoms to a medical examination. Participation in screening

may have both positive and negative effects for individuals, and ethical and legal considerations suggest that women should be fully informed about the benefits, limitations, and harms of a screening process and its aftermath. While some women trust the health authorities with the decision ([Østerlie et al., 2008](#)), many women want to make their own informed decision about mammography screening ([Hersch et al., 2011](#)). One study in the USA showed that most adults perceive mammography as valuable, probably due partly to decades of screening promotion campaigns ([Schwartz et al., 2004](#)). It is important to note that literature and debates on informed decision-making come primarily from high-income countries and that issues in low- and middle-income countries may be different.

The dominant approach to information about cancer screening has emphasized benefits, to improve participation in screening programmes. Many studies have examined how tailored information may increase screening participation (e.g. [Champion et al., 1997](#); [Rakowski et al., 1998](#); [Latimer et al., 2005](#); [Williams-Piehota et al., 2005](#)). [Albada et al. \(2009\)](#) reviewed 18 studies of tailored information on mammography screening, and 6 of them reported that educational interventions increased adherence to mammography. [The authors did not assess whether these interventions increased women's informed decision-making.] In a more recent review ([Biesecker et al., 2013](#)), 5 of 8 interventions on screening for different diseases were reported to facilitate informed choice. [The Working Group noted that it remained unclear whether this was due to better understanding of information, and the review fell short of explaining the effective components of interventions that facilitate informed choice.]

If autonomy of choice is the leading ethical principle, women should be provided with balanced evidence-based information to enable them to make informed decisions about health care ([Barratt, 2008](#)). Several terms,

such as “informed decision-making” and “informed choice”, have been used to describe this process. Informed choice includes knowledge, attitudes, and test choice, and at least two different scales of measure have been developed to measure informed decision-making (the Multidimensional Measure of Informed Choice and the Decisional Conflict Scale) ([Biesecker et al., 2013](#)).

The issue of what constitutes balanced information on screening is subject to debate. Based on 12 articles, “balance” can be defined as “the complete and unbiased presentation of the relevant options and the information about those options – in content and in format – in a way that enables individuals to process this information without bias” ([Abhyankar et al., 2013](#)). Presenting information in a side-by-side display form was associated with more users/respondents judging the information as balanced ([Abhyankar et al., 2013](#)). However, sometimes patient decision aids may deviate from neutrality to counter pre-existing biases, such as pre-existing values and beliefs ([Blumenthal-Barby et al., 2013](#)). An example of pre-existing bias was found about the different recommendations for mammography for women younger than and older than 50 years ([Schulz & Meuffels, 2012](#)). The bias was the reluctance to accept that mammography is not usually recommended for women younger than 50 years, which was in contrast to the overwhelming acceptance of breast cancer screening for women older than 50 years. This points towards the difficulty of acceptance of “doing nothing”. Balancing information means including the “doing nothing” option ([Abhyankar et al., 2013](#)). Others have argued that decisions about mammography screening should be individualized based on patients’ risk profiles, preferences, and values ([Pace & Keating, 2014](#)). Yet others have argued that designing patient decision aids that lead patients to make a particular choice may be “more ethical” than balanced, nondirective content ([Blumenthal-Barby et al.,](#)

[2013](#)). This controversial standpoint raises questions about who should decide what is the most ethical option, and which information should be provided to women.

Many studies have assessed women’s knowledge of the benefits and risks of mammography screening. Text analyses of information material show that women are often not being informed about the likelihood of having a false-positive result, about overdiagnosis and overtreatment ([Jørgensen & Gøtzsche, 2004, 2006](#); [Giordano et al., 2005](#)), or about the possibility and implications of a diagnosis of carcinoma in situ ([Jørgensen & Gøtzsche, 2004](#)). More recently, in a study in the Netherlands that measured 13 items of knowledge about breast cancer screening, 95% of the 229 respondents were deemed to have sufficient knowledge to make an informed choice about mammography screening; 68% of the women responded correctly on the item of overdiagnosis, and there was 90% consistency between intention to participate (or not) and attitude ([van Agt et al., 2012](#)). Other studies have found women to overestimate the benefit of mammography screening and their own risk of breast cancer ([Chamot et al., 2001](#); [Domenighetti et al., 2003](#)). Many women who intend to participate in mammography screening believe that breast cancer can be prevented or cured through screening ([Vahabi & Gastaldo, 2003](#)). In addition, women of screening age may overestimate the mortality reduction due to mammography screening ([Edgar et al., 2013](#)). Women with strong “utility beliefs” in screening were more inclined to participate ([Lauver et al., 2003](#)), whereas belief that mammography screening is recommended every 4 years or not at all may lead to deciding not to participate ([Chamot et al., 2001](#)). Also, women might believe that mammography will detect all breast cancers, as the visualization technology convinces them of its potential ([Solbjør 2008](#); [Griffiths et al., 2010](#)). Beliefs about breast cancer and screening can be seen as a hindrance to making an informed decision ([Denberg et al.,](#)

2005). Knowledge about the benefits and negative consequences of mammography screening must be present for women to make an informed choice about participation.

In a literature search in Germany, six studies on screening mammography showed that the majority of women were uninformed about the benefits of screening and the incidence of false-positive and false-negative test results in mammography (Dreier et al., 2012). In a cross-sectional study in south-western Nigeria, where a self-administered questionnaire was used to assess the knowledge, attitudes, and practice of breast cancer screening programmes among nurses in a university teaching hospital and among women in non-health professions, the authors concluded that good knowledge did not imply higher screening rates (Bello et al., 2011). Moreover, in a study in Switzerland, many women were not interested in detailed information about mammography screening that is deemed relevant by public health authorities (Chamot et al., 2005). Women may say “no” to professional recommendations about mammography screening because they see themselves as being at low risk of breast cancer, being their own health experts, and claiming responsibility for their own health, rather than conforming to professional perspectives on health care (Michaels et al., 2008).

Laypeople may conceptualize informed choice differently from policy-makers, and information about the disease could be as important as information about the risks and the limitations of screening (Jepson et al., 2007). Studies in Scandinavia have found that women may trust health authorities to offer relevant screening programmes and thus participate in screening on the basis of receiving an invitation (Forss et al., 2001; Østerlie et al., 2008; Willis, 2008). Moreover, women may see participation as a responsible action, as the morally right thing to do (Crossley, 2002; Pfeffer, 2004). For some women, very strong feelings lead to a reluctance

to accept contrary information. For example, women with breast cancer participating in online breast cancer discussion boards were in opposition to the 2009 United States Preventive Services Task Force (USPSTF) recommendation against routine screening mammography for women in their forties (Barker & Galardi, 2011).

Several articles have argued that women must be informed about all possible outcomes of screening mammography, such as having a recall/false-positive result, having breast cancer or ductal carcinoma in situ (DCIS), or overdiagnosis on the population level. Some women express surprise at the possible extent of overdiagnosis (Hersch et al., 2013; Waller et al., 2013). About half of the women in a British study had ever heard of overdiagnosis before being confronted with the term during a survey (Waller et al., 2014). The concept of overdiagnosis was difficult to understand, and the study suggested that brief printed information on overdiagnosis is unlikely to have a major impact on participation in breast screening. Women who received information about the ratio of lives saved to overdiagnoses had a greater decrease in intention to participate than women who received information about the total number of overdiagnoses compared with lives saved in the United Kingdom (Waller et al., 2014). A randomized controlled trial is currently being conducted in Australia to investigate the consequences of providing information about overdiagnosis of breast cancer to women approaching the age of invitation to mammography screening (Hersch et al., 2014). Not knowing about the uncertainties of mammography screening could change women’s trust in mammography when they experience a false-negative/interval cancer (Solbjør et al., 2012a). A qualitative study with semi-structured interviews in 10 women diagnosed with DCIS as a result of mammography screening highlighted that the diagnosis had changed the women’s information needs and that most of them would have liked to have had

more information about DCIS when they were invited to routine screening ([Prinjha et al., 2006](#)).

(b) *Ways of presenting information*

Methods of communicating information are important to ensure that women's information needs are met. Which kind of information should be given to women is the subject of ongoing debate. However, information material has been criticized to be pro-screening and biased ([Jørgensen & Gøtzsche, 2004, 2006](#); [Gummersbach et al., 2010](#)). Analyses of online health information have suggested that it is inadequate to support informed decision-making on screening ([Burkell & Campbell, 2005](#)). More information about breast cancer is included in brochures from programmes established earlier compared with newer programmes ([Zapka et al., 2006](#)).

The manner in which information is provided could also influence whether women will make an informed choice. Whether women prefer numerical or verbal information varies. In a study in Canada, two thirds of participants preferred numerical information, but comprehension was higher among women who received probabilistic information in verbal format ([Vahabi, 2010](#)). Numbers for screening effects can be presented as either relative risk reduction or absolute risk reduction. One study analysed how four different scenarios for presentation of data on screening affected women's decision-making and found that respondents indicated a significantly greater willingness to have a test when the benefit of a "new" screening test for breast cancer was expressed as relative risk reduction (88%) rather than either absolute risk reduction (78%) or all-cause mortality (53%) ([Davey et al., 2005](#)). Significantly more respondents considered information about absolute risk reduction to be "new" to them (65%) compared with information about relative risk reduction (30%). The results demonstrate that women's willingness as individuals to participate in mammography screening is

influenced by how information is framed, and indicate that the quantitative content of information aids must be comprehensive and balanced to promote informed choice ([Davey et al., 2005](#)).

For women with low literacy, video material may be a way to communicate information, as has been tried among Latinas ([Borrayo, 2004](#)) and Chinese immigrants in the USA ([Maxwell et al., 2011](#)). Coleman et al. developed and tested a particular motivational book at a maximum third-grade literacy level, which led to increased knowledge and intent to follow guidelines among pilot participants ([Coleman et al., 2003a](#)). In the USA, several pilot studies that used health advisors to reach minority women with information about breast cancer screening have increased knowledge, uptake, and follow-up among Hispanic women ([Koval et al., 2006](#); [Fernández et al., 2009](#)), Vietnamese-American women ([Bird et al., 1998](#); [Nguyen et al., 2009](#)), Korean-American women ([Han et al., 2009](#)), African-American women ([Coleman et al., 2003b](#); [Crump et al., 2008](#)), and Chinese-American women ([Yu et al., 2007](#)). In a study in Brazil, the mass media was found to be a source of information about breast self-examination (BSE) ([Brito et al., 2010](#)).

### 3.1.4 *Psychological consequences of mammography screening*

Participation in breast cancer screening could have psychological or psychosocial consequences for women, which are largely dependent on the result of the screening process. This section summarizes the psychological impacts of an invitation to screening, of a negative result, of a diagnosis of breast cancer, and of interval cancer, as well as the impact of a false-positive result on further participation. The psychological consequences of a false-positive result and of DCIS are evaluated in Section 5.3.5.



(a) *Psychological consequences of an invitation to screening*

Invitation to routine breast screening by itself may affect some women negatively, making them nervous, anxious, or depressed ([Johnston et al., 1998](#)). The invitation may also increase women's concern about breast cancer ([Scaf-Klomp et al., 1997](#)). However, such impacts of the invitation are not homogeneous. In a sample of 1253 women, the letter of invitation reduced anxiety about breast problems in 39.7%, increased anxiety in 24.6%, and had no appreciable effect in 35.7% ([Swanson et al., 1996](#)). A woman's perception of the impact of receiving the letter of invitation and undergoing the screening examination procedure is likely to be related to her previous levels of concern about breast problems.

(b) *Psychological consequences of a normal screening result*

Women who receive a clear negative result after participation in mammography screening generally have few negative psychological consequences from screening ([Sutton et al., 1995](#); [Scaf-Klomp et al., 1997](#); [Lowe et al., 1999](#); [Aro et al., 2000](#); [Meystre-Agustoni et al., 2001](#)) (reviewed by [Brett et al., 2005](#); [Hafslund & Nortvedt, 2009](#)).

Some women may feel reassured by a clear negative result, perceiving mammography screening to be a reassuring preventive initiative ([Brodersen et al., 2011](#)). A few studies have even suggested improved psychological well-being and reduced anxiety after screening ([Dean et al., 1986](#); [Baines et al., 1990](#); [Walker et al., 1994](#); [Bakker et al., 1998](#)), which lasted up to 2 months after screening ([Scaf-Klomp et al., 1997](#)) (reviewed by [Hafslund & Nortvedt, 2009](#)).

Although most articles report few psychological consequences of screening participation among women who receive a clear negative result, there have been discussions on how to measure anxiety due to participation in breast cancer screening. Questionnaires developed for

measuring general psychiatric morbidity may not be able to measure changes among otherwise healthy individuals, and [Cockburn et al. \(1992\)](#) developed and validated a questionnaire (the psychological consequences questionnaire) to measure the psychological consequences of screening mammography. This questionnaire has been used both among the general population undergoing screening and among women who are recalled after mammography ([Cockburn et al., 1994](#); [Swanson et al., 1996](#); [Olsson et al., 1999](#); [Meystre-Agustoni et al., 2001](#); [Brodersen et al., 2004](#)). These studies point to small psychological consequences of mammography screening. [Swanson et al. \(1996\)](#) found that the psychological consequences questionnaire was sensitive in measuring changes in anxiety about breast problems, and concluded that screening procedures can either increase or decrease anxiety about breast problems or have no appreciable effect. Therefore, participants in breast screening programmes cannot be considered a homogeneous entity ([Swanson et al., 1996](#)).

(c) *Psychological consequences of a breast cancer diagnosis*

Having a breast cancer diagnosis will likely have psychological and psychosocial consequences. Psychological distress is strongly associated with the diagnostic phase for suspected breast cancer ([Montgomery & McCrone, 2010](#)). Being diagnosed with breast cancer after participating in mammography screening for women without symptoms may potentially have specific psychological consequences, but no studies were found comparing the mode of detection and its influence on the psychological aspects of having a breast cancer diagnosis. A qualitative interview study in Denmark found that women who are diagnosed with breast cancer through screening may feel optimistic about the future due to the internalization of arguments about how early detection of breast cancer may save lives ([Ryle, 2009](#)).

*(d) Psychological consequences of interval cancer*

No reviews or other articles were found about psychological consequences of having a false-negative result. However, it was shown that women's experiences with interval breast cancer may affect their trust in mammography screening (Solbjør et al., 2012a). A study in the Netherlands found that breast cancer patients with interval cancers attended the screening programme less often than breast cancer patients with screen-detected tumours, within 5 years as well as more than 5 years after treatment (de Munck et al., 2013). [One possible explanation is that the patients may have been disappointed and therefore reluctant to re-enter the programme.] One qualitative study showed that participation in a mammography screening programme may contribute to a delayed reaction when symptoms are detected between screening rounds (Solbjør et al., 2012b).

*(e) Impact of a false-positive result on further participation*

Negative psychological consequences of participation in screening may have an impact on further participation in mammography screening. Long-term psychological consequences of having a recall may negatively affect women's experiences at future screening rounds (Lampic et al., 2001) or affect future attendance in mammography screening (Marshall, 1994; Brett & Austoker, 2001; Brett et al., 2005). In their review on long-term effects of false-positive mammography results, Brewer et al. (2007) found that the effect of having a recall influenced women in different countries and within different screening regimes differently. Women in the USA were more likely than women in Europe to return for routine screening mammography after false-positive results. This may be explained by the opt-in system in the USA and the opt-out system in Europe (Brewer et al., 2007). If women opt in

for mammography screening, they may already have considered eventualities such as a recall, whereas women who participate in an opt-out screening programme may be more surprised at having a false-positive result. Defrank & Brewer (2010) even suggested that having a false-positive mammography screening result increases women's perceived likelihood of having breast cancer and decreases their belief in test results, and that this will affect further participation in screening mammography. Experiences of false-positive results could lead to non-participation in the future, especially if coupled with a lack of advice on regular screening from the women's physicians (DeFrank et al., 2012). However, a study in Denmark found no significant difference in participation in the subsequent round between women with a false-positive test result and women with a negative test result (Andersen et al., 2008).

## 3.2 Availability and use of screening programmes

### 3.2.1 Europe

Breast cancer screening programmes are well established in many European countries. Most have organized programmes, several of which are now more than 25 years old, such as those in Finland, the Netherlands, and the United Kingdom. These programmes shared many aspects of their development from the outset and still have much the same form of delivery. For many years the European Union (EU) funded the European Breast Screening Network (EBSN), which encouraged the establishment of organized programmes and also the dissemination of knowledge from the more established programmes to pilot programmes. In 1993, the EBSN produced the first European guidelines for quality assurance in mammography screening (Kirkpatrick et al., 1993). These guidelines are now in their fourth edition (Perry et al., 2006).

The long-term support from the EBSN, when the screening service was new and needed to be developed in many countries, was a major influence on the common approach that developed across much of Europe. The EBSN included several pilot programmes and an annual meeting. It first focused on the delivery of high-quality screening and then moved on to publish quality standards and guidance for those establishing new programmes. The EBSN facilitated mutual cooperation and understanding, and enabled sharing of experiences about advances in technology and also about understanding of the science and epidemiology of breast screening. This international cooperation was also extended to countries that were not members of the EU, such as Norway and Switzerland, and in recent years was extended to include the countries in central and eastern Europe that had joined the EU.

The Council of the EU agreed on a recommendation on cancer screening in December 2003 ([Council of Europe, 2003](#)). This followed on the success of the EBSN, which had been emulated by the cervical cancer screening community and the burgeoning interest in colorectal cancer screening. The Council recommendation included the need to offer evidence-based cancer screening through a systematic population-based approach with quality assurance at all appropriate levels. The recommendation also included the requirement to ensure that the people participating in a screening programme were fully informed about the benefits, limitations, and adverse effects. Mammography screening for breast cancer in women aged 50–69 years in accordance with the European guidelines for quality assurance in mammography screening was then listed as one of the approved tests.

Health is not one of the areas in which the EU determines policy across all Member States. Therefore, the European guidelines for quality assurance in mammography screening are not mandatory, but they are a recognized

authoritative view on best practice, with much practical advice for those countries operating, or beginning to operate, breast screening programmes. Member States are free to decide for themselves how to design and deliver the breast screening programmes in each country, and variations in protocols generally reflect societal pressures on the screening programme, the resources available, and the health-care system in which they operate. Thus, where health care is locally led, such as in Belgium, Portugal, and Sweden, the screening programme is run by the county or similar local authority. In the United Kingdom, there are effectively four screening programmes, reflecting the four constituent countries of the United Kingdom. Thus, initiatives to compare data across European countries face difficulties in obtaining comparative data.

#### (a) *Systems, policies, and guidelines*

Two Europe-wide surveys were recently carried out under different EU auspices, and [Table 3.1](#) summarizes the key findings reported. The first European survey, published in 2012, described the organization of mammography screening in Europe and presented some basic quality indicators ([Giordano et al., 2012a](#)). Data were provided by only 18 of the 29 countries asked to participate; 10 countries provided national data, and the other 8 countries provided only regional data, although some (Portugal, Spain, and Sweden) from more than one regional programme. In 2014, the European Commission Joint Research Centre (JRC) carried out a further survey to prepare for consideration of a Europe-wide quality assurance system for breast cancer care, including screening ([Lerda et al., 2014](#)). This included a slightly different group of countries, and 25 of the 30 countries asked to participate provided a response. Whereas the first survey was peer-reviewed and aimed to provide comparative data, the JRC report came with the caveat that the figures were described as indicative only and not for comparison. The JRC report drew

**Table 3.1 Policies and practice for breast cancer screening with mammography in Europe**

Country, region	Start year	Target age (years)	Interval (years)	No. of mammography views <sup>a</sup>	Double reading?	No. of screening tests per year	Invitation coverage <sup>b</sup> (%)	Examination coverage <sup>c</sup> (%)	Participation rate <sup>d</sup> (%)	References <sup>e</sup>
Austria, Burgenland, Tyrol	Pilot	40–69	1–2	—	—	—	—	—	—	<a href="#">Lerda et al. (2014)</a>
Austria, Vienna-Vorarlberg-Salzburg	Pilot	50–69	1–2	—	—	—	—	—	—	<a href="#">Lerda et al. (2014)</a>
Belgium, Flanders	2001	50–69	2	2	Yes	134 356	82.2	37.4	37.9	<a href="#">Giordano et al. (2012a)</a>
Cyprus	2003	50–69	2	—	—	—	100	65.0	—	<a href="#">Lerda et al. (2014)</a>
Czech Republic	2002	45–69	2	2	Yes	374 157	—	41.0	—	<a href="#">Giordano et al. (2012a)</a>
Denmark, Copenhagen	1992	50–69	2	2/1	Yes	16 987	64.6	46.7	—	<a href="#">Giordano et al. (2012a)</a>
Estonia	2002	50–59	2	2	Yes	20 534	78.3	39.1	50.0	<a href="#">Giordano et al. (2012a)</a>
Finland	1987	50–69	2	—	Yes	211 183	68.4	84.0	87.0	<a href="#">Giordano et al. (2012a)</a> , <a href="#">Finnish Cancer Registry (2014)</a>
France	2004	50–74	2	2	Yes	2 361 548	—	52.4	—	<a href="#">Lastier et al. (2013)</a>
Germany, pilot projects	2001	50–70	2	2	Yes	20 097	65.8	34.7	52.8	<a href="#">Giordano et al. (2012a)</a>
Hungary	2002	45–65	2	2	Yes	219 406	75.9	29.0	38.2	<a href="#">Giordano et al. (2012a)</a>
Ireland, east	2000	50–64	2	—	Yes	59 960	87.3	68.4	78.3	<a href="#">Giordano et al. (2012a)</a>
Italy	1990	50–69	2	2/1	Yes	1 072 357	50.9	28.4	56.7	<a href="#">Giordano et al. (2012a)</a>
Latvia	2009	50–69	2	—	—	—	99.0	34.0	—	<a href="#">Lerda et al. (2014)</a>
Lithuania	2005	50–69	2	2	—	—	—	51.4	—	<a href="#">Lerda et al. (2014)</a>
Luxembourg	1992	50–69	2	—	Yes	14 009	93.9	58.5	62.3	<a href="#">Giordano et al. (2012a)</a>
Malta	2009	50–60	3	2	—	—	100	60.0	—	<a href="#">Lerda et al. (2014)</a>
Netherlands	1988	50–75	2	2	Yes	890 837	94.8	78.5	82.6	<a href="#">Giordano et al. (2012a)</a>
Norway	1996	50–69	2	2	Yes	185 389	94.2	72.1	76.6	<a href="#">Giordano et al. (2012a)</a>
Poland	2007	50–69	2	2	No	935 416	115.2	39.4	19.4	<a href="#">Giordano et al. (2012a)</a>
Portugal, centre	1990	45–69	2	2	Yes	73 182	97.4	60.4	62.1	<a href="#">Giordano et al. (2012a)</a>
Portugal, north	1999	45–69	2	2	Yes	32 122	80.2	54.0	67.3	<a href="#">Giordano et al. (2012a)</a>
Slovenia	2008	50–69	2	2/1	—	—	28.0	78.6	—	<a href="#">Lerda et al. (2014)</a>
Spain, Asturias	1991	50–69	2	2	No	40 136	81.8	59.8	73.1	<a href="#">Giordano et al. (2012a)</a>
Spain, Balearic Islands	1990	50–64	2	2	Yes	13 018	54.4	36.9	67.8	<a href="#">Giordano et al. (2012a)</a>

**Table 3.1 (continued)**

Country, region	Start year	Target age (years)	Interval (years)	No. of mammography views <sup>a</sup>	Double reading?	No. of screening tests per year	Invitation coverage <sup>b</sup> (%)	Examination coverage <sup>c</sup> (%)	Participation rate <sup>d</sup> (%)	References <sup>e</sup>
Spain, Basque Country	1990	50–64	2	2/1	No	76 229	95.0	72.3	76.1	<a href="#">Giordano et al. (2012a)</a>
Spain, Galicia	1992	50–66	2	2	Yes	86 170	84.6	66.7	78.9	<a href="#">Giordano et al. (2012a)</a>
Spain, Navarra	1990	45–69	2	2	No	37 044	103.6	92.1	88.9	<a href="#">Giordano et al. (2012a)</a>
Spain, Valencia	1992	45–69	2	2/1	Yes	209 271	101.9	73.9	72.5	<a href="#">Giordano et al. (2012a)</a>
Sweden, Södermanland	1990	40–74	2	2/1	Yes	21 222	84.6	71.0	84.0	<a href="#">Giordano et al. (2012a)</a>
Sweden, Stockholm	1989	40–69	2	2/1	Yes	76 371	95.5	66.8	70.0	<a href="#">Giordano et al. (2012a)</a>
Sweden, Västmanland	1986	40–69	2	2/1	Yes	19 617	93.7	82.5	88.1	<a href="#">Giordano et al. (2012a)</a>
Switzerland, Fribourg	2004	50–70	2	2/1	Yes	6886	88.7	46.7	44.3	<a href="#">Giordano et al. (2012a)</a>
United Kingdom, England	1988	50–70	3	—	Yes	1 634 688	102.4	78.0	74.2	<a href="#">Giordano et al. (2012a)</a>

<sup>a</sup> 2/1 indicates two views at first screening and one view at subsequent screening.

<sup>b</sup> Annual invitations as percentage of annual target population. Data from [Lerda et al. \(2014\)](#) should be considered mainly as indicative trends, as it was not possible for the authors to ensure that the data were consistently reported by country.

<sup>c</sup> Annual examinations as percentage of annual target population. Data from [Lerda et al. \(2014\)](#) should be considered mainly as indicative trends, as it was not possible for the authors to ensure that the data were consistently reported by country.

<sup>d</sup> Annual examinations as percentage of annual invitations.

<sup>e</sup> Data from [Lerda et al. \(2014\)](#) were provided by national authorities and are generally presented at a national level without the regional details. Data from [Giordano et al. \(2012a\)](#) were provided as part of the European Network for Information on Cancer (EUNICE) project, funded by the European Commission. Contributors were those involved with detailed operations of the screening programmes in their regions and countries. Most countries are represented in both surveys, but data from the [Giordano et al. \(2012a\)](#) survey are preferentially shown where available, as the data are more detailed and have been peer-reviewed. There are some differences between the two data sources, and more information is available on individual countries in the full survey reports.

on the previous work ([Giordano et al., 2012a](#)) and provided supplementary information. These surveys reflect the different ways in which breast screening is run in the different countries in Europe, although all aspire to the same quality standard defined in the European guidelines for quality assurance in mammography screening.

In 2007, 26 of the 27 Member States of the EU had breast screening programmes operating, and in 22 of those countries the programme was organized on a population basis ([von Karsa et al., 2008](#)). Overall, it has been estimated that screening programmes in those 26 countries offered breast screening by mammography regularly to more than 79% of their eligible populations, with some countries yet to achieve screening over their entire territory. The size of the populations served by a breast screening programme varies from the very large populations of England and France to the much smaller populations of Luxembourg or a Swiss canton. In some of the smallest programmes, fewer than 20 000 women are screened per year. Austria is piloting an organized programme, and Switzerland has local provision of screening, some of which is organized and some of which is opportunistic ([Giordano et al., 2012a](#)). Most countries report having a system that is mainly or totally public and that is provided at little or no cost to women, although in 20 countries at least some private sector provision of screening is involved ([Lerda et al., 2014](#)). Of the 20 countries with organized screening programmes included in the JRC survey, all reported a degree of national coordination, except for Belgium and Spain ([Lerda et al., 2014](#)).

Countries with regional programmes may have health-care decisions that differ between regions. For example, in Spain the different provinces make their own health policy decisions, and the age range for screening depends on where a woman lives ([Giordano et al., 2012a](#)).

All breast screening programmes in Europe use mammography, and two views and double

reading are standard in most areas. The type of double reading (consensus, arbitration, etc.) varies among the programmes, and there are a few exceptions where a single view and/or single reading are used. France also includes clinical breast examination (CBE) ([Lerda et al., 2014](#)), but this is not usual. All countries screen women in the age group 50–59 years, although some start at age 40 or 45 years and most also invite women up to age 69 or 70 years ([Giordano et al., 2012a](#)). However, among the services reported, France, the Netherlands, and one county in Sweden (Södermanland) also invite women up to age 74 or 75 years. England, alone in the United Kingdom, is conducting a trial of also offering screening appointments to women aged 47–49 years or 71–73 years ([Moser et al., 2011](#)). All countries in Europe screen at 2-year intervals, with the exception of Malta and the United Kingdom, which use a 3-year interval, and there is some scope for annual screening in the pilot in Austria.

Screening for women at high risk of breast cancer at a more intensive level is generally available across Europe. Several European countries (Austria, Germany, Italy, the Netherlands, Norway, and the United Kingdom) have carried out cohort studies on high-risk women using magnetic resonance imaging (MRI) as well as mammography as the screening technique. The European Society of Breast Cancer Specialists has reviewed the evidence and produced consensus guidelines ([Sardanelli et al., 2010](#)) taking into account the recommendations from North America ([Saslow et al., 2007](#)). High-risk protocols focus on genetic risk (*BRCA1/2* and *TP53* mutation carriers) and family history. Provision of more intense breast screening for survivors of cancers in childhood and young adulthood is generally a local clinical decision. High-risk surveillance protocols have recently been formally incorporated into the screening programme in England ([Department of Health, 2013](#)). Recent legislation in some states in the

USA about breast density may influence practice in Europe in the future (see Section 3.2.2).

Across Europe, the switch to digital mammography is well established, but some analogue screen-film mammography sets are still in use. There has been extensive use of computed radiography in some countries, particularly in the early years of digital mammography, when this made the conversion cheaper and potentially quicker to achieve. There have been problems with computed radiography technology in some jurisdictions, and at the same time digital mammography has become more established. Computer-aided detection has not come into general use.

Discussion and research have now moved on to the use of digital breast tomosynthesis. Research trials are under way in some screening programmes to evaluate and assess this technology for routine use. There are some early adopters, but so far no single screening programme has moved to routine use of digital breast tomosynthesis.

The European quality assurance guidelines emphasize that the invitation to screening and initial imaging are only the start of the process. Women with abnormalities will need to have those abnormalities assessed, and any woman with cancer will require treatment. No screening programme encompasses treatment; several, such as the programmes in the United Kingdom, include the diagnostic workup in the programme, but others, such as the programme in the Netherlands, make a referral at that point. In France, the radiologist may undertake ultrasonography and clinical examination at the time of the initial imaging if this is thought to be warranted at that time ([Lerda et al., 2014](#)).

Across Europe, the need to deliver breast screening to the requisite quality has been accepted as the appropriate standard of care. Four editions of the European guidelines for quality assurance ([Perry et al., 2006](#)) have developed the concept, starting from the quality of the original

image, to cover the diagnostic process, including histopathology and the underpinning epidemiology for the programmes. The basic importance of a high-quality image has remained over the years, and there are now guidelines to cover digital mammography, MRI, and the appropriate use of ultrasonography, including input about physics where necessary. Given the difference in population sizes across the different countries in Europe, the quality assurance operation can be regionally or nationally based, but often there is national coordination of data to enable evaluation of the overall activity. This has enabled the Europe-wide surveys to have an overview of the services that are delivered ([Giordano et al., 2012a](#); [Lerda et al., 2014](#)).

The European guidelines for quality assurance specify that personnel should hold appropriate professional qualifications, but these vary from one state to another and there are complex EU rules governing recognition of medical and allied qualifications between states. However, universally after initial training, personnel are required to undergo specialist training for work in breast cancer screening, to participate in continuing education and update training, and to participate in any recognized quality assurance schemes. Also, who actually reports the mammogram can vary from one country to another. For example, in the United Kingdom, radiographers have evolved “advanced practice” and can not only report the images but also perform several diagnostic procedures, such as needle biopsies. In contrast, in the United Kingdom there is no role in breast cancer for the gynaecologist, which is standard practice in several other countries in Europe.

#### (b) *Participation*

Participation rates in organized programmes are reported to vary from just under 20% in Poland to nearly 90% in the Navarra region of Spain, with an average across Europe of just less than 50% ([Giordano et al., 2012a](#)). It is not known

how many women are screened outside of the organized programmes ([von Karsa et al., 2008](#)). Estimates of opportunistic screening rates were sought in the JRC survey, but of the 22 countries that responded, no information was available for 5 and the rates were regarded as very low in 8 ([Lerda et al., 2014](#)). However, the contribution of opportunistic screening was regarded as significant in Austria, Belgium, Cyprus, Finland, France, Italy, Malta, Slovenia, and Switzerland.

Participation in breast cancer screening is influenced by personal, socioeconomic, cultural, and other factors (see Section 3.1). Generally, in Europe, the more affluent a woman, the more likely she is to participate in breast cancer screening ([Maheswaran et al., 2006](#); [Moser et al., 2009](#)), whereas ethnic minority status and, particularly, being an immigrant are likely to decrease screening participation ([Vermeer & Van den Muijsenbergh, 2010](#)). These factors can be influenced by how the screening offer is made and how access to screening is organized ([Palència et al., 2010](#)). A randomized controlled trial in Italy that invited women to screening by different means of communication concluded that invitation letters with a fixed appointment to screening correlated with a higher attendance rate but did not overcome the social gradient in participation ([Giordano et al., 2012c](#)). However, a study from 22 European countries found socioeconomic inequalities in screening in countries with opportunistic screening but not in countries with nationwide population-based programmes ([Palència et al., 2010](#)). A study in France found that the existence of a screening programme decreased socioeconomic differences in participation, especially in women aged 60 years and older ([Duport & Ancelle-Park, 2006](#)). As part of the European initiative on screening participation funded by the European Commission, [Molina et al. \(2013\)](#) reported on social inequalities in participation in cancer screening programmes in Spain.

(c) *Information and breast cancer awareness*

The information provided to women who are invited to screening has developed a great deal since the early years, when the emphasis was on encouraging or even persuading women to participate. In 1999, Austoker wrote about the need to respect patients' autonomy and not to gloss over the uncertainties and harms, as well as describing the benefits ([Austoker, 1999](#)). The United Kingdom moved to an explicit policy of informed choice in 2003, and the fourth edition of the European quality assurance guidelines included, for the first time, a section on communication to support informed decision-making and described four ethical principles: autonomy, non-maleficence, beneficence, and justice ([Perry et al., 2006](#)). In reviewing the current state of knowledge on breast screening in Europe, the Euroscreen Working Group discussed how to communicate the issue of balancing benefits and harms in breast screening ([Giordano et al., 2012b](#)). One of the points made was that women did not make decisions about whether to participate in screening based solely on the quantitative and evidence-based information provided but also took into account cultural factors and other issues.

In the past 20 years, October has become Breast Cancer Awareness Month in many countries around the world, including most of Europe. Since 2008, 15 October has been designated as Breast Health Day to focus activity even further. Europa Donna, the European Breast Cancer Coalition, has promoted Breast Health Day in all the countries of the EU ([Fricker, 2009](#)). In 2014, the National Health Service in England ran a specific campaign to improve awareness about breast cancer in older women because of concern that older women were delaying presentation to their doctor after finding symptoms in their breasts ([Grunfeld et al., 2002](#); [NHS Choices, 2014](#)).



### 3.2.2 North America

This discussion focuses on Canada and the USA.

Breast cancer screening is available and is well established in North America. In both Canada and the USA, some level of organized and opportunistic screening exists, but in Canada breast cancer screening is delivered mostly through organized programmes, whereas in the USA screening is mostly opportunistic. These two countries have unique health systems, and therefore they will be described separately.

#### (a) Canada

In 1992, the Canadian federal government launched the Canadian Breast Cancer Screening Initiative (CBCSI), which has since been integrated into the Canadian Partnership Against Cancer ([CPAC, 2013](#)). Currently, federal funding for the CBCSI is through the Public Health Agency of Canada.

#### (i) Systems, policies, and guidelines

Among the 13 provinces and territories in Canada, organized breast cancer screening programmes have been initiated in all except Nunavut; British Columbia started its programme in 1988, and the Northwest Territories started its in 2003 (see [Table 3.2](#)). Opportunistic screening, typically performed in facilities not participating in the organized programme, is also available in all provinces and territories, and some women who qualify for the organized programme, as well as women in age groups that are not invited to screening, can receive screening mammograms outside of the programme. For example, of the 60% of women aged 50–74 years in Ontario who were screened in 2011–2012, approximately 16% were screened outside of the organized programme ([Cancer Quality Council of Ontario, 2014](#)). The Public Health Agency of Canada promotes to the target population the advantages of organized screening compared

with opportunistic screening, based on the reliability and quality of a programme that includes population-based recruitment, automatic recall/reminders for subsequent screening, coordinated follow-up for abnormal screening results, systematic quality assurance, and the ability to provide monitoring and evaluation of programme performance ([CPAC, 2013](#)). In Canada, there is no cost to women for screening mammography, regardless of whether they are screened in the organized programme or opportunistically.

The Canadian Task Force on Preventive Health Care recommends mammography screening every 2–3 years for women aged 50–74 years ([Tonelli et al., 2011](#)), but the provinces and territories set their own screening policies with respect to age, high-risk status, and invitation versus physician referral ([Table 3.2](#)). All provinces and territories invite women aged 50–69 years to biennial mammography screening; however, they differ in terms of whether mammography screening is available by invitation or by physician referral for women younger than 50 years and older than 70 years, and also in the type of mammography that is available. Screening mammograms are provided at fixed sites in the larger urban areas, and through mobile mammography for rural and distant communities. Digital mammography is available in Canada, both with digital radiography and with computed radiography, although computed radiography is no longer available in Ontario after evidence demonstrating lower sensitivity led Health Ontario to ban the use of computed radiography for breast cancer screening ([Chiarelli et al., 2013](#); [Montgomery, 2013](#)). However, the penetration of digital radiography is highly variable both in the organized programmes and in settings that provide only opportunistic screening. For example, in Newfoundland, all 14 units in the screening centres are digital radiography units, and in Ontario, which accounts for 38% of the population of Canada, digital radiography units account for 95% of the screening

**Table 3.2 Policies and practice for breast cancer screening with mammography in North America**

Country	Start year	Target age (years)	Interval (years)	Examination coverage <sup>a</sup> (%)
Canada	All provinces invite women aged 50–69 years to biennial screening with 2-view mammography. Policies for other age groups vary by province; see below			47.3
Alberta	1990	40–49 70–74 ≥ 75	1 2 NR	7.5 <sup>b</sup>
British Columbia	1988	30–39 40–49 70–79 ≥ 80	PR, NR 1 2 PR, NR	56.5
Manitoba	1995	40–49 ≥ 70	PR, 2 PR, NR	58.4
Nunavut	No programme, but opportunistic screening is available			
New Brunswick	1995	40–49 ≥ 70	PR, NR PR, NR	59.2
Newfoundland and Labrador	1996	≥ 70	IPE, NR	40.1
Northwest Territories	2003	40–49 ≥ 70	1 2	28.9
Nova Scotia	1991	40–49 ≥ 70	1 NR	59.9
Ontario	1990	30–49 70–74 ≥ 75	HR, PR, 1 2 NR	42.5
Prince Edward Island	1998	30–39 40–49 70–74	HR, PR, 1 1 2	—
Quebec	1998	35–49 ≥ 70	PR, NR PR, NR	60.1
Saskatchewan	1990	70–74 ≥ 75	IPE, 2 NR	50.0
Yukon	1990	40–49 ≥ 70	NR 2	—
USA	Mid-1980s	40–49 50–74	1 2	51.3

HR, high-risk; IPE, accept if previously enrolled in the screening programme; PR, physician referral; NR, no recall (indicates that women in this age group will be accepted for screening but will not be recalled for subsequent screening).

<sup>a</sup> Canada: women who had a screening mammogram within a 30-month period as percentage of target population, in 2009. USA: women who had a screening mammogram in the previous year as percentage of target population, in 2013.

Data for Canada from [CPAC \(2013\)](#); data for USA from [USPSTF \(2009\)](#) and [Smith et al. \(2015\)](#).

<sup>b</sup> Data for Alberta were collected from the Screen Test programme only, which conducts approximately 10–12% of screening mammograms in the province.

units. In contrast, all screening units in Manitoba are screen-film units. Some of the provinces and territories, such as British Columbia, are transitioning to digital radiography units (Dr Martin J. Yaffe, University of Toronto, Canada, personal communication, 2014).

In the organized screening programmes, the coordination of invitations and recall for screening is managed through a centralized programme or agency (Alberta, British Columbia, Manitoba, Northwest Territories, Nova Scotia, and Saskatchewan), through screening centres (New Brunswick, Newfoundland and Labrador, Ontario, Prince Edward Island, and Yukon), or through regional coordination centres (Quebec) (CPAC, 2014). Women are invited every 2 years, but some women are invited after 1 year, based on age, breast density, family history, and results of previous screening examinations. Five provinces or territories invite women on an annual basis if they have a mammographic density of more than 75% (Newfoundland and Labrador, Northwest Territories, Nova Scotia, Ontario, and Saskatchewan). If the screening mammogram is abnormal, either the screening programme or the woman's primary care provider coordinates follow-up testing (CPAC, 2013, 2014).

Six provinces or territories also have incorporated criteria for referral to MRI for women at high risk (Alberta, British Columbia, Newfoundland and Labrador, Nova Scotia, Ontario, and Prince Edward Island), principally for women who have undergone genetic testing and tested positive for a *BRCA1/2* mutation or other high-risk mutation of known penetrance, or women who had chest irradiation at age 10–30 years (CPAC, 2014).

All provinces have quality assurance programmes that focus on image quality. Most provinces and territories also have requirements for minimum numbers of screening examinations that radiologists should evaluate each year, and most evaluate radiologists' level of performance annually (Prince Edward Island

and Yukon are exceptions) (CPAC, 2014). In Alberta, Northwest Territories, and Quebec, the minimum annual volume of mammography examinations is 480–500, which is similar to the minimum volume (480) in the USA under the Mammography Quality Standards Act (MQSA) (FDA, 1992); higher minimum annual volumes are required in Manitoba, Ontario, and Saskatchewan (1000), New Brunswick (1200), Newfoundland and Labrador and Nova Scotia (2000), and British Columbia (2500). In some provinces or territories, both screening and diagnostic examinations are acceptable for minimum volume requirements (Alberta, New Brunswick, and Ontario), whereas in the others, only screening examinations qualify. National targets also exist for screening outcomes on initial and subsequent screening examinations, including abnormal recall rate, invasive cancer detection rate, positive predictive value, proportion of screen-detected invasive cancers of 15 mm or smaller, and interval cancer rates (CPAC, 2013). Six provinces or territories solicit feedback from women undergoing screening about their satisfaction with the process (Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Northwest Territories, and Nova Scotia) (CPAC, 2014).

### (ii) Participation

The target participation rate for the breast cancer screening programmes in Canada is 70% attendance of women aged 50–69 years within a 30-month period. The programmes also have target retention rates of 75% for women aged 50–69 years who return for screening within 30 months after an initial screen and of 90% for a subsequent screen (CPAC, 2013). In 2009, 47.3% of women aged 50–69 years had been screened within the previous 30 months, with a range of 7.5% to 60.1% among the organized programmes (Table 3.2). Based on a review of 52 studies of mammography use among Canadian women, Hanson et al. concluded that the most common

barriers to screening were ethnic minority status, older age, and concerns about radiation, pain, and embarrassment ([Hanson et al., 2009](#)). Lower income, low awareness about breast cancer and breast cancer screening, language and communication difficulties, and living in a rural area were also common barriers. While some studies identified lower educational status as a barrier to screening, others did not, leading to speculation that the expected influence of lower educational status on uptake of screening had been mitigated by programmes targeted at women with lower education levels. The reason reported most frequently by women for having had a recent mammogram was a provider's recommendation.

(iii) *Information and breast cancer awareness*

Strategies to increase screening uptake in Canada include letters of invitation, mass media campaigns, population-based invitations, and educating physicians to increase referrals to screening. Advocacy groups also provide educational information. On the website of the Canadian Breast Cancer Foundation, there is clear information about the benefits and limitations of mammography, including a discussion about overdiagnosis and advice to be informed about breast cancer screening and to make an informed decision about screening ([Canadian Breast Cancer Foundation, 2014](#)).

(b) *USA*

(i) *Systems, policies, and guidelines*

In the USA, mammography screening began to become available opportunistically during and after the initiation of the Breast Cancer Detection Demonstration Project by the American Cancer Society (ACS) and the National Cancer Institute ([Baker, 1982](#)), after the publication of favourable results from the Health Insurance Plan of Greater New York randomized trial of breast cancer screening ([Shapiro et al., 1971](#)). The increase in mammography screening was significantly influenced by advocacy groups

and federal and state agencies' promotion of mammography to women and primary care providers during the late 1980s and early 1990s ([CDC, 1989](#)), as well as by advocacy groups' efforts to compel state and federal regulations to require mandated coverage of mammography by health insurance plans ([CDC, 2000](#)). In 1981, only one state in the USA (Illinois) mandated that health plans cover mammography, but by 2000 the District of Columbia and all but one state (Utah) mandated health insurance reimbursement for mammography screening. Despite state legislation, many women either had no health insurance or had a health plan that was not covered by state law, and thus still faced financial barriers to screening ([Trivedi et al., 2008](#)).

Many, but not all, of these shortcomings in coverage were resolved in 2010 by the passage of the Affordable Care Act, which requires that new or altered private health plans fully cover (i.e. no cost sharing) preventive health services, including mammography ([Blumenthal & Collins, 2014](#)). Thus, for all women with private health plans, screening mammography in the USA is fully covered. Some low-income women and all adults aged 65 years and older are covered by two federal programmes, Medicaid and Medicare. By statute or agency policy, Medicaid or public assistance programmes in all 50 states and the District of Columbia cover mammography screening for breast cancer either routinely or upon a physician's recommendation. Medicare covers annual mammography for women aged 65 years and older. Under the Affordable Care Act, women living in states that enter into an agreement with the federal government to expand Medicaid will have the same coverage for mammography screening as women with private health plans. However, in 2014 only about half of the states had chosen to expand Medicaid. Under Medicare, coverage for screening mammography every 2 years began in 1991, and coverage for screening mammography annually began in 1998 ([NCI, 2013](#)).

Recommendations for breast cancer screening for women at average risk are issued by numerous organizations in the USA, although the dominant guideline development organizations are the ACS and the USPSTF ([Smith et al., 2003](#); [USPSTF, 2009](#)). ACS guidelines recommend that women undergo CBE at least every 3 years between age 20 years and age 40 years, and annually afterwards, and that they begin annual mammography at age 40 years and continuing screening until a woman likely will no longer benefit from screening due to poor health conditions. [Note added after the Meeting: These guidelines have recently been updated.] The USPSTF does not recommend CBE, and recommends biennial screening between age 50 years and age 74 years. However, under the Affordable Care Act, the United States Congress requires health plans to cover mammography screening beginning at age 40 years, according to previous USPSTF guidelines ([NBCCEDP, 2002](#)). Although neither the ACS nor USPSTF recommends monthly BSE, the majority of physicians in the USA report that they recommend mammography, CBE, and BSE to women aged 40 years and older ([Meissner et al., 2011](#)). In addition, considerable deviation from guidelines by health-care professionals is also seen, with either overuse or underuse of mammography ([Bynum et al., 2005](#); [Kapp et al., 2010](#); [Leach et al., 2012](#)).

In 2007, the ACS issued guidelines for high-risk women and recommended annual screening mammography and MRI starting at age 30 years for women with a known *BRCA* mutation, women who are untested but have a first-degree relative with a *BRCA* mutation, women with a 20–25% or greater lifetime risk of breast cancer as estimated mainly by family history, or women who had been treated with radiation to the chest for Hodgkin lymphoma between age 10 years and age 30 years ([Saslow et al., 2007](#)).

In the USA, mammography quality assurance is governed by the United States Food and Drug Administration under the MQSA ([FDA, 1992](#)).

Early quality assurance efforts in the USA were strongly influenced by the American College of Radiology's Mammography Accreditation Program, which had the goal of establishing quality standards for mammography and began to accredit mammography facilities in August 1987 ([McLelland et al., 1991](#)). To ensure that women could depend on a uniform set of quality standards in all mammography facilities, Congress passed the MQSA in 1992. Under the MQSA, all facilities offering mammography services are required to be accredited by an approved accrediting body, undergo an annual on-site inspection, and be certified by an agency designated by the Secretary of Health and Human Services. The Food and Drug Administration was assigned the task of enforcing the MQSA by establishing standards for personnel, equipment, quality control, record-keeping, regulations, inspection processes, compliance mechanisms, and penalties for failure to comply with the regulations ([Fintor et al., 1995](#)). Accreditation must be renewed every 3 years, and on-site inspections by the state health department occur annually. Interpreting physicians must be board-certified in radiology or board-certified with extensive additional training related to radiology, and are required to interpret 960 mammograms over a 24-month period and to receive continuing medical education related to mammography over a 36-month period ([FDA, 1992, 2014](#)).

Under MQSA regulations, referring physicians and women undergoing screening must receive a report of the mammography results, and the woman's report should be written in lay language. Recently, 21 states have passed legislation mandating that mammography reports also include communication about breast density if a woman has heterogeneously dense or very dense breast tissue ([Are You Dense?, 2013](#)). The legislation is being promoted by the advocacy group Are You Dense? and commonly requires that women with significant breast density be informed on their mammography reports about their breast

density, and that women with significant breast density should consider supplemental imaging. Federal legislation has also been introduced, and the National Mammography Quality Assurance Advisory Committee has endorsed adding similar language to the current federal requirements for reporting the results of mammography examinations ([National Mammography Quality Assurance Advisory Committee, 2011](#)).

(ii) *Participation*

In the USA, nearly all breast cancer screening is opportunistic, but it shares various programme elements commonly found in organized screening programmes. Some screening programmes, such as those operated by more integrative health plans and, in particular, the Centers for Disease Control and Prevention's National Breast and Cervical Cancer Early Detection Programme, have a greater degree of organization, but neither meets the level of integration of key elements that distinguishes organized programmes from opportunistic models ([NBCCEDP, 2014](#)). In the absence of central registers to provide invitations to screening, a referral from a health-care professional has remained the main reason that women report for having had a recent mammogram ([MacDowell et al., 2000](#)).

Mammography is widely available in the USA, although access may be limited by geography in rural and frontier areas and by shortages of units and personnel in some urban areas ([D'Orsi et al., 2005](#); [Coughlin et al., 2008](#); [Leung et al., 2014](#)). Availability of mammography is not governed by any central authority, and despite an increasing population, the number of mammography facilities has been declining in recent years. Between 2000 and 2010, the number of mammography facilities and mammography units in the USA declined by 10%, and the median county mammography capacity declined by 20%, from 1.77 to 1.42 mammography machines per 10 000 women aged 40 years and older ([Elkin et al., 2013](#)). Geographical variation in capacity and

declines in capacity were associated with demographic, socioeconomic, and health-care market characteristics. Specifically, counties with a higher percentage of uninsured population, lower education levels, and higher population density had a lower mammography capacity.

Uptake of mammography was fairly rapid in the period from 1985 to 1989, and by 1990 a summary of seven studies demonstrated that between 25% and 41% of non-Hispanic White women aged 50–74 years reported having had a mammogram in the previous year ([NCL, 1990](#)). Data from the National Health Interview Survey in 2013 showed that 51.3% of American women aged 40 years and older reported having had a mammogram in the previous 12 months, revealing that there had been little change in breast cancer screening rates among American women since 2005, when 51.2% of women aged 40 years and older reported having had a mammogram in the previous year ([Smith et al., 2015](#)). Breast cancer screening rates differed by ethnicity, ranging from 45.9% in Hispanic women to 52.6% in non-Hispanic Black women, and screening rates among the insured (54.8%) were more than twice those among the uninsured (22.3%).

(iii) *Information and breast cancer awareness*

In the USA there are numerous opportunities for women to acquire information in various forms (websites, educational materials, public service announcements, etc.) about the benefits, limitations, and harms associated with breast cancer screening. Educational efforts are supported by federal and state health agencies, nongovernmental organizations (NGOs), health plans, and health service providers ([American Cancer Society, 2014](#); [CDC, 2014](#); [Susan G. Komen, 2014](#)). Guidelines commonly recommend mammography but also emphasize that women should be informed about screening mammography and that referring physicians should support shared and informed decision-making. However, the

content of this information commonly differs in terms of the detail and thoroughness on key aspects of the benefits, limitations, and harms associated with breast cancer screening.

### 3.2.3 Latin America

Latin America includes Central America, South America, and the Spanish-speaking countries of the Caribbean. It is characterized by disparities in social and health service development, not only between countries but also within countries. These conditions, and particularly contextual factors related to health system organization and financing, strongly influence the implementation and performance of breast cancer screening ([Akinyemiju, 2012](#)).

Some of the countries with the highest per capita gross domestic product (GDP) in the region, such as Argentina, Brazil, and Uruguay, have high breast cancer incidence rates (age-standardized rate,  $\geq 60$  per 100 000), whereas countries with similar GDPs, such as Chile, Mexico, and Venezuela, have lower incidence rates (age-standardized rate, 35–41 per 100 000) ([Ferlay et al., 2012](#); [PAHO, 2012](#)). There are large differences between countries in health system development; in some countries, such as Paraguay, about 80% of the population is without health coverage or insurance, whereas other countries, such as Cuba, report 100% health coverage ([PAHO, 2012](#)).

Despite differences in the definition of health system coverage, most countries in the region report social security systems with coverage for workers and their relatives, but only a few countries have implemented substantial complementary health-care coverage through insurance plans not only for workers but for the entire population; Chile, Colombia, Costa Rica, and Puerto Rico have reached more than 90% of their citizens, Peru about 60%, and Mexico about 40% ([PAHO, 2012](#)). However, the package of services included in these insurance plans

varies enormously; consequently, specific insurance plans for cancer treatment have been implemented in some countries, such as Mexico, Peru, and Uruguay, but not in all countries ([PAHO, 2012](#)).

#### (a) Systems, policies, and guidelines

With the exception of Venezuela, all of the Latin American countries in which breast cancer is the leading cause of cancer mortality among women have developed recommendations or guidelines for early detection; however, currently no country in the region meets all the criteria of organized programmes. Cuba, El Salvador, and Peru have also developed national recommendations, despite the fact that breast cancer is not the leading cause of cancer mortality among women in those countries ([Ferlay et al., 2012](#); [PAHO, 2013](#)). The available recommendations are summarized in [Table 3.3](#).

Of the 13 countries with national recommendations, 6 include BSE as one of the strategies for breast cancer control, 10 include CBE, and 12 include mammography as the basic component for screening, but only 3 (Colombia, El Salvador, and Peru) specify two-view mammography in the available guidelines.

Although the basic screening strategies are similar, there are some differences between the Latin American countries in the age range and the frequency of examination. El Salvador, Panama, and Peru recommend BSE to all women after menarche, whereas the remaining countries recommend BSE for adult women, except for Cuba, which recommends starting BSE at age 30 years. The largest variability is seen for CBE: three countries recommend starting CBE at age 40 years, three recommend starting during the thirties, two recommend starting during the twenties, and the remaining two countries recommend CBE for all women after menarche. The observed differences between countries, and particularly the recommendation of BSE and CBE for all women, may indicate that those strategies

**Table 3.3 Policies and practice for breast cancer screening in Latin America**

Country	National recommendation or guideline <sup>a</sup>			Mammography units per million women aged 50–69 years in 2013 <sup>b</sup>
	Screening practice	Target age (years)	Interval (years)	
Argentina	CBE	40–50	1	—
	Mammography	50–70	2	
Brazil	CBE	40–69	1	—
	Mammography <sup>c</sup>	50–69	2	
Chile	Mammography	50–74	2	32.2 <sup>d</sup>
Colombia <sup>e</sup>	CBE	≥ 40	1	—
	Mammography	50–69	2	
Costa Rica	Mammography	≥ 40	1	150.3
Cuba	BSE <sup>f</sup>	≥ 30	—	15.6 <sup>b</sup>
	CBE	≥ 30	1	
	Mammography	50–64	3	
Dominican Republic	BSE	≥ 18	Monthly	—
	CBE	≥ 35	Any contact with health provider	
	Mammography	≥ 35	35–40: 2 > 40: 1	
El Salvador	BSE	All women	Monthly	70
	CBE	All women	Any contact with health provider	
Mexico	BSE	≥ 20	Monthly	74.5
	CBE	≥ 25	1	
	Mammography	40–69	2	
Panama	BSE	All women	Monthly	278.5
	CBE	All women	Any contact with health provider	
	Mammography	≥ 35	35: baseline 40–50: 1–2 > 50: 1	
Peru <sup>g</sup>	BSE	All women	Monthly	—
	CBE	≥ 30	1	
	Mammography	≥ 40	1	
Puerto Rico	Mammography	50–74	2	—
Uruguay	CBE	≥ 20	20–39: 3 ≥ 40: 1	172.4
	Mammography	≥ 40	1–2	

<sup>a</sup> PAHO (2013).<sup>b</sup> WHO (2014).<sup>c</sup> In women with a family history of breast cancer, mammography is annual, starting at age 35 years.<sup>d</sup> Restricted to the public sector.<sup>e</sup> Updated from [Ministerio de Salud y Protección Social \(2013\)](#).<sup>f</sup> [Ortíz-Martínez et al. \(2005\)](#).<sup>g</sup> [INEN \(2008\)](#).

BSE, breast self-examination; CBE, clinical breast examination.



are not necessarily considered as screening techniques with false-positive and false-negative results but rather as complementary actions for general women's health care, a hypothesis that is reinforced by the fact that no specific indications about quality control or impact evaluation were found.

For mammography, six countries recommend beginning screening at age 50 years, four at age 40 years, and two during the thirties. The recommendation to provide mammography screening for women before age 50 years, and before age 40 years in the Dominican Republic and Panama, may be influenced by the relevant percentage of cases in this age group in most Latin American countries. Like for BSE and CBE, despite the widespread existence of recommendations, not all countries seem to have developed evidence-based guidelines, and even among those with this tool, such as Chile, Colombia, and Mexico, the final indication for mammography screening differs, with only Colombia including an economic evaluation to establish recommendations ([Secretaría de Salud de México, 2008](#); [Ministerio de Salud de Chile, 2011](#); [Ministerio de Salud y Protección Social, 2013](#)). The situation described here does not take into account guidelines developed by scientific societies and other organizations outside of national governments.

With regard to high-risk women, Colombia and Mexico provide specific recommendations in the available guidelines, with a clear definition of risk categories and screening based on MRI ([Secretaría de Salud de México, 2008](#); [Ministerio de Salud y Protección Social, 2013](#)). Peru describes risk factors for breast cancer, but no specific definition of high-risk women is presented; in addition, recommendations for high-risk women aged 35 years and older are the same as those for women at average risk aged 40 years and older ([INEN, 2008](#)). In contrast, Chile recommends using validated risk scales, but no specific recommendation for screening of high-risk women is presented ([Ministerio de Salud de Chile, 2011](#)).

Information on health service availability and supply is scarce in Latin American countries. Some data show the highest rates of mammography units per million women aged 50–69 years in Panama, Uruguay, and Costa Rica (278.5, 172.4, and 150.3, respectively) and the lowest in Cuba and Paraguay (15.6 and 7.3, respectively; information restricted to the public sector) ([WHO, 2014](#)); the low availability of mammography units in some countries may be related to low participation rates despite the declaration of universal health coverage, such as in Cuba. A survey conducted among 30 surgical associations and breast surgery societies in 18 Latin American countries showed that more than 53% of surgeons lack specific training in breast care and that less than 50% have a sufficient number of cases per month to warrant proper expertise ([Acuna et al., 2014](#)).

Latin American countries have made progress in policy definition for breast cancer control, mainly concerning technical standards, access to screening, diagnosis and treatment, resource allocation, and training of personnel ([González-Robledo et al., 2010, 2013](#)). Progress on this issue does not necessarily result in programme implementation and performance; indeed, although Uruguay has better indicators for breast care access, more structured policies and regulations are seen in Argentina, Brazil, Colombia, and Mexico ([González-Robledo et al., 2010](#)). Similarly, although Chile does not have strong indicators (mammography units per million women, 32.2) ([WHO, 2014](#)), it has implemented one of the most comprehensive policies in Latin America, including a law on guarantees for health that defines, among other health conditions, specific ages and conditions for access to breast cancer diagnosis and treatment ([González-Robledo et al., 2010](#)).

All of the above-mentioned screening guidelines and recommendations include general indications about mammography quality assurance, but no specific guidance is provided

and no mention of CBE is made. Argentina, Brazil, and Colombia have published guidelines for mammography quality control ([INCA, 2007](#); [Blanco et al., 2010](#); [INC, 2011](#)), and the International Atomic Energy Agency has designed a quality control programme for mammography oriented specifically to Latin American countries ([IAEA, 2006](#)). No quality control programme has yet been implemented in Argentina ([Viniegra et al., 2010](#)).

A report from Colombia showed results from 39 centres in 6 capital cities where the quality control protocol was implemented. The evaluation included equipment and facilities, processes, and film quality. On average, general compliance with standards for screen-film mammography was 59.4%, with the highest compliance for glandular dose (94.7%) and the lowest compliance for image quality and facility conditions for image reading ([Alejo-Martínez et al., 2013](#)). In the same way, data from 35 mammography centres in Goiânia, Brazil, revealed an improvement in compliance with quality standards from 64.1% in 2007 to 77.1% in 2009; 80% of centres met the standard for glandular dose, thus indicating a positive effect of the quality control programme ([Corrêa et al., 2012](#)). Another evaluation, carried out in five mammography services in Mexico City, showed general compliance of between 52% and 82%, with critical failure points in the film-processing darkroom and viewboxes but 100% compliance in glandular dose. The clinical image reviewed by an external expert panel showed poor quality and low reading agreement ([Brandan et al., 2004](#)). Despite the satisfactory results for glandular dose, a recent study by the International Atomic Energy Agency in 13 Latin American countries that analysed more than 2000 patient doses found that 15–19% of cranio-caudal views and 23–26% of mediolateral oblique views reported values above the 3 mGy standard; in addition, five countries had diagnostic levels above this limit, suggesting that improvement

in process safety, monitoring, and evaluation is highly desirable ([Mora et al., 2014](#)).

#### (b) *Participation*

During the past decade, at least five countries have reported information on breast cancer screening uptake from national probabilistic surveys, and five more were included in the World Health Survey of 2003 ([Table 3.4](#); [WHO, 2005](#); [Gobierno de El Salvador, 2009](#); [Gobierno de Chile, 2011](#); [Minsal, 2011](#); [Profamilia, 2011](#); [INSP, 2012](#); [Torres-Mejía et al., 2013](#)).

Most surveys have been focused on mammography, with only two countries that collected information on BSE, and only one on CBE. Data on mammography use differ in terms of year of collection, age of surveyed population, and definition of coverage. The World Health Survey conducted in 2003 obtained information from six Latin American countries (the report on the topic for Guatemala is not available) ([WHO, 2005](#)). Brazil and Uruguay presented the highest uptake in the region, and, similarly, Argentina reported 54.2% coverage in 2011 ([Minsal, 2011](#)). According to the available information, the coverage of mammography screening in these three countries is more than twice that observed for other countries with existing data, except for Chile, which has an intermediate coverage of 36.2% ([Gobierno de Chile, 2011](#)). As previously stated, these countries have the highest breast cancer incidence rates in the region, and Chile has one of the most organized health systems in Latin America, as well as suitable development of policies for cancer control.

Across all Latin American countries, about 80% of the population is urban, and, in general, women living in urban areas have a higher participation rate in screening than those living in rural areas ([Table 3.4](#)), probably due to deficiencies in health system development ([Goss et al., 2013](#)). In addition, data from Colombia show that breast cancer mortality is concentrated in large urban centres, indicating a greater need for action in

**Table 3.4 Coverage of breast cancer screening in Latin America**

Country	Target age (years)	Coverage definition <sup>a</sup>	Year of survey	Examination coverage <sup>b</sup> (%)			Richest-to-poorest ratio <sup>c</sup>
				Urban	Rural	Total	
<i>Mammography alone</i>							
Argentina	≥ 40	Within past 2 years	2011	NR	NR	54.2	1.5
Chile	45–64	Within past 5 years	2010	NR	NR	36.2	
Colombia	40–69	Within past 2 years	2010	21.3	5.4	18.0	15.5
Mexico	50–69	Within past 2 years	2012	32.3	17.7	21.0	
<i>Mammography or CBE</i>							
Brazil	40–69	Within past 3 years	2003	50.4	28.8	47.1	3.4
Dominican Republic	40–69	Within past 3 years	2003	19.1	15.2	17.6	1.9
Ecuador	40–69	Within past 3 years	2003	13.4	5.6	10.8	1.8
Paraguay	40–69	Within past 3 years	2003	18.9	6.2	13.7	12.3
Uruguay	40–69	Within past 3 years	2003	55.8	41.4	54.7	2.1
<i>Mammography or ultrasonography</i>							
El Salvador	40–49	Within past 2 years	2008	32.4	12.4	24.3	11.7
<i>CBE only</i>							
Colombia	≥ 35	Within past year	2010	24.0	14.6	24.3	2.6
<i>BSE only</i>							
Colombia	18–69	Monthly practice within past year	2010	25.8	18.0	24.2	2.2
El Salvador	15–49	Monthly practice	2008	17.9	8.8	14.0	

<sup>a</sup> Definition of coverage indicates the history of screening activities within a given period preceding the corresponding survey.

<sup>b</sup> Number of women reporting undergoing screening examination within the coverage period as percentage of total number of women in the target population.

<sup>c</sup> Differential coverage between the highest income level and the lowest income level. Caution is advised when comparing ratios, as the definition of income levels varies between countries.

BSE, breast self-examination; CBE, clinical breast examination; NR, not reported.

Compiled by the Working Group. Data adapted from [WHO \(2005\)](#), [Gobierno de El Salvador \(2009\)](#), [Gobierno de Chile \(2011\)](#), [Minsal \(2011\)](#), [Profamilia \(2011\)](#), [INSP \(2012\)](#), [Torres-Mejía et al. \(2013\)](#).

these zones ([Piñeros-Petersen et al., 2010](#)); as the data were adjusted and breast cancer is the only malignant neoplasm with such a geographical distribution, this suggests that the finding is due not to registration bias but rather to a lack of proper response from the health system.

Uruguay reports comparable coverage for women aged 40–49 years and those aged 50–69 years (57.1% and 52.7%, respectively) ([WHO, 2005](#)), but Mexico shows a significantly lower coverage for women aged 40–49 years than for those aged 50–69 years (17.2% and 29.4%, respectively) ([INSP, 2012](#); [Torres-Mejía et al., 2013](#)).

The richest-to-poorest ratio as an indicator of social disparities in access to breast cancer early detection deserves special mention. Comparisons merit cautious analysis since definitions of income strata differ between country reports, both in number and in interval limits; however, the large gap between the highest and lowest income strata for Colombia, El Salvador, and Paraguay clearly indicates important social inequalities in access to screening, in spite of the expected gradient between income levels ([Table 3.4](#)). Additional studies in Colombia found similar results regarding income and education, but data on the effect of insurance plan or type of affiliation to the health system are contradictory ([Charry et al., 2008](#); [Piñeros et al., 2011](#)). Reports from Brazil and Mexico reveal similar results, but in the case of Brazil, racial inequalities have been observed in local analysis ([Dias-da-Costa et al., 2007](#); [Lages et al., 2012](#)), and in Mexico affiliation to the health system is associated with better access ([Agudelo Botero, 2013](#)). From a different perspective, a report from Argentina showed a reduction in social disparities when data from the 2005 and 2009 National Surveys of Risk Factors were compared ([De Maio et al., 2012](#)).

National surveys from Chile and Colombia reported relevant information on the issue of access to diagnosis and treatment after screening. In 2010, almost 98% of Colombian women

received mammography results and about one half of women with abnormal mammography findings underwent biopsy ([Profamilia, 2011](#)); since no information is available on specific mammography findings, it is not possible to establish whether these data represent improper access or overuse of confirmatory diagnosis. In 2011, Chile reported that about 17% of screen-positive women had no diagnostic follow-up procedures or treatment ([Gobierno de Chile, 2011](#)). In addition, two reports from different cities in Brazil showed a significant delay between clinical suspicion and confirmatory diagnosis, with a median time of 3–6 months ([Trufelli et al., 2008](#); [Soares et al., 2012](#)); furthermore, a significant correlation was found between stage IV disease and longer elapsed time between mammography and final biopsy results. Likewise, two reports from Colombia showed that the majority of women (65.9%) sought medical attention within 1 month after initial symptoms or abnormal mammography, whereas the median time between initial consultation and beginning of treatment was 137 days ([Piñeros et al., 2009, 2011](#)). A report from Mexico showed median times of 4.6 months from consultation to diagnosis and 5.2 months from diagnosis to beginning of treatment ([Bright et al., 2011](#)). Despite the fact that the study population may not be representative of the entirety of breast cancer cases for the given countries, data were obtained from reference institutions in Brazil and Mexico, and the study in Colombia recruited more than 1000 cases in 17 oncology centres in Bogotá.

### (c) *Information and breast cancer awareness*

Among countries with data on BSE, El Salvador reported that 81.5% of women aged 15–49 years received information about breast cancer and that 44.7% of them were thought to perform BSE ([Gobierno de El Salvador, 2009](#)); the knowledge level and teaching activity were higher among women living in urban areas and among older women. Similarly, Colombia

reported that 90.3% of women aged 50–69 years had knowledge of BSE, particularly those living in urban areas and those with higher education levels, with no major differences within that age range ([Profamilia, 2011](#)).

Numerous initiatives aimed at increasing knowledge of breast cancer and screening, as well as initiatives led by NGOs, may be identified in the media (particularly in Brazil); however, scarce information on the impact of these efforts was found in the scientific literature. A study conducted in a municipality in Brazil found that the mass media was the most frequent source of information about BSE; the level of knowledge on the topic (> 68%) was similar to that found in other surveys conducted in different cities in Brazil ([Brito et al., 2010](#)).

Most recommendations and guidelines in the region mention the necessity of information, communication, and education to encourage participation in breast cancer screening; however, none of them develops specific guidance on the topic, and only the Mexican guidelines explicitly recommend providing information on adverse events to all women undergoing screening ([Secretaría de Salud de México, 2008](#)).

Several actions have been implemented in Latin American countries in an attempt to improve breast cancer screening. Besides programme development, research on factors associated with screening uptake and adherence as well as intervention studies have increased in number and quality in the region.

In Peru, a pilot study is being conducted in a northern region with community health workers educating women aged 40–64 years about awareness of breast cancer symptoms, trained midwives performing CBE, and local trained physicians conducting fine-needle aspiration biopsy. Women with positive biopsies are referred for full evaluation and treatment ([Goss et al., 2013](#)). In Colombia, a pilot study has been implemented in a cluster randomized trial comparing organized hospital-based screening with regular

care; for the intervention arm, all women aged 50–69 years attending health services on their own were invited to breast cancer screening, general practitioners were trained on CBE and mammography screening, and a quality control programme and follow-up were implemented for both CBE and mammography ([Murillo et al., 2008](#)). In Brazil, a centralized model of multi-disciplinary and comprehensive breast care was implemented in Porto Alegre, where control of screening adherence and strict follow-up of positive results are crucial components of the intervention ([Caleffi et al., 2009](#)). No results from these studies have yet been reported, but preliminary data from Colombia showed a higher screening uptake and a higher proportion of early breast cancer in the intervention group ([Thomas et al., 2013](#)).

### 3.2.4 Sub-Saharan Africa

Cancer remains a low priority for much of the population in sub-Saharan Africa, an area that refers to the combined regions of Central Africa, East Africa, Southern Africa, and West Africa. In many countries in sub-Saharan Africa, many barriers to breast cancer screening exist, such as lack of infrastructure, inadequate training and expertise, inequitable distribution of services in urban versus rural areas, and poverty. Sociocultural influences, including use of traditional medicines, also work against the development of population-based breast cancer screening programmes.

NGOs are important resources for many countries in this region, as they partner with governments with the goal of reducing cancer mortality, often by promoting early detection, diagnosis, and treatment, and reducing the stigma that often surrounds a cancer diagnosis ([Oluwole & Kraemer, 2013](#)).

This section discusses systems, policies, and guidelines within the four regions, where data were available ([Table 3.5](#)). Data on participation

**Table 3.5 Policies and practice for breast cancer screening in sub-Saharan Africa**

Country	National recommendation or guideline			Mammography units per million women aged 50–69 years in 2013 <sup>a</sup>	Support organization	References
	Screening practice	Target age (years)	Interval (years)			
Kenya	Awareness	All women	Not stated	6.8 <sup>b</sup>	Kenyan Ministry of Health	<a href="#">Kenyan Ministry of Health (2014)</a>
Mauritius	BSE CBE	All women ≥ 30	Not stated Not stated	49.7	Mauritius Ministry of Health	<a href="#">Republic of Mauritius (2014)</a>
South Africa	BSE CBE  Mammography	All women All women  ≥ 40	Monthly “Regular” (unspecified)  1	7.8	NGO: Cancer Association of South Africa	<a href="#">CANSA (2014a)</a>
Swaziland	BSE CBE Mammography	All women All women ≥ 40	Monthly Not stated 1	33.6	NGO: Swaziland Breast Cancer Network	<a href="#">Swaziland Breast Cancer Network (2008)</a>
Zimbabwe	BSE	≥ 18	Monthly	6.9	NGO: Cancer Association of Zimbabwe	<a href="#">Cancer Association of Zimbabwe (2014)</a>

<sup>a</sup> [WHO \(2014\)](#).

<sup>b</sup> Restricted to the public sector.

BSE, breast self-examination; CBE, clinical breast examination; NGO, nongovernmental organization.

rates in screening programmes are non-existent; where available, cross-sectional studies of any screening or early detection behaviours are discussed.

#### (a) Central Africa

Central Africa includes Angola, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of the Congo, Equatorial Guinea, and Gabon.

##### (i) Systems, policies, and guidelines

No data were found on breast screening policies or practices for these countries.

##### (ii) Participation

In Cameroon, a 2011 retrospective study examined the medical records of 531 breast cancer patients diagnosed at Yaoundé Medical Hospital between 1989 and 2009. Self-detection was the mode of detection in 95.3% of patients, and only 2.9% of patients were diagnosed via mammography or CBE ([Kemfang Ngowa et al., 2011](#)). A study that interviewed 20 women

presenting with late-stage cancer at Yaoundé General Hospital found that the main reasons for delay in seeking medical care were inability to pay, inadequate diagnosis by general doctors, cultural factors including a fatalistic attitude after a diagnosis of cancer, and lack of knowledge about breast cancer ([Ekortarl et al., 2007](#)). Compounding these issues is the fact that treatment for breast cancer is often inaccessible for many women ([Price et al., 2012](#)). A cross-sectional survey in Cameroon of 120 women in 2012 reported that although 74.2% of women had heard of BSE, 40% had never performed it ([Suh et al., 2012](#)).

##### (iii) Information and breast cancer awareness

Although there are no government guidelines on breast screening in Cameroon, periodic mass campaigns for breast health awareness and CBE are organized by the Ministry of Health ([Kemfang Ngowa et al., 2011](#)). A cross-sectional survey of women in Cameroon found that knowledge of preventive measures and risk factors was poor ([Suh et al., 2012](#)). Solidarité Chimiothérapie

(SOCHIMIO), a Cameroonian NGO affiliated with the Union for International Cancer Control (UICC), has initiated several cancer research projects in Cameroon. These are aimed primarily at providing therapeutic care to cancer patients, but educational outreach programmes have also been implemented ([SOCHIMIO, 2014](#)).

A recent publication from the Democratic Republic of the Congo reported use of the Breast Health Global Initiative guidelines in implementing a breast cancer awareness campaign in Kinshasa in 2010–2012, based on BSE and CBE by trained health-care workers ([Luyeye Mvila et al., 2014](#)). Participating women underwent CBE; in the case of suspicious findings, they underwent mammography and ultrasonography, and where necessary a needle biopsy. This campaign increased the awareness of breast cancer diagnosis and treatment.

#### (b) East Africa

East Africa comprises Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Somalia, Uganda, the United Republic of Tanzania, Zambia, and Zimbabwe.

##### (i) Systems, policies, and guidelines

No data were found on breast screening policies or practices for the majority of countries in East Africa. Historically, medical resources have been focused on infectious diseases, and the resources allocated to breast cancer detection, diagnosis, and treatment have been very limited ([Dye et al., 2010](#)). It has been suggested that BSE could be promoted as a screening method for early detection of breast cancer ([Azage et al., 2013](#)).

In recognition of the need to develop formal guidelines, a report by the Kenyan Ministry of Health called for enhanced health promotion and education as well as improved early detection by introducing or expanding screening programmes and by developing guidelines for

screening and early cancer detection ([Kenyan Ministry of Health, 2014](#)). However, many of these initiatives have yet to be implemented ([Matheka, 2014](#)). Health workers have been proposed as a link between the general population and access to care, especially in rural areas ([Mutebi et al., 2013](#)).

In Madagascar, breast screening is implemented primarily by NGOs. In 2010, the Akbaraly Foundation launched the 4aWomen project, which aims to improve the management of breast cancer screening and treatment ([Akbaraly Foundation, 2014](#)).

In Malawi, there are no government guidelines on breast cancer screening, and mammography screening is available in only one private hospital ([Msyamboza et al., 2012](#)).

Mauritius is one of the few countries in the region with formal guidelines on breast cancer screening. Mauritius developed a National Cancer Control Programme for 2010–2014 and recommended breast health awareness campaigns encouraging BSE for all women and CBE for women aged 30 years and older. Population-based screening mammography was not thought to be advisable, given the relatively high proportion of cancers in women younger than 45 years ([Republic of Mauritius, 2014](#)).

In Uganda, the limited health-care budget and resources are directed towards fighting communicable diseases ([Galukande & Kiguli-Malwadde, 2010](#)). In addition, the average age of onset of breast cancer is low, and there is a lack of mammography units (only two in government and two in private health units) and of trained personnel (42 radiologists) ([Monu et al., 2012](#)). [Galukande & Kiguli-Malwadde \(2010\)](#) thus commented on the greater availability and lower cost of ultrasonography as a potential breast cancer screening tool ([Galukande & Kiguli-Malwadde, 2010](#)). Although there is some government-subsidized health care, the majority of the population has to self-fund care. Consequently, the Breast Cancer Guidelines for Uganda (written

by a team of oncologists, surgeons, and radiologists from Kampala) recommended BSE for its practicability and affordability ([Gakwaya et al., 2008](#)).

There are no formal screening guidelines in Zimbabwe, but several non-profit organizations such as the Cancer Association of Zimbabwe recommend breast health awareness and monthly BSE for women aged 18 years and older ([Cancer Association of Zimbabwe, 2014](#)). The Zimbabwean Ministry of Health set national goals for cancer prevention and control for 2014–2018, including a reduction of late-stage breast cancer presentation from 80% to 50% by 2018 ([Ministry of Health and Child Care of Zimbabwe, 2013](#)).

### (ii) Participation

As in other countries in sub-Saharan Africa, in this region women with symptoms of breast cancer do not seek medical attention, leading to late-stage presentation and poor prognosis. Qualitative studies of women in this region report a variety of barriers to seeking early diagnosis or participating in screening.

Data from 69 breast cancer patients in Ethiopia showed that even among women who are aware of breast cancer, early signs and symptoms are frequently ignored and traditional healers are preferred; study participants indicated that stigmatization and social isolation complicate discussion and action around breast cancer ([De Ver Dye et al., 2011](#)).

A 2012 study of 390 health workers in north-western Ethiopia found that 37% of respondents had ever practised BSE and that 14.4% practised it regularly. The main reasons for not performing regular BSE were not having problems with breasts (53.2%), not knowing the technique (30.6%), and not knowing its importance (21.4%); having knowledge of the importance of BSE was a predictor of BSE practice ([Azage et al., 2013](#)).

A qualitative study of women in Kenya reported differences between rural and urban

women with respect to knowledge of symptoms and the importance of breast screening. The majority of women were fatalistic about the disease and assumed it to be incurable ([Muthoni & Miller, 2010](#)).

In Zimbabwe, a series of barriers to breast cancer screening and other cancer screening were identified. These included lack of access to early detection; inadequate resources, equipment, and technology; lack of education and awareness of the importance of regular cancer screening; prohibitive costs of screening services; and lack of referral of patients ([Ministry of Health and Child Care of Zimbabwe, 2013](#)).

### (iii) Information and breast cancer awareness

A study in Kenya, designed to improve knowledge and awareness among health workers in a hospital in Nairobi using an abbreviated training intervention, reported that knowledge and practical skills related to CBE were low initially but improved significantly after the intervention ([Mutebi et al., 2013](#)). Several NGOs in Kenya, such as Cancer Free Women, support a variety of awareness and education campaigns, including teaching BSE and symptoms of breast cancer to Kenyan women ([Cancer Free Women, 2013](#)).

In Madagascar, a variety of NGOs provide preventive care initiatives and education and awareness campaigns ([Akbaraly Foundation, 2014](#)).

In Rwanda, the NGO Breast Cancer Initiative East Africa launched a month-long campaign in Kigali to provide free CBE to women and to educate both women and their partners about the importance of cancer awareness ([Republic of Rwanda Ministry of Health, 2014](#)).

In Zimbabwe, NGOs run a variety of awareness programmes to inform women about cancer prevention strategies and cancer screening procedures ([Cancer Association of Zimbabwe, 2014](#)).



*(c) Southern Africa*

This area comprises Botswana, Lesotho, Namibia, South Africa, and Swaziland.

*(i) Systems, policies, and guidelines*

No data were found on breast screening policies or practices for Southern African countries, with the exception of South Africa and Swaziland. In South Africa, the public sector health service emphasizes community-level health care, complemented by a hierarchical referral system through district hospitals. Breast cancer symptoms are usually detected by cancer patients rather than via screening. Patients attend primary health-care clinics and are then referred to secondary- and tertiary-level clinics and hospitals for diagnosis and treatment. Residential distance from hospitals has been shown to be negatively associated with risk of late-stage diagnosis ([Dickens et al., 2014](#)). The NGO Cancer Association of South Africa (CANSA) recommends monthly BSE for all women and regular CBE, and performs CBE through mobile health clinics and CANSA care clinics throughout South Africa ([CANSA, 2014b](#)). Annual mammograms are recommended for women older than 40 years, and mammograms are offered through public hospital breast clinics; however, these are not free. The Radiological Society of South Africa provides reduced-rate mammograms during October. Results from a pilot screening programme using a mobile mammography unit in the Western Cape in women aged 40 years and older in 2011–2012 reported multiple problems, both technical (e.g. poor-quality images) and administrative (e.g. images not reaching the referral centre), and a low cancer detection rate, concluding that commencement of a screening programme using this model was not justified in this setting ([Apffelstaedt et al., 2014](#)).

The Swaziland Breast Cancer Network (SBCN) operates two breast cancer clinics, which offer free consultations, examinations, diagnosis, and referrals. The SBCN recommends monthly

BSE, and CBE by a trained provider, and has developed a referral tool for further diagnostic work for patients who report suspicious findings ([Swaziland Breast Cancer Network, 2008](#)). It is unclear whether the SBCN is affiliated with the Swaziland Ministry of Health; no formal guidelines on breast screening were found on the website of the Swaziland Ministry of Health. The SBCN recommends that all women older than 40 years should undergo annual mammography; however, it recognizes that mammography is used only very occasionally, by those who can afford this service.

*(ii) Participation*

A national population-based cross-sectional study of 2202 women in South Africa found that only 15.5% reported ever having had a mammogram; screening was associated with being from the White or Indian/Asian population group, having a higher education level, having greater wealth, and having health insurance ([Peltzer & Phaswana-Mafuya, 2014](#)). Participation rates are unavailable for other countries in this region.

*(iii) Information and breast cancer awareness*

In South Africa, the government and a variety of NGOs provide community outreach and educational materials to increase awareness of breast cancer signs and symptoms. Initiatives include mobile breast check units, which travel to semi-urban and urban areas offering free CBE, education about BSE, and other awareness campaigns ([CANSA, 2014a](#)). In Swaziland, the SBCN's education programmes aim to increase awareness of aspects of breast cancer, including the promotion of BSE, medical examinations, and the importance of early diagnosis and treatment ([Swaziland Breast Cancer Network, 2008](#)).

*(d) West Africa*

West Africa comprises the countries of Benin, Burkina Faso, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria,

Senegal, Sierra Leone, and Togo. In many of these countries, life expectancy is low and there is a high burden of infectious diseases. In this region, breast cancer patients are predominantly premenopausal, present at late stages, and have poor prognosis ([Sighoko et al., 2013](#)).

(i) *Systems, policies, and guidelines*

Data on breast screening policies and practices in this region are either sparse or non-existent. No data were found for Benin, Burkina Faso, The Gambia, Guinea, Guinea-Bissau, Liberia, Niger, or Togo. Limited data are available from other West African countries. There are no national programmes for breast screening in Ghana, Mali, Nigeria, or Senegal. The Ministry of Health of Sierra Leone is attempting to implement a variety of interventions, including a free health-care initiative, but it has no specific policy or plan for the prevention or control of breast cancer ([WHO African Health Observatory, 2014](#)).

(ii) *Participation*

A small cross-sectional study in Ghana reported that breast screening practices were poor; self-reported rates were 32% for BSE, 12% for CBE, and 2% for mammography, and a higher education level was strongly associated with screening behaviours ([Opoku et al., 2012](#)). A study of 66 breast cancer patients found that whereas 14 (21.2%) of the breast cancers were discovered through breast education and CBE as offered through outreach programmes, women commonly waited between 6 weeks and 2 years before seeking formal diagnosis and treatment ([Clegg-Lamptey et al., 2009](#)).

In Nigeria, the Lagos State Ministry of Health reported that there are only four functional mammography units in Lagos, that use of mammography is rare, and that most women are unaware of its use as a screening tool ([Lagos State Ministry of Health, 2014](#)).

In a cross-sectional study in Senegal in 2006, 300 patients attending five hospitals in

Dakar for a medical or surgical consultation were interviewed about knowledge and practice of BSE. Study participants were young (average age, 34 years), uneducated, and living in poverty. Of the participants, 43% were aware of BSE and 29% regularly practised BSE. Practice of BSE was associated with income and education level ([Gueye et al., 2009](#)).

In Sierra Leone, a study of 3645 women identified minimal education, poverty, and reliance on traditional healers as barriers to medical care for women with breast masses ([Ntirenganya et al., 2014](#)).

(iii) *Information and breast cancer awareness*

In the absence of formal guidelines in West African countries, several awareness and education campaigns have been initiated. In Ghana, a cross-sectional survey assessed the impact of education programmes on knowledge and attitudes about breast cancer and breast cancer prevention as well as practices among women in rural communities and found that knowledge about breast cancer symptoms had improved and that the number of women who reported beginning BSE had increased ([Mena et al., 2014](#)).

Multiple studies of awareness, attitude, and practice of breast examination in women in Nigeria have shown a low knowledge and practice of BSE and CBE. The Breast Cancer Awareness and Free Screening programme, launched in Nigeria in 2006 in collaboration with the Ministry of Women Affairs and Poverty Alleviation, educates women about BSE and provides free counselling and referral services ([Lagos State Ministry of Health, 2011](#)). At community events, women were shown videos about how to perform BSE and received counselling and referral, where applicable. Those diagnosed through the programme were treated for free. A study in Nigeria identified several economic and cultural barriers to implementing education about basic screening programmes, including a lack of both specialized health personnel and

breast cancer screening facilities, the absence of biomedical terminology in local languages, gender inequality, and the prevailing influence of traditional health practitioners ([Asobayire & Barley, 2014](#)).

In Sierra Leone, some efforts have been made to provide education to women about breast cancer and the importance of breast health ([Shepherd & McInerney, 2006](#)).

### 3.2.5 Central and West Asia and North Africa

The region of Central and West Asia includes Afghanistan, Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, the Islamic Republic of Iran, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Oman, Qatar, Saudi Arabia, the Syrian Arab Republic, Tajikistan, Turkey, Turkmenistan, the United Arab Emirates, Uzbekistan, the West Bank and Gaza Strip, and Yemen. North Africa includes the Maghreb countries (Algeria, Libya, Mauritania, Morocco, and Tunisia), Egypt, and Sudan.

These countries are heterogeneous in terms of access to screening. While high-income countries such as Israel, Kuwait, and Qatar have well-developed health services, most countries in this area are classified as low- and middle-income countries, with limited resources allocated to health care. Large population-based screening programmes do not exist in the majority of these countries, and screening is primarily opportunistic. Some countries, such as Egypt and Turkey, have active and ongoing efforts to implement population-based screening via a series of pilot projects. Breast screening costs are covered in countries in a variety of ways, including through government funding, through partnerships with NGOs, or via patients' out-of-pocket expenditure. Available data on screening policies and practice are summarized in [Table 3.6](#).

(a) *Armenia, Kazakhstan, Kyrgyzstan, and Turkey*

(i) *Systems, policies, and guidelines*

In Armenia, the ability of the health-care system to detect and treat breast cancer has been augmented through the efforts of NGOs and private organizations, most importantly the Armenian American Wellness Center in Yerevan, which provides mammography and free teaching of BSE ([AAWC, 2014](#)). There are no formal government guidelines, but awareness campaigns from the Armenian American Wellness Center stress the importance of annual mammograms and monthly BSE.

In Kazakhstan, recommendations for breast screening are biennial mammography for women aged 50–60 years ([Beysebayev et al., 2015](#)). The NGO Together Against Cancer with the support of UICC launched the National Breast Cancer Awareness programme in 2008, based on mobile units screening women in an opportunistic fashion using diagnostic ultrasonography, and at the same time instructing women about how to perform BSE ([CIS Anti-Cancer Association, 2013a](#)).

In Kyrgyzstan, an NGO-led programme for prevention and early diagnosis of breast cancer was developed in 2006 ([CIS Anti-Cancer Association, 2013b](#)). It is unclear whether active opportunistic screening has been implemented.

Turkey has had a national breast screening programme since 2008 and has the most established screening services of these countries. Since 2012, the recommendations of the Ministry of Health's Cancer Control Department are annual mammography for women aged 40 years and older and CBE for women participating in the screening ([Republic of Turkey, Ministry of Health, Department of Cancer Control, 2009](#); [Kayhan et al., 2014](#)). By 2012, 125 Cancer Early Diagnosis, Screening, and Training Centers (KETEM) had been established in 81 provinces in Turkey, with the aim of establishing 280 centres

**Table 3.6 Policies and practice for breast cancer screening in Central/West Asia and North Africa**

Country	National recommendation or guideline			Mammography units per million women aged 50–69 years in 2013 <sup>a</sup>	Support organization	References
	Screening practice	Target age (years)	Interval (years)			
Armenia	BSE	All women	Monthly	22.5	NGO: Armenian American Wellness Center	<a href="#">AAWC (2014)</a>
	Mammography	Not stated	1			
Bahrain	BSE	30–64	Not stated	Not stated	Bahrain Ministry of Health	<a href="#">Bahrain Cancer Society (2012)</a>
	CBE	30–64	Not stated			
	Mammography	≥ 40	2			
Egypt	BSE	≥ 20	Monthly	Not stated	Egypt Ministry of Health	<a href="#">Women's Health Outreach Program (2014)</a>
	Mammography	≥ 45	1			
Israel	Mammography	50–74	2	112.3	Israel Ministry of Health	<a href="#">Israel Cancer Association (2014)</a>
		≥ 40, familial risk	1			
	MRI	≥ 40, <i>BRCA1/2</i>	1			
Jordan	BSE	All women	Monthly	129.1	Jordan Ministry of Health	<a href="#">JBCP (2014a)</a>
	CBE	20–39	1–3			
	Mammography	40–49	2			
Kazakhstan	Mammography	≥ 40	1	22.1	NGO: Together Against Cancer	<a href="#">Beysebeyev et al. (2015)</a>
		≥ 50	1			
Kuwait	CBE	≥ 40	Not stated	Not stated	Kuwait Ministry of Health	<a href="#">Kuwait Ministry of Health (2014)</a>
	Mammography	≥ 40	Not stated			
Lebanon	BSE	≥ 20	Monthly	370.2	Lebanese Breast Cancer National Task Force/Ministry of Health	<a href="#">Adib et al. (2009)</a>
	CBE	20–40	3			
	Mammography	≥ 40	1			
Morocco	CBE	45–69	1–2	18.5	Moroccan Ministry of Health	<a href="#">Lalla Salma Foundation (2014)</a>
Oman	BSE	All women	Monthly	149.8	NGO: Oman Cancer Association	<a href="#">Oman Cancer Association (2015)</a>
	Mammography	≥ 40	1–2			
Qatar	BSE	≥ 20	Monthly	225.1	Qatar Supreme Council of Health	<a href="#">College of the North Atlantic Qatar (2012)</a>
	CBE	≥ 35	1			
	Mammography	40–69	1			
Tunisia	CBE	40–69	1	22.6	Tunisian Ministry of Health	<a href="#">ATREP (2014)</a>
	Mammography	“High-risk” women	Not stated			
Turkey	CBE	≥ 40	1	230.4	Turkish Ministry of Health	<a href="#">Kayhan et al. (2014)</a>
	Mammography	≥ 40	1			
United Arab Emirates	BSE	All women	Monthly	Not stated	United Arab Emirates Ministry of Health	<a href="#">HAAD (2013)</a>
	CBE	≥ 40	1			
	Mammography	≥ 40	2			

<sup>a</sup> [WHO \(2014\)](#).

BSE, breast self-examination; CBE, clinical breast examination; MRI, magnetic resonance imaging; NGO, nongovernmental organization.

by 2015 ([Republic of Turkey, Ministry of Health, Department of Cancer Control, 2009](#); [Güllüoğlu et al., 2012](#)). Multiple pilot screening programmes have been carried out, including a 10-year population-based screening programme for women aged 40–69 years living in a large urban region of Istanbul with a well-organized address-based population registration system ([Kayhan et al., 2014](#)). In addition to these publicly administered screening projects, some municipalities and NGOs also organize screening programmes on their own initiative. All of these screenings are provided free of charge ([Holland et al., 2006](#)).

(ii) *Participation*

In Armenia, a cross-sectional study found that the proportion of women who practised BSE was 20% and that the proportion of women who had had at least one mammogram was 6% ([Harutyunyan, 1999](#)).

Since 2008, mobile ultrasonography units have screened about 78 000 women in Kazakhstan ([CIS Anti-Cancer Association, 2013a](#)). A study of knowledge, attitudes, and practices of women for breast screening found that the majority of the women sampled (82.6%) performed BSE, an average of 9.5 times per year; about two thirds of the women (62.9%) had had CBE performed by a physician, and only 12.4% indicated that they had previously had a mammogram ([Chukmaitov et al., 2008](#)).

(iii) *Information and breast cancer awareness*

The majority of education and awareness campaigns in this region are carried out by NGOs.

(b) *Arab countries in West Asia*

As in other countries with previously low incidence rates of breast cancer, in this region breast cancer incidence and mortality rates are rapidly increasing. Breast cancer in Arab women is often diagnosed at a younger age and at a more advanced stage compared with other populations

([Ezzat et al., 1999](#); [El Saghir et al., 2002, 2006](#); [Salhia et al., 2011](#)). In response, several countries in the region have developed recommendations for breast cancer screening.

(i) *Systems, policies, and guidelines*

The World Health Organization (WHO) Regional Office for the Eastern Mediterranean published guidelines on breast cancer screening in 2006, and, in line with the Breast Health Global Initiative guidelines, suggested that screening could be implemented in centralized cancer facilities where breast cancer treatment is available ([Khatib & Modjtabai, 2006](#)). These programmes would provide screening to only a limited proportion of the population, but they could act as pilot programmes, with the ultimate aim of expanding them to cover the entire population as more resources become available. Recommendations for screening frequency vary considerably in this region.

In Bahrain, breast cancer screening began in December 1992 for women aged 30–64 years and included education activities about CBE and BSE ([Hamadeh et al., 2014](#)). Mammography screening was performed only for suspected breast cancer cases and high-risk women after referral. Since 2005, biennial mammography screening is recommended for women aged 40 years and older, and it is provided free of charge ([Bahrain Cancer Society, 2012](#)).

The Jordan Breast Cancer Program was established in 2007 ([JBCP, 2008](#)) and recommends monthly BSE for all women, CBE once every 1–3 years for women aged 20–39 years and annually thereafter, and mammography once every 2 years for women aged 40–49 years and annually for women aged 50 years and older ([JBCP, 2014a](#)). In 2010, a programme of free mammography and CBE was implemented, which is expected to increase participation rates ([JBCP, 2010](#)).

The Kuwait National Mammography Screening Program was launched in 2014; it is

designed to provide mammography and CBE to women aged 40 years and older in several governmental clinics ([Kuwait Ministry of Health, 2014](#)). It does not recommend BSE but does promote breast cancer awareness.

The Lebanese Ministry of Public Health and the Lebanese Breast Cancer National Task Force recommend monthly BSE starting at age 20 years and CBE every 3 years for women aged 20–40 years; for women aged 40 years and older, annual mammography and CBE are recommended ([Adib et al., 2009](#)).

In Oman, mammography screening is conducted at government hospitals free of charge. The Oman Cancer Association recommends annual or biennial mammography screening for women aged 40 years and older, and monthly BSE ([Oman Cancer Association, 2015](#)).

The State of Palestine Ministry of Health has no formal guidelines or policies for breast screening but emphasizes the importance of regular breast screening ([State of Palestine Ministry of Health, 2014](#)). A variety of health centres provide opportunistic screening and diagnostic mammography, but many territories have no screening centres ([Khaleel Abu Shmais, 2010](#)). There are four mammography facilities in the entire West Bank and Gaza Strip, and whereas screening is free for insured women, uninsured women are required to pay a fee ([Azaiza et al., 2010](#)).

Qatar released a National Cancer Strategy in 2011 ([Supreme Council of Health of Qatar, 2014](#)) and later developed a National Cancer Control Program ([National Cancer Program Qatar, 2014](#)). It recommends monthly BSE starting at age 20 years, annual CBE for women aged 35 years and older, and annual mammography for women aged 40–69 years, unless otherwise advised by a physician ([College of the North Atlantic Qatar, 2012](#)).

Although regional screening initiatives exist in Saudi Arabia, there are no national guidelines,

and data from these initiatives are not available ([Abulkhair et al., 2010](#)).

The United Arab Emirates implemented a National Breast Screening Program in 1995 and recommends a combination of monthly BSE, annual CBE, and mammography every 2 years aged 40 years and older ([HAAD, 2013](#)). Screening services are provided free of charge and are widely available but are opportunistic in nature ([Elobaid et al., 2014](#)).

In Yemen, mammography screening has been in place since the 1990s, but there are no policies or recommendations for breast cancer screening, and few data are available on breast screening practices in the country.

#### (ii) *Participation*

Despite awareness campaigns and efforts to reduce costs and improve accessibility of screening mammography, participation tends to be low among women in this region. Data on participation in screening programmes are taken primarily from the peer-reviewed literature and are usually from cross-sectional studies. Studies report low participation rates in breast screening programmes and low awareness of BSE ([Bener et al., 2002](#); [Azaiza & Cohen, 2006](#); [Dündar et al., 2006](#); [Soskolne et al., 2007](#); [Taha et al., 2010](#); [Donnelly et al., 2013a, b](#); [Elobaid et al., 2014](#)). Screening programmes are opportunistic and are relatively new to the region, and there are no centrally organized invitation or follow-up systems ([Donnelly et al., 2013a](#)).

In 2008–2010, only 12.7% of breast cancers in Bahrain were screen-detected, and primary health-care centres in Bahrain reported CBE coverage rates of 6.6%, 7.1%, and 6.9% in women aged 30 years and older ([Hamadeh et al., 2014](#)).

A study of female schoolteachers in Kuwait found that 81.9% had never had CBE performed by a health professional and 85.7% did not know what mammography was ([Alharbi et al., 2012](#)). A study of 510 women attending a public health clinic found that only 21% of the women

practised BSE regularly, and these women had a sufficient level of knowledge about BSE, CBE, and mammography ([Al-Azmy et al., 2013](#)).

In Lebanon, a 3-month national mammography campaign in 2009, targeted at women older than 40 years, implemented free mammography screening subsidized by the Ministry of Public Health in participating public radiology centres, and mammography screening at a reduced cost in private centres. The campaign successfully screened 10 953 women; 68.2% of the women who participated did so for the first time, and 97.8% of the women indicated their willingness to undergo the examination again the following year ([Kobeissi et al., 2012](#)).

A study of 397 women aged 30–65 years residing in the West Bank and Gaza Strip reported that more than 70% of the women had never had a mammogram or CBE and that 62% of the women performed BSE ([Azaiza et al., 2010](#)). A 2011 study of 100 women living in Gaza reported that only 27% of the women were willing to undergo screening mammography; the barriers identified included limited financial resources, lack of resources to treat breast cancer if diagnosed, lack of access to screening facilities, and concern about personal safety while travelling to medical centres ([Shaheen et al., 2011](#)).

A 2009 study of 1200 Qatari women aged 30–55 years reported that despite an adequate knowledge of breast cancer, only 24.9% had performed BSE, 23.3% had undergone CBE, and 22.5% had had a mammogram ([Bener et al., 2009](#)).

In 2011, a study of 719 Saudi Arabian women reported that 23.1% of the women practised BSE, 14.2% had undergone CBE, and 8.1% had had a mammogram ([Ravichandran et al., 2011](#)).

In the United Arab Emirates, a cross-sectional study of 247 women in 2013 found rates of 48.6% for self-reported BSE, 49.4% for CBE, and 44.9% for mammography ([Elobaid et al., 2014](#)). These rates represent an improvement on those reported in an earlier study, in 2001, when 12.7%

of the study population practised BSE, 13.8% had undergone CBE, and 10.3% had had a mammogram ([Bener et al., 2001](#)).

A study of 425 female Yemeni university students found that although 76.9% of the participants had heard about BSE, only 17.4% had performed it, and 55.9% cited a lack of knowledge about BSE technique as a barrier ([Ahmed, 2010](#)). A cross-sectional study of 105 female Yemeni doctors about attitudes and practice of mammography screening found that only 24.7% sent patients for mammography screening every year regardless of the patients' history or symptoms ([Al-Naggar et al., 2009](#)).

### (iii) *Information and breast cancer awareness*

Several cross-sectional studies across the region reported lack of knowledge of BSE and CBE, a mainstay of screening programmes in many low-resource settings.

A variety of NGOs and government bodies in this region run awareness campaigns emphasizing the importance of regular breast screening, disseminate information about the availability of mammography screening where these facilities exist, and promote awareness of breast health ([Adib et al., 2009](#); [Kobeissi et al., 2012](#); [JBCP, 2014b](#); [State of Palestine Ministry of Health, 2014](#)).

### (c) *Islamic Republic of Iran and Israel*

#### (i) *Systems, policies, and guidelines*

In the Islamic Republic of Iran, there is no formal breast screening programme, and no national guidelines exist; efforts for breast cancer prevention have focused on educating women, teaching BSE, and encouraging opportunistic screening. The most widely available forms of breast screening in the Islamic Republic of Iran are CBE and BSE ([Babu et al., 2011](#)).

In Israel, the National Mammography Screening Program was implemented in the early 1990s. Current screening policy recommendations include biennial mammography for women aged 50–74 years, annual mammography

for women at increased familial risk aged 40 years and older, and annual MRI for *BRCA1/2* mutation carriers aged 40 years and older ([Israel Cancer Association, 2014](#)).

(ii) *Participation*

A study of 318 Iranian health-care providers found that 48% of female providers had not carried out any method of breast cancer screening for themselves during the previous year, 81.5% did not perform CBE for the majority of their female patients, and only 5.1% recommended BSE to more than 70% of their female patients ([Harirchi et al., 2009](#)). The percentage of women who had ever had a mammogram ranged from 1.3% to 28% ([Donnelly et al., 2013a](#)), and the percentage who performed BSE was estimated to be between 3% and 17% ([Babu et al., 2011](#); [Donnelly et al., 2013a](#)). A variety of regional studies in the Islamic Republic of Iran found that knowledge of screening practices and rates of BSE were inadequate, including among health-care workers ([Haji-Mahmoodi et al., 2002](#); [Harirchi et al., 2009](#); [Yadollahie et al., 2011](#); [Akhtari-Zavare et al., 2014](#); [Tazhibi & Feizi, 2014](#)).

Data from the Israel Cancer Association showed that in 2009, of 181 429 women aged 50–74 years, 85.6% had ever been screened by mammography ([Israel Cancer Association, 2014](#)). Screening rates for Israeli Jews and Arabs were broadly similar ([Keinan-Boker et al., 2013](#); [Israel Cancer Association, 2014](#)). There were no significant differences in the percentages of women reporting having had a mammogram in the previous 2 years, which increased by 16% in Jewish women and by 17% in Arab women from 2002 to 2008 ([Keinan-Boker et al., 2013](#)).

(iii) *Information and breast cancer awareness*

Few data are available on awareness campaigns in this region.

(d) *North Africa*

The age-standardized incidence rate of breast cancer in North Africa is currently one quarter to one half that in Europe and the USA ([Corbex et al., 2014](#)), but it is expected to double in the next 15 years as exposure to risk factors increases (including those related to population ageing).

(i) *Systems, policies, and guidelines*

Cancer has become a national priority in Algeria, with the preparation of the 2015–2019 National Cancer Plan ([Hamdi Cherif et al., 2014](#)), but no data on breast screening policies or practices were found. Some opportunistic pilot projects are in place; for example, a mobile mammography unit was launched in 2013 through a partnership between the Algerian government, mobile phone operator Mobilis, Roche, and the patient advocacy group El Amel (Hope) ([Roche, 2014](#)).

Similar to the situation in other countries in the area, women in Egypt present with advanced breast cancer ([Omar et al., 2003](#); [Salhia et al., 2011](#)). The Egyptian national screening programme, the Women's Health Outreach Programme, was launched in 2007; it recommends monthly BSE starting at age 20 years and offers free annual breast screening for all Egyptian women aged 45 years and older ([Salem et al., 2008](#); [Women's Health Outreach Program, 2014](#)). The programme consists of five phases, with a 1-year pilot phase (2007–2008) to identify barriers in implementation. Each implementation phase will address several governorates. The goal of the 5-year implementation plan is to provide coverage for the entire population.

There were no data in the literature about screening guidelines in Libya or about breast screening practices among Libyan women.

In Mauritania, a 2012 review of the health-care service found that it was underfunded, underdeveloped, and disorganized. Cancer prevention campaigns or implementation of screening policies are absent, and they are



unlikely to be implemented in the near future ([Global Centre for Renewal and Guidance, 2012](#)).

Morocco set up a National Cancer Prevention and Control Plan in 2010, comprising a coordinated breast cancer awareness campaign and a programme aimed at developing breast cancer screening in half a million women. Breast cancer screening with CBE is recommended for women aged 45–69 years, at least every 2 years ([Lalla Salma Foundation, 2014](#)). A new breast and uterine cancer screening and early detection centre was opened in 2013 in Mohammedia, which provides screening facilities for more than 40 000 eligible women ([Morocco World News, 2013](#)). Mobile mammography units travel to remote areas to provide opportunistic screening to those without access to centralized screening facilities. The National Cancer Prevention and Control Plan in Morocco has developed a three-tiered system for increasing screening coverage: level 1, health-care clinics with general practitioners and nurses who provide breast health education and CBE to women; level 2, specific reproductive health clinics, which receive referrals from level 1 clinics and perform diagnostic ultrasonography and mammography; and level 3, oncology centres ([Lalla Salma Foundation, 2014](#)).

Sudan established its National Cancer Control Programme with CBE in 1982; the programme focuses on prevention, early detection and screening, diagnosis, and treatment ([Hamad, 2006](#)). However, a lack of resources has hampered implementation of breast cancer screening, and the majority of efforts have been focused on public awareness campaigns and education of medical professionals ([Abuidris et al., 2013](#)).

The Tunisian Ministry of Health has stated goals of focusing on prevention and early detection of cancer as part of the 2010–2014 National Strategy of the Fight against Cancer, and currently recommends annual CBE for women aged 40–69 years, with

mammography reserved for high-risk women and those referred after primary screening via CBE ([ATREP, 2014](#)). Tunisia has implemented several pilot programmes examining the efficacy and feasibility of mammography screening in the general population. Based on the results of these programmes, the Tunisian government will consider moving towards population-based mammography screening.

### (ii) Participation

In Egypt, mammography is delivered in an opportunistic fashion through mobile units equipped with digital mammography units ([Women's Health Outreach Program, 2014](#)); as of 2013, 107 193 women had been screened ([Philips Healthcare, 2014](#)). Despite these mobile units, which increase the presence in rural areas and less affluent areas, barriers to accessing mammography still exist, and other methods of breast screening have been explored, including training women living in a slum in Cairo about breast health awareness and BSE ([Kharboush et al., 2011](#)). A randomized study, with women who received CBE versus a control arm of women who received only health education, demonstrated high acceptance, with 85–91% of the women in the target population enrolling in the study. Initial results demonstrated that stage distribution was significantly better in the intervention arm compared with the control arm ([Miller, 2008](#)). A study in 2000 reported that of 565 newly diagnosed breast cancer patients, only 10.4% had practised BSE, and 2.7% reported performing BSE monthly ([Abdel-Fattah et al., 2000](#)).

In Morocco, a study of 136 female doctors and nurses found that 75% of study participants practised BSE monthly, but only 15% had ever had a mammogram ([Ghanem et al., 2011](#)).

In Tunisia, one of the first pilot studies, started in 2003, was large-scale population-based mammography screening in urban areas, but participation rates have tended to be low ([Bouchlaka et al., 2009](#); [Zaanouni et al., 2009](#)).

The most recent study evaluated three rounds of mammography screening as part of a pilot programme, carried out in 2004–2010 in Sfax. Biennial screening was offered to women aged 45 years and older, and 17.4% of the target population underwent screening, resulting in 12 657 mammograms ([Frikha et al., 2013](#)). A cross-sectional study in Tunisia of 900 women reported poor knowledge of specific risk factors for breast cancer and of breast screening modalities; only 14% of women performed any type of breast screening ([El Mhamdi et al., 2013](#)).

(iii) *Information and breast cancer awareness*

Awareness campaigns and training of health-care workers are part of national screening programmes in these regions, including in Algeria ([Roche, 2014](#)), Morocco ([Lalla Salma Foundation, 2014](#)), and Tunisia ([ATREP, 2014](#)).

### 3.2.6 South-East Asia

During the past decade, the Republic of Korea, Singapore, and Taiwan, China, have started national organized screening programmes with mammography ([Table 3.7](#)). Although Japan was the first country to introduce a national screening programme with CBE, in 1987, and later also included mammography, organized screening remains insufficient in Japan. Eleven other countries in South-East Asia have partial programmes supported by governments or NGOs in local areas, and screening systems have not been standardized. All 15 countries in this region have breast cancer awareness programmes, which are often included in national programmes for cancer control and prevention of noncommunicable diseases.

(a) *Republic of Korea*

(i) *Systems, policies, and guidelines*

The National Cancer Screening Program, launched in 1999, recommends mammography with and without CBE as the screening method

([Kim et al., 2011](#)). The target group for screening is women aged 40 years and older, with no upper age limit, and the screening interval is 2 years. Although CBE is recommended when mammography screening is performed, the fee is not covered by the National Cancer Screening Program.

The national programme provides breast cancer screening with different fees; women are divided into three groups, based on their insurance premium ([Kim et al., 2011](#)). The lowest-income beneficiaries (those exempted from premium payment) are supported directly by the national government. For people whose insurance premium is less than the 50th percentile, a free programme is provided by the National Health Insurance system (National Cancer Screening Program), supported also by national and local governments. People whose premium is more than the 50th percentile, although they are supported by the National Health Insurance Corporation cancer screening programme, are required to make a 10% co-payment.

Based on the Cancer Control Act of 2003, the Ministry of Health and Welfare organized the cancer screening programme systematically by cooperating with public institutions ([Kim et al., 2011](#)). The National Health Insurance Corporation selects the target population and sends invitation letters. Women can visit hospitals or clinics that have been approved for cancer screening and then receive the screening results within 15 days. Women who have positive results on their primary screening undergo follow-up examinations, and the diagnostic evaluation is available with co-payment from their health insurance ([Goto et al., 2015](#)). However, co-payment for treatment is supported only when breast cancer is diagnosed by the National Cancer Screening Program.

The certification of screening providers and quality management are conducted mainly by the National Cancer Center ([Goto et al., 2015](#)). Private hospitals provide multiphasic health

**Table 3.7 Policies and practice for breast cancer screening in South-East Asia**

Country	Type of programme <sup>a</sup>	Start year	Screening practice	Target age (years)	Interval (years)	Examination coverage <sup>b</sup> (%)	Mammography units per million women aged 50–69 years in 2013 <sup>c</sup>	References
Bangladesh	Partial programme	Unclear	CBE	40–69	Unclear	Unclear	—	<a href="#">Ministry of Health and Family Welfare, Bangladesh (2008)</a>
Brunei Darussalam	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	91.9	<a href="#">Ministry of Health, Brunei Darussalam (2007)</a>
China	Partial programme	Unclear	Unclear	Unclear	Unclear	21.7 <sup>d</sup>	—	<a href="#">Mo et al. (2013)</a> , <a href="#">Pan et al. (2013)</a> , <a href="#">Wang et al. (2013)</a>
Hong Kong Special Administrative Region, China	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	—	<a href="#">Lui et al. (2007)</a> , <a href="#">Centre for Health Protection (2012)</a>
India	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	—	<a href="#">Ministry of Health and Family Welfare, Government of India (2005)</a> , <a href="#">Agarwal &amp; Ramakant (2008)</a> , <a href="#">Reddy et al. (2012)</a>
Indonesia	Partial programme	2007	CBE	Unclear	Unclear	Unclear	—	<a href="#">WHO (2008a)</a>
Japan	National programme	1987 <sup>e</sup>	Mammography + CBE	≥ 40	2	18.3	227.3	<a href="#">Oshima (1994)</a> , <a href="#">Ministry of Health, Labour and Welfare, Japan (2013b)</a> , <a href="#">National Cancer Center, Japan (2013)</a> , <a href="#">Goto et al. (2015)</a> , <a href="#">Hamashima, 2016</a>
Malaysia	Partial programme	Unclear	CBE Mammography	Unclear	Unclear	51.8 7.6	86.7	<a href="#">Ministry of Health Malaysia (2010)</a> , <a href="#">Dahlui et al. (2011)</a>
Pakistan	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	1.6	<a href="#">WHO (2008b)</a>
Philippines	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	13.1	<a href="#">National Statistics Office (2009)</a>

**Table 3.7 (continued)**

Country	Type of programme <sup>a</sup>	Start year	Screening practice	Target age (years)	Interval (years)	Examination coverage <sup>b</sup> (%)	Mammography units per million women aged 50–69 years in 2013 <sup>c</sup>	References
Republic of Korea	National organized programme	1999	Mammography ± CBE	≥ 40	2	49.5	402.3	<a href="#">Kim et al. (2011)</a> , <a href="#">National Cancer Center of Korea (2013)</a>
Singapore	National organized programme	2002	Mammography	50–69	2	39.6 <sup>f</sup>	127.6	<a href="#">Ministry of Health Singapore (2010, 2011)</a>
Taiwan, China	National organized programme	2004	Mammography	45–69	2	36.0	—	<a href="#">Health Promotion Administration, Ministry of Health and Welfare (2014)</a>
Thailand	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	27.9	<a href="#">National Cancer Control Programme, Thailand (2013)</a>
Viet Nam	Partial programme	2008	CBE	Unclear	Unclear	15–20	—	<a href="#">Nguyen et al. (2013)</a>

<sup>a</sup> Partial programmes are supported by government and nongovernmental organizations and are conducted mainly in local areas, and screening systems have not been standardized.

<sup>b</sup> Annual examinations as percentage of annual target population, with the screening method and within the age range reported in the policy.

<sup>c</sup> [WHO \(2014\)](#).

<sup>d</sup> Coverage refers to any breast cancer examination in women older than 18 years.

<sup>e</sup> Current policy started in 2005.

<sup>f</sup> Coverage refers to the previous 2 years.

±, with or without; CBE, clinical breast examination.

check-ups, including cancer screenings. Some private companies provide subsidies for these health check-ups.

(ii) *Participation*

The participation rate in breast cancer screening increased from 14.1% in 2002 to 49.5% in 2011, and in 2012 the participation rate including opportunistic screening was 71.0% ([National Cancer Center of Korea, 2013](#)).

(iii) *Information and breast cancer awareness*

To increase participation in cancer screening, awareness campaigns have been actively promoted in the media by the National Health Insurance Corporation. BSE is well known among Korean women through television, radio, and newspapers ([Yoo et al., 2012](#)). Community-based intervention also seems to be effective in increasing participation in mammography screening ([Park et al., 2011](#)).

(b) *Singapore*

(i) *Systems, policies, and guidelines*

BreastScreen Singapore was adopted as a national screening programme in 2002, and the Ministry of Health Singapore revised the guidelines in 2010. The ministry recommended stand-alone mammography every 2 years for asymptomatic women at average risk aged 50–69 years ([Ministry of Health Singapore, 2010](#)). Women at average risk aged 40–49 years are given information describing the benefits and harms of mammography screening, and can therefore make an informed choice. Ultrasonography and CBE are not included in the programme.

BreastScreen Singapore provides subsidized mammograms at many government centres ([Teo & Soo, 2013](#)). Service partnerships were established with health service providers of two public health clusters and a private service provider ([Yeoh et al., 2006](#)). They have cooperated to select and assess mammography screening centres. After the first screening, all women in the target

population are sent reminders for the subsequent screening at the appropriate interval for their age group. Multidisciplinary assessment is performed and completed until a final diagnosis is obtained ([Yeoh et al., 2006](#)). Women who have a diagnosis of breast cancer are given the choice of either seeing a breast surgeon at any centre in Singapore or remaining at the assessment centre hospital for further treatment.

To ensure that patients undergo high-quality screening, health-care providers must adhere to a common quality assurance framework for the screenings ([Yeoh et al., 2006](#)). Standards and target requirements for screening, reading, and assessment centres were established, and audit teams including trained multidisciplinary clinical professionals carry out audit visits every 2 years ([Yeoh et al., 2006](#)). Every set of films is interpreted by two radiologists; their performance is monitored, and feedback is given to individuals and to the centre to facilitate the taking of appropriate action. Although private clinics provide mammography screening to women individually, the women are charged fees ([Yeoh et al., 2006](#)).

(ii) *Participation*

In 2010, about 66% of Singaporean women aged 50–69 years had undergone mammography at least once, and 39.6% of Singaporean women aged 50–69 years had undergone mammography within the previous 2 years ([Ministry of Health Singapore, 2011](#)).

(iii) *Information and breast cancer awareness*

In 2010, 90.9% of Singaporean women aged 50–69 years were aware of mammography as a screening method for breast cancer ([Ministry of Health Singapore, 2011](#)). Women with higher education levels tended to be more aware of mammography compared with women with lower education levels.

(c) *Taiwan, China*(i) *Systems, policies, and guidelines*

In accordance with the Cancer Prevention Act of 2003, national screening for breast cancer was started in 2004 ([Health Promotion Administration, Ministry of Health and Welfare, 2014](#)). The Taiwan, China, government currently offers free mammography screening every 2 years for women aged 45–69 years. For women aged 40–44 years, mammography screening is limited to those with a second-degree relative with breast cancer. Women in the target population can be examined at community health centres, clinics, or hospitals. To further improve accessibility of breast cancer screening services, the national government subsidized provinces and cities to provide mobile mammography services or mammography equipment.

The health insurance covers the screening fee and the cost of further examinations. To increase cancer screening coverage, the national government has provided special funding for cancer prevention and control after raising the tobacco tax ([Health Promotion Administration, Ministry of Health and Welfare, 2014](#)).

Hospitals in Taiwan, China, are required to establish an outpatient screening reminder system and a referral system for positive test results. The national government has also commissioned the Radiography Society to certify medical institutions for mammography based on requirements ([Health Promotion Administration, Ministry of Health and Welfare, 2014](#)). The degree of appropriateness of mammography equipment, including radiation exposure levels, showed a significant improvement after the enforcement of quality assurance ([Hwang et al., 2013](#)). In further efforts to improve the quality of cancer screening, the national government launched a project to build a nationwide database for quality assurance. The database is interconnected with all screening-related databases (the Taiwan Cancer Registry, the Taiwan

Mortality Registry, and the Taiwan Household Registration).

(ii) *Participation*

In 2013, mammography was conducted in 694 000 women aged 45–69 years. The coverage rate over the past 2 years was 36% ([Health Promotion Administration, Ministry of Health and Welfare, 2014](#)).

(iii) *Information and breast cancer awareness*

The national government supported local health departments to conduct community screenings, introduced on-site education programmes, and followed the WHO Health Promoting Hospitals model in assisting local hospitals to promote cancer screening ([Health Promotion Administration, Ministry of Health and Welfare, 2014](#)).

(d) *Japan*(i) *Systems, policies, and guidelines*

In 1987, national cancer screening using annual CBE was introduced in Japan for women aged 30 years and older ([Oshima, 1994](#)). In 2000, mammography screening was added for women aged 50 years and older, and in 2005 the protocol was changed to biennial mammography screening with CBE for women aged 40 years and older, with no upper age limit. In 2013, the National Cancer Center published new guidelines for organized and opportunistic breast cancer screening, in which mammography with or without CBE was recommended ([National Cancer Center, Japan, 2013](#)). [Note post-meeting: the guidelines have been further updated ([Hamashima, 2016](#)).] Use of ultrasonography as a screening tool is currently under investigation ([Ishida et al., 2014](#)).

There are two types of opportunistic screening in Japan; one is individual-based screening, and the other is provided as a premium by large health insurance associations or large companies at workplaces, but there is no obligatory

monitoring or quality assurance for these types of screening ([Goto et al., 2015](#)).

Local governments are responsible for cancer screening and make decisions about the screening method, screening fee, provision of primary screening, quality assurance for primary screening, and monitoring; most of these local governments do not have a call-recall system ([Goto et al., 2015](#)). The national government provides some funding, although non-specific, for cancer screening, and the local governments pay the remaining portion of the cancer screening fees. The women's fees for the screening examination and management differ among municipalities (about US\$ 5–20); 8.5% of municipalities provide free screening as part of mass screening programmes ([Ministry of Health, Labour and Welfare, Japan, 2013a](#)).

Local governments do not support follow-up examinations for women with positive results at the primary screening; therefore, the participation rate at follow-up examinations has remained at approximately 80% ([Ministry of Health, Labour and Welfare, Japan, 2013b](#)). Diagnosis and treatment are covered by health insurance, and the co-payment is usually 30%. Women can access any clinic or hospital, including university hospitals, without a referral from a general physician.

Although there is an insufficient quality assurance system for breast cancer screening in Japan, technical support for mammography has been actively promoted by the Central Committee on Quality Control of Mammographic Screening ([Japan Central Organization on Quality Assurance of Breast Cancer Screening, 2014](#)). The committee has approved technical skills for mammography screening for physicians. Several public information programmes, including for the management of mammography equipment, have been made available through the committee's website.

## (ii) Participation

Although participation rates have increased since 2009, they have remained at approximately 20%. In 2011, 2 511 299 women participated in breast cancer screening, at a rate of 18.3% ([Ministry of Health, Labour and Welfare, Japan, 2013b](#)). When opportunistic screening is included, the participation rate is 43.4% ([National Cancer Center, Japan, 2014](#)).

## (iii) Information and breast cancer awareness

To improve screening rates, the Japanese government implemented an intervention aimed at reducing out-of-pocket costs, and offered vouchers for free screening accompanied by information leaflets to women in specific age groups to undergo breast cancer screening nationwide ([Tabuchi et al., 2013](#)). The vouchers increased the participation rate and decreased inequalities in screening ([Sano et al., 2014](#)).

## (e) Other countries in South-East Asia

### (i) Bangladesh

The National Cancer Control Strategy and Plan of Action 2009–2015 in Bangladesh has promoted breast awareness among all women and CBE for women aged 40–69 years ([Ministry of Health and Family Welfare, Bangladesh, 2008](#)). However, because resources are extremely limited, the most cost-effective strategy for screening needed to be sought ([Hussain & Sullivan, 2013](#)). General health education in the country is poor; only few people are aware of cancer, and most patients are diagnosed at an advanced stage ([Hossain et al., 2014](#)). Studies have suggested that women have insufficient knowledge of breast cancer ([Chowdhury & Sultana, 2011](#)), but women with higher education levels were more likely to know about BSE ([Rasu et al., 2011](#)).

*(ii) Brunei Darussalam*

In 2007, the Ministry of Health developed the Integrated Health Screening and Health Promotion Programme, which includes screening for colorectal, cervical, and breast cancer for all people in Brunei Darussalam, i.e. approximately 46 000 people in 2009 ([Ministry of Health, Brunei Darussalam, 2007](#)). The programme includes mammography for women at a certain age; the national government has made efforts to collaborate with volunteer associations and has promoted breast cancer awareness.

*(iii) China*

China does not currently have a national screening programme or national screening guidelines ([Wanget al., 2013](#)). Although screening programmes exist in local areas, the screening method used and the target population are not standardized ([Mo et al., 2013](#); [Pan et al., 2013](#); [Wang et al., 2013](#)). Based on the China Chronic Disease and Risk Factor Surveillance System, in 2010, 21.7% of women aged 18 years and older had ever had any breast cancer examination ([Wang et al., 2013](#)). The participation rate for breast cancer screening was higher in the eastern region of China than in the western region, and was higher in women with higher education levels. The highest participation rate was observed among women aged 30–49 years, and the participation rate decreased with increasing age. To increase the participation rate, free breast cancer examination programmes have been offered by local governments in some rural districts ([Wang et al., 2013](#)). These programmes cover CBE, mammography, and ultrasonography. Between 2009 and 2011, such programmes facilitated the screening of 1.46 million women living in rural areas. Overall, awareness of breast cancer is low, but differences exist by location, age group, and education level ([Huang et al., 2011](#), [Liu et al., 2014](#)). The national government has promoted the China National Plan for Noncommunicable and Chronic Diseases Prevention and Treatment,

2012–2015 ([Chinese Center for Disease Control and Prevention, 2012](#)).

*(iv) Hong Kong Special Administrative Region, China*

In 2012, the Cancer Expert Working Group on Prevention and Screening revised the guidelines for breast cancer screening that had been developed in 2002 and 2008 ([Centre for Health Protection, 2012](#)). BSE, CBE, and mammography were not recommended in women at average risk, but women were advised to be aware of early symptoms of breast cancer and to consult a doctor if these occur. Opportunistic screening (CBE, mammography, and ultrasonography) is available in private hospitals ([Lui et al., 2007](#)). A community-based outreach programme has increased knowledge of breast cancer and screening ([Chan et al., 2007](#)). Although most women were aware of the benefits of mammography, they were reluctant to participate in mammography screening and CBE because of screening fees and lack of time ([Chua et al., 2005](#)).

*(v) India*

The National Cancer Control Programme was started in 1975 and revised in 1984–1985. Although the programme promotes education for primary prevention and early detection, it is not specific for breast cancer ([Ministry of Health and Family Welfare, Government of India, 2005](#)). Breast cancer screening by CBE or mammography is available only within research studies conducted at a few institutions or to women who refer themselves to specialty hospitals to have the screening provided for a fee ([Agarwal & Ramakant 2008](#); [Reddy et al., 2012](#)). A recent study assessed cancer awareness among women of low socioeconomic status in Mumbai. Among 182 participants, of which the majority (90.5%) were from lower socioeconomic groups, knowledge about cancer was good (84.6%) compared with knowledge about cancer screening (35.1%); awareness was higher among the richer and



more educated women. Major sources of information were friends or relatives (46.1%) and the media (35.2%). Only 6.6% of the participants had undergone screening ([Kumar et al., 2011](#)). Among the 52 011 women in the intervention group of a breast cancer screening trial in Trivandrum District, 23.2% reported practicing BSE, 96.8% had attended CBE, and 49.1% of 2880 screen-positive women attended referral. Women who were not currently married or who had no family history of cancer were significantly less likely to attend the screening process at any level ([Grosse Frie et al., 2013](#)).

(vi) *Indonesia*

Since 1996, 8 out of 33 provinces in Indonesia have adopted the Integrated Comprehensive Cancer Control Programme and have implemented the Population-Based Cancer Control (PBCC) Program ([WHO, 2008a](#)). The PBCC Program aims to improve people's knowledge through education, focusing mainly on prevention, early detection of the most common cancers, and home-based palliative care. The PBCC Program is well established in several provinces, and all of the established programmes have a network to monitor their training activities. These activities are carried out by primary care providers and supported by the PBCC Program team. More than 74 million people are being served by the PBCC Program, and cancer awareness has increased significantly. The Ministry of Health established the National Comprehensive Cancer Plan in 2005, and in 2007 provided services for the early detection of breast cancer in six districts as pilot projects ([WHO, 2008a](#)). A preliminary result of the breast cancer screening with CBE was reported from the project conducted in Jakarta ([Kardinah et al., 2014](#)).

(vii) *Malaysia*

In 2010, the Ministry of Health revised the clinical practice guidelines for the management of breast cancer, including screening for the general population ([Ministry of Health Malaysia, 2010](#)). For women aged 50–74 years, biennial mammography screening was recommended. Routine mammography screening was not recommended for women aged 40–49 years, but it could be provided upon request. BSE was recommended for raising awareness but not as a screening method. The Ministry of Health has been promoting BSE and CBE by trained health workers as part of a breast care awareness campaign since 1995 ([Dahlui et al., 2011](#)). CBE by a trained health-care professional has been offered to Malaysian women aged 20–65 years attending primary health-care services since 2009 ([Bhoo-Pathy et al., 2014](#)). At the same time, women are taught the BSE technique. Since 2012, a targeted mammography screening programme has been made available for women at high risk of breast cancer, namely those with a family history of breast cancer or with breast abnormalities ([Bhoo-Pathy et al., 2014](#)). According to the Third National Health Morbidity Survey, in 2006 the breast examination rates were 57.1% for BSE, 51.8% for CBE, and 7.6% for mammography ([Dahlui et al., 2011](#)). Knowledge of breast cancer and screening is reported to be low in Malaysia ([Parsa et al., 2008](#); [Hadi et al., 2010](#)).

(viii) *Pakistan*

The Lady Health Worker Programme, a unique system in Pakistan, was developed by the national government in 1994 to provide essential primary health services ([WHO, 2008b](#)). The programme selected, trained, and deployed 100 000 female community health workers throughout the country by 2005. Through monthly visits to the female community in their assigned areas, the Lady Health Workers teach BSE and highlight the importance of breast cancer screening ([Baig & Ali, 2006](#)). In urban

areas, knowledge of breast cancer has spread among educated women who are employed by large companies, and 55% of these women had the experience of learning BSE ([Banning & Hafeez, 2009](#)).

(ix) *Philippines*

Although more than half of the female population does not have any health insurance, women in the Philippines undergo breast cancer screening even if it is at their own expense ([National Statistics Office, 2009](#)). The Breast Cancer Control Programme of the Philippines includes nationwide programmes for breast cancer prevention as follows: public information, health education, case finding, and treatment integrated into the community health structure ([Ngelangel & Wang, 2002](#)).

(x) *Thailand*

A National Cancer Control Programme, including breast cancer screening, was developed in Thailand in 1998 ([National Cancer Control Programme, Thailand, 2013](#)). Thailand also has opportunistic screening and some pilot studies in local areas. Because provision of universal access to mammography is not currently possible in Thailand, risk-prediction models are being developed in order to target mammography screening only at women at higher risk of breast cancer ([Anothaisintawee et al., 2012, 2014](#)). Knowledge and uptake of screening are low, and campaigns for increasing public awareness and teaching BSE have been recommended ([Mukem et al., 2014](#)).

(xi) *Viet Nam*

The National Cancer Control Programme was introduced in selected regions of Viet Nam in 2008. The objectives of the programme were to decrease cancer morbidity and mortality and to improve the quality of life of cancer patients ([Nguyen et al., 2013](#)). To realize these objectives, six regions in which cancer registries had been established initiated an organized screening

programme with CBE. Although the screening policy focused on women aged 40–55 years, there were differences in the target age range of women among the regions, as follows: 35–60 years in Hanoi, 40–55 years in Hai Phong, 30–50 years in Thừa Thiên-Huế, and 40–54 years in Thái Nguyên. Because of the fiscal constraints of the National Cancer Control Programme, only about 15–20% of the total population in each region participated in 2008 ([Nguyen et al., 2013](#)).

### 3.2.7 *Oceania*

In Australia and New Zealand, organized breast cancer screening has been established nationwide, as well as breast awareness programmes.

(a) *Australia*

(i) *Systems, policies, and guidelines*

In Australia, organized screening was established in 1991 by the national government, and BreastScreen Australia is the national breast cancer screening programme ([Australian Government, Department of Health, 2014](#)). The Australian government performs the overall coordination in terms of policy-making, national data collection, quality control, monitoring, and evaluation. The responsibility of implementing the programmes lies with the governments of each state and territory. In 2013, BreastScreen Australia operated in more than 600 locations, including fixed and mobile screening units. Recruitment and reminder systems by mail ensure that women in the target group are screened and rescreened in accordance with the programme policy. The screening is provided free of charge for all Australian women.

The screening method for breast cancer is mammography without CBE ([AIHW, 2013; Australian Government, Department of Health, 2014](#)). The target group for screening is women aged 50–74 years ([Table 3.8](#)). Nevertheless, free mammography screening is available for

**Table 3.8 Policies and practice for breast cancer screening in Oceania**

Country	Type of programme <sup>a</sup>	Start year	Screening practice	Target age (years)	Interval (years)	Examination coverage <sup>b</sup> (%)	Mammography units per million women aged 50–69 years in 2013 <sup>c</sup>	References
Australia	National organized programme	1991	Mammography	50–74	2	55.0 <sup>d</sup>	—	<a href="#">AIHW (2014)</a> , <a href="#">Australian Government, Department of Health (2014)</a>
Fiji	Partial programme	Unclear	Unclear	Unclear	Unclear	Unclear	28.8	<a href="#">Ministry of Health, Fiji (2009)</a>
New Zealand	National organized programme	1998	Mammography	45–69	2	70.2 <sup>e</sup>	—	<a href="#">BreastScreen Aotearoa (2014)</a>

<sup>a</sup> Partial programmes are supported by government and nongovernmental organizations and are conducted mainly in local areas, and screening systems have not been standardized.

<sup>b</sup> Annual examinations as percentage of annual target population, with the screening method and within the age range reported in the policy.

<sup>c</sup> [WHO \(2014\)](#).

<sup>d</sup> Coverage refers to women aged 50–69 years, as this was the target age until 2012.

<sup>e</sup> Coverage refers to 2010–2012.

asymptomatic women aged 40–49 years, or for women aged 75 years and older who have decided to participate based on current knowledge and personal choice. The screening interval is 2 years. All women are screened using two-view mammography, and results are read by at least two professionals.

The screening results are provided by letters directly to women who have undergone the screening ([Australian Government, Department of Health, 2014](#)). If any suspicious diagnostic images are found, further investigation, including clinical examination, mammography, ultrasonography, and biopsy, is provided free of charge by BreastScreen Australia. Women with histologically confirmed breast cancer are actively involved in the decision-making process about management of the cancer and are given the option of referral to a specialized treatment clinic for breast cancer or returning to their

nominated general practitioner for referral to the appropriate surgeon.

BreastScreen Australia has rigorously monitored and assessed the performance of breast cancer screening ([Australian Government, Department of Health, 2014](#)). At the national level, the screening results have been evaluated based on the following performance indicators: participation, rescreening, recall to assessment, invasive breast cancer detection, DCIS detection, sensitivity, morbidity, and mortality. A comprehensive system of accreditation ensures that all BreastScreen Australia services operate under a common set of standards ([BreastScreen Australia, 2008](#); [Australian Government, Department of Health, 2014](#)). Each service is assessed on a regular basis by an independent team to ensure that the services provided comply with the national standards.

*(ii) Participation*

The programme's aim was to achieve a participation rate of at least 70% among women aged 50–69 years. In 2011–2012, the programme was able to screen about 55% of women in this age group ([Table 3.8](#); [AIHW, 2014](#)). The participation of Aboriginal and Torres Strait Islander women aged 50–69 years was 38%, compared with participation of non-Indigenous women of 54%.

*(iii) Information and breast cancer awareness*

Extensive efforts, including public awareness campaigns, have improved the knowledge of breast cancer and the need to seek medical advice when symptoms occur ([Jones et al., 2010](#)). In many of the states and territories, BreastScreen Australia programmes have continued to develop strategies and initiatives, including the use of appropriate communication, to encourage greater participation by Aboriginal and Torres Strait Islander women ([AIHW, 2013](#)). These strategies include group bookings for breast cancer screening for Aboriginal and Torres Strait Islander women. Non-English-speaking women generally participate in breast cancer screening less frequently than English-speaking women; special programmes based on cultural background were adopted to promote awareness of breast cancer among immigrant Chinese women ([Koo et al., 2012](#)).

*(b) Fiji*

The Fiji national government has developed a national strategy plan for noncommunicable disease prevention and control ([Ministry of Health, Fiji, 2009](#)). The programme includes improvement of public education on breast cancer.

*(c) New Zealand*

BreastScreen Aotearoa was established as a national breast cancer screening programme in 1998, to provide free mammograms and follow-up for asymptomatic women ([BreastScreen Aotearoa,](#)

[2014](#)). This programme is part of the National Screening Unit of the Ministry of Health and provides breast screening services throughout New Zealand.

*(i) Systems, policies, and guidelines*

The eligible age range for free breast cancer screening was first set at 50–64 years and then extended to 45–69 years in 2004, following the recommendations of a multidisciplinary Expert Advisory Group ([Table 3.8](#)). Women aged 70 years and older are not eligible for free mammograms provided by BreastScreen Aotearoa ([Baker et al., 2005a, b](#)). The screening interval is 2 years, and all women are screened using two-view mammography ([BreastScreen Aotearoa, 2014](#)).

The programme identifies the target population and then sends invitation letters ([BreastScreen Aotearoa, 2014](#)). BreastScreen Aotearoa provides clinics for breast cancer screening throughout New Zealand, including clinics in communities, public hospitals, and mobile units. Women who have undergone screening usually receive the results within 2 weeks after the mammography and, upon consent, the general practitioner can also be informed of the results. The assessment of breast cancer is made by a multidisciplinary team of experts. Treatment of breast cancer is provided free of charge in public hospitals and clinics, but a certain amount must be paid for private treatment.

All BreastScreen Aotearoa facilities must meet the BreastScreen Aotearoa National Policy and Quality Standards ([BreastScreen Aotearoa, 2014](#)). These standards determine the minimum requirements for any provider of BreastScreen Aotearoa services. Regular audits of BreastScreen Aotearoa are performed to assess how the quality standards are met.

*(ii) Participation*

In 2010–2012, the coverage rate was 70.2% ([Table 3.8](#)): 62.7% for Māori women and 71.1% for non-Māori women ([BreastScreen Aotearoa, 2014](#)).

The coverage rate for women aged 50–69 years has increased steadily in Māori women, who have a higher breast cancer mortality rate compared with non-Māori women.

### (iii) Information and breast cancer awareness

BreastScreen Aotearoa provides information in various forms, such as leaflets for breast cancer awareness and screening, including specific messages for Māori women ([BreastScreen Aotearoa, 2014](#)). The Te Whanau a Apanui Community Health Services have provided education and information about breast cancer screening for Māori and Pacific women ([Thomson et al., 2009](#)). The programme also provides mammography screening by a mobile unit, which has increased the participation rate. Although the number of migrant Chinese women has increased, their participation rate has remained lower than that of other New Zealanders because of insufficient knowledge of the national cancer screening programmes and limited engagement with preventive primary care services ([Zhang et al., 2014](#)).

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