BREAST CANCER SCREENING

THE BREAST CANCER SCREENING PROGRAMME IN FINLAND

ANNUAL REVIEW 2020

The breast cancer screening programme has been effective. There is, though, much variation in the programme's indicators by region and population group. A particular concern is the inequality among the population groups participating in the screening. We now need research data on the reasons for non-participation and on whether the observed disparities can be reduced. The development of nationwide guidelines is also important.

SUMMARY

A total of 373,000 invitations to take part in breast cancer screening were sent out in 2018. Three hundred and four thousand women (81%) took part in the programme. A total of 1,907 breast cancers or breast in situ carcinomas were found, or six cases per thousand screened. Participation in screening has decreased from the previous level of about 87% in 2005 to about 81% in 2018. Between 2014 and 2018, there was great variation in participation by hospital district, and there was much variance in screening findings. Participation in screening was lower for people not in employment than for the rest of the population, and lower among people with the lowest level of education, as well as among those whose mother tongues are other than the domestic languages.

1. INTRODUCTION

Finland's national breast cancer screening programme started in 1987. Screening aims to detect breast cancer as early as possible, so that the cancer treatment prognosis is good and can be done with efficient methods. The ultimate goal of screening is to reduce mortality from breast cancer.

The quality and effectiveness of breast cancer screening in Finland has been evaluated throughout its thirty-year history using follow-up studies. Finnish and international follow-up studies further confirm the positive effects of screening on early diagnosis and the reduction of breast cancer mortality (Heinävaara et al. 2014 and 2016, IARC 2016, Zielonke et al. 2020). In Finland, breast cancer mortality among women at the age of 50–84 who participated in screening is about a third lower than it would be in a setting where screening was not arranged (Heinävaara et al. 2016). Although advances in treatments and increased breast cancer awareness have reduced breast cancer mortality, screening also has an inherent effect.

ANNUAL REVIEW

This annual review includes age-standardised breast cancer detection results from 2018 nationwide and by region. Screening indicators, such as participation and discovery rates, are compared to those of previous years. Comparisons are presented from 1992 onwards. The regional overview is based on 21 hospital districts. In addition, statistics for the City of Helsinki have been compiled separately from the rest of Uusimaa province. Participation in screening and other screening results are also examined in population groups according to mother tongue, level of education and socio-economic status. In addition to screening statistics, this annual review discusses current research on breast cancer screening and considers the key development needs of screening.

2. BREAST CANCER SCREENING IN FINLAND

In accordance with the government decree on screening, women aged 50–69 are invited for breast cancer screening every two years. The screening protocol — including the screening interval, age groups to be screened, and test — has been adopted based on domestic and international research data.

Municipalities organise screening. They select a screening provider, which may be the municipality itself or a private operator tendered by the municipality. The units carrying out the screening send out screening invitations and perform the mammography examinations and, if required, confirmatory examinations. Diagnostic confirmation and surgical procedures for breast cancers are performed under specialised medical care. Mammography and confirmatory examinations by screening units are free of charge for those invited. Patient fees are charged for treatments and examinations performed under specialised care, and the municipality is charged for the costs in accordance with the hospital's pricing.

Individual information on all stages of screening is submitted electronically to the Finnish Cancer Registry's Mass Screening Registry for quality and effectiveness evaluation. Comprehensive data capture also enables the detection and rectification of screening programme deficiencies and problems.

THE SCREENING PROCESS

Screening involves a personal invitation, mammography as the primary screening test

and, if necessary, confirmatory examinations (complementary mammography, ultrasound and needle biopsy) at the screening centre, and a referral for specialised medical care. Mammogram images are taken from two directions on both breasts. The images are interpreted by two radiographers operating independently. If a cancerous tumour is suspected in either breast, a co-reading is performed. The results of the screening are given by personal letter. If necessary, personal invitations for confirmatory examinations are issued.

MAIN FINDINGS 2018

The coverage of screening invitations in 2018 was 100% (Table 1), meaning that all municipalities invited women aged between 50 and 69 every two years. Breast cancer screening data from all municipalities was thereby obtained for the Mass Screening Registry. A total of 373,000 invitations were sent out under the screening programme, and 304,000 women took part in it (81 %, Table 2). About 97% of those screened received a normal screening result and about 3% were recalled for confirmatory examinations at the screening unit. There were approximately 2,500 (0.8% of those screened) referrals for surgery and other specialised medical follow-up examinations (Table 3). A total of 1,907 breast cancers or breast in situ carcinomas were diagnosed in the programme (0.6% of those screened), or about six cases per thousand women screened. About 5% of those who received a surgical referral lack a definitive, histologically verified diagnosis (n = 135). Because breast cancer data has also been collected from the cancer registry, it is likely that most of the inadequate diagnoses were benign findings.

COMPARISON WITH PREVIOUS YEARS

The expansion of the target population for breast cancer screening to all 50–69-year-olds began in 2007 and was fully realised in 2016. Invitation coverage thus increased within the female population over 60 years of age until 2016, when virtually all members of the target population were invited for breast cancer screening every two years (Figure 1).

Participation in screening, on the other hand, has declined, falling from a level of about 87% between 1992 and 2005 to 81% in 2018 (Figure 1). There is no conclusive data on the reasons for the decrease in participation, which has been similar in all age groups. The proportions of confirmatory examinations and cancer findings have remained at the level of previous years. The increase in target age is also reflected in the total number of breast cancers found in screenings, which peaked in 2015 and 2016.

3. BREAST CANCER SCREENING BY HOSPITAL DISTRICT

Participation in screening varies quite a lot among hospital districts. Between 2014 and 2018, age-standardised (Finland 2014) participation activity ranged from 74 to 87% (Figure 2, Table 4). It is known that in large cities participation is lower than elsewhere in Finland. As in previous years, the lowest participation rate in 2018 was in Helsinki, where only 73% of those invited participated in the screenings.

There has also been fairly wide variation in screening results among hospital districts (Figure 3, Figure 4, Table 5). Between 2014 and 2018, the proportion of those invited to age-standardised (Finland 2014) confirmatory examinations ranged from 1.5 to 4.7%, the proportion of surgical referrals from 0.5 to 1.1% and the proportion of breast cancers detected from 0.5 to 0.8%. Regional differences are due to variations in the background

risk of breast cancer, as well as differences in procedures and the quality of diagnostics.

4. BREAST CANCER SCREENING BY POPULATION GROUP

Statistics for breast cancer screening from 2017 to 2018 and participation from 2005 to 2018 were also produced according to population group. Mother tongue, socioeconomic status and educational attainment are considered in this annual review, based on data from the Digital and Population Data Services Agency and Statistics Finland. Because population groups are generally not similar in age structure, the figures are age-standardised, making comparisons between population groups more pertinent.

Invitees for breast cancer screening were classified into two groups according to their mother tongue. Finnish, Swedish and Sámi were counted as domestic languages. Inadequate information concerning mother tongue was excluded from the review. The mass screening registry did not contain language information on those who died before 2015.

Information on socioeconomic status and level of education was determined according to information prior to the invitation year. Persons of unknown socioeconomic status were those whose socioeconomic group could not be determined. Information on qualifications was only available from higher education upwards, so primary school and missing educational information have been classified in the same group.

LANGUAGE GROUPS

The age-standardised participation rate of screening (Finland 2014) between 2017 and 2018 was clearly lower in the non-domestic language population group (63%) than in the domestic language group (83%) (Table 6).

In the former language group, breast cancer findings were also slightly less common (0.5% vs. 0.6% of participants), probably due to differences in population risk factors for breast cancer.

Between 2005 and 2018, the absolute difference between the age-standardised participation of language groups did not change much (Figure 5). Differences in the participation of language groups in screening remained similar throughout the study period.

SOCIOECONOMIC STATUS

Worrying differences in participation activity were observed between the female population outside employment (students, the long-term unemployed, pensioners, and those whose socio-economic status is unknown) and the working population (entrepreneurs, white-collar employees, workers) (62–87%, Table 7). Nevertheless, there were no significant differences in breast cancer detection between these population groups.

Between 2005 and 2018, differences in population participation in breast cancer screening have remained fairly similar (Figure 6).

LEVEL OF EDUCATION

There were also differences in age-standardised participation in 2017 and 2018 according to level of education: the higher the level of education, the greater the level of participation (70–85%, Table 8). There was no difference in age-standardised referral and cancer detection rates between these groups. Between 2005 and 2018, the order between secondary and higher levels of education in age-standardised participation changed, as participation fell more sharply among women with secondary education than among those with higher education. Howe-

ver, the differences in the level of participation between these educational groups were fairly small (Figure 7). On the other hand, the participation of higher education graduates decreased significantly in the 2010s. Overall, differences in participation rates between education groups clearly increased between 2005 and 2018.

5. BREAST CANCER TREATMENT COSTS

A study by the Finnish Cancer Registry (Lehtinen et al. 2019) investigated the costs of specialised treatment of breast cancer according to the patient's age and the stage of the cancer. According to the study, the average cost of treating a breast cancer patient in a ten-year follow-up was €28,700. The cost was higher the younger the patient and the more extensive the breast cancer. Costs varied by age group from €19,000 to €41,300, and according to stage from €16,800 to €47,300 (Figure 8). The results are in line with estimates published elsewhere in Europe.

Breast cancer screening has already been found to be effective in reducing breast cancer mortality. In addition, screening often brings forward breast cancer diagnoses. The cost of treatment can play a major role in the cost-effectiveness of screening, which ultimately tells us whether screening is worthwhile. The observed research results will be utilised in the future in the assessment of breast cancer screening cost-effectiveness.

6. LINKAGE BETWEEN SYMPTOMS OBSERVED IN BREAST CANCER SCREENING AND OVERALL MORTALITY

The Finnish Breast Cancer Screening Programme collects preliminary data on breast symptoms in connection with screening visits based on the observations of women participating in screening and screening nurses. Such symptoms include, for example, a lump in or skin retraction of the breast. A previous Finnish study found a significantly increased risk of breast cancer detection during screening and between screenings in women who had breast symptoms identified in connection with a screening visit (Singh et al. 2018). Also, fatal screening and intermediate risk cancers were significantly increased. A recent study compared the incidence, mortality, and overall mortality of breast cancer in women who reported breast symptoms to the corresponding indicators in asymptomatic women who participated over a twenty-year follow-up period (Singh et al. 2019). The incidence of breast cancer in symptomatic women was twice as high and breast cancer mortality three times as high as in asymptomatic women who participated (Table 9). The cumulative overall mortality of symptomatic women remained increased until the end of follow-up. Thus, a new study shows that the risk of breast cancer in symptomatic women also shows significant mortality in long-term follow-up. Symptomatic women should therefore be readily referred for confirmatory examinations and biopsies, and a shorter screening interval should be considered for them in the future. Screening guidelines should be developed in this regard.

7. SYSTEMATIC REVIEW OF THE IMPACT OF SCREENING ON BREAST CANCER MORTALITY

The aim of the review was to examine the impact of population-based European screening programmes on breast cancer mortality (Zielonke et al. 2020). The study was part of the EU-TOPIA joint project funded by the EU's Horizon 2020 programme,

in which the Mass Screening Registry has been involved. Evaluation studies published up until March 2018 ranked variously in the review in terms of quality and the possibility of biases. The review evaluated a total of 60 studies on the effects of screening on breast cancer mortality, including 36 cohort-based follow-up studies, 17 case-control studies, and seven randomised follow-up studies. A total of 19 studies were judged to be of high quality. In these studies, breast cancer mortality rates of screening participants ranged from 33% to 58% compared with non-participants. The magnitude of the impact depended on such things as age groups and length of follow-up. In a published study with the highest efficiency assessment the follow-up time after a screening visit was quite short, and correspondingly the lowest efficiency assessment was for a very long follow-up time after the end of the screening. The reduction in breast cancer mortality ranged from 4 to 31% among screening invitees.

The research has provided useful information on the impact of screening programmes on breast cancer mortality. The rather wide range observed in screening efficacy evaluations mainly referred to differences in study design, and less to actual differences in the efficacy of the screening programmes studied. Such considerations are important for informing different actors and the public about research results. Most of the programmes evaluated have in the past been the subject of systematic statistics and evaluation. On the other hand, there are still screening programmes in many countries whose evaluation is not yet sufficiently developed. The results of the review cannot be applied to such programmes.

8. MODELLING RESEARCH ON BREAST CANCER AND TOTAL MORTALITY IN SCREENING PARTICIPANTS

This sub-study of the joint European EU-TOPIA project simulated breast cancer and overall mortality and estimated the additional life years achieved by total mortality estimates in the female population aged 50–69 years participating in breast cancer screening up to the age of 100. The study also clarified the statistical power requirements of follow-up studies in assessing overall mortality impact. (Heijnsdijk et al. 2019.) In addition to breast cancer screening, the study also addressed screenings for intestinal and lung cancer. The study was based on the Dutch Erasmus University Medical Center's MISCAN simulation method and Dutch breast cancer screening data. For the thousand women who participated in screening, the screening was evaluated to have reduced a total of seven breast cancer deaths (29 deaths without screening, 22 deaths in the screened population). The total 1,000 women who participated in the screening were estimated to live 88 person-years longer than without screening. Participants in the screening were estimated to attain on average 32 days per screened woman and an additional 12.6 years of life per prevented breast cancer death. Overall mortality decreased, especially in the 16–26-year follow-up window, between 75 and 85 years of age. Breast cancer deaths account for only a relatively small proportion of all deaths in the female population, so the data size required for the overall mortality impact assessment is very large even in such a follow-up window — approximately 300,000 women per study group in a randomised screening study. Overall mortality is therefore not considered to be a very good endpoint of follow-up studies.

Follow-up studies by cause of death continue to play an important role in assessing the effectiveness of screening.

9. RECOMMENDATIONS AND CONCLUSIONS

In Finland, the breast cancer screening programme, which has been running for over 30 years, has been effective. An evaluation of the benefits and harms of screening is still needed to continue to verify the effectiveness of the programme, other pros and cons, and potential problems with the implementation of the programme, benefits and harms. Based on the results presented now, more detailed information is needed, including the cost-effectiveness of screening, reasons for non-participation and whether disparities between regions and population groups in screening indicators can be reduced. Regional and population group differences in screening should also be examined, including in terms of interval cancer screening and efficacy.

Participation activity has decreased in recent years from the previous level of nearly 90% to about 81%. The reasons for non-participation should be clarified and efforts should be made to improve participation. The national and regional minimum goal should aim for a participation rate of at least 85%. A good level of participation is essentially influenced by good invitation practices, such as sending out a reinvitation and the time pre-specified in the invitation letter, compliance with which should in future be included in the quality monitoring of the screening programme. The number of mammograms done outside the screening programme should also be assessed, and whether external testing impacts participation in screening.

The inequality of population groups in participation in screening is a special source of concern. Although there are no large differences in detection rates between population groups, some cancers from poorly participating groups go undetected by screening. In future, the integrity of the screening chain, treatment decisions and the effectiveness of screening should also be considered in terms of inequality. The planning and evaluation of measures to ameliorate inequalities related to screening should be included in the ongoing operation of the Mass Screening Registry.

There have long been significant differences between regions in the national screening programme in terms of participation activity and indicators describing the quality of diagnostics, as we have noted in this annual review. The harmonisation of the national programme requires sufficiently detailed guidelines. A new, nationwide cancer screening steering group has recently started operating in the country. A goal of this control structure is to develop sufficiently reliable quality assurance for the screening programme. It must also be ensured that good practice is followed consistently in all areas. One of the tasks of the Cancer Registry is to use its data to monitor compliance with the practices developed by the steering group.

AUTHORS

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LINKS AND PUBLICATIONS

FINNISH CANCER REGISTRY
cancerregistry.fi/

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TERMINOLOGY

BIOPSY
Tissue sample (core needle or open biopsy) or cell sample (fine needle aspiration biopsy). Histological confirmation of the diagnosis is always made from a tissue sample. Surgical referral is usually based on a core-needle biopsy, but the final diagnosis of breast cancer is usually made by open biopsy.

CANCER INCIDENCE
The number of new cancer cases in relation to the population over a given period.

CONFIRMATORY TESTS
Breast cancer screening follow-up tests include additional mammography, ultrasound, pneumocystography, ductography, and fine-needle (cell sample) and core-needle (tissue sample) examination or a combination of these.

FALSE POSITIVE MAMMOGRAPHY RESULT
A false positive mammography test result is a result (usually after a co-reading) in which a woman is invited to a screening centre for confirmatory tests, but the result of confirmatory and other follow-up examinations is negative (no breast cancer or breast carcinoma in situ).

MALIGNANT FINDINGS IN BREAST CANCER SCREENING

CARCINOMA *IN SITU*
A tumour in which malignant cells have not penetrated deeper into the breast tissue but occur within the duct or lobule (ICD-10: D05).

INVASIVE BREAST CANCER
Breast cancer (ICD-10: C50).

MAMMOGRAPHY
X-ray imaging of the breasts.

MORTALITY
The number of deaths in a given period relative to the population.

OPPORTUNISTIC TESTING
Asymptomatic testing outside an organised screening programme, in private or public health care. Testing for symptoms and referral of patients is also performed outside the screening programme. In most cases, there is not information available on the reason for out-of-programme testing.

OVERDIAGNOSIS OF BREAST CANCER SCREENING
Diagnosis of a latent breast cancer or carcinoma in situ that untreated would not affect the person's health during her lifetime.

SCREENING CHAIN
The progress of the screening process from the identification of the target population and the sending of invitations to testing and possible follow-up examinations, treatments and post-treatment follow-up.

SCREENING COVERAGE
Proportion of the target population invited for screening (invitation coverage) or percentage of the target population screened (inspection coverage).

LIST OF FIGURES AND TABLES

FIGURE 1 **Participation in breast cancer screening (%) and invitation coverage (%) 1992–2018.**

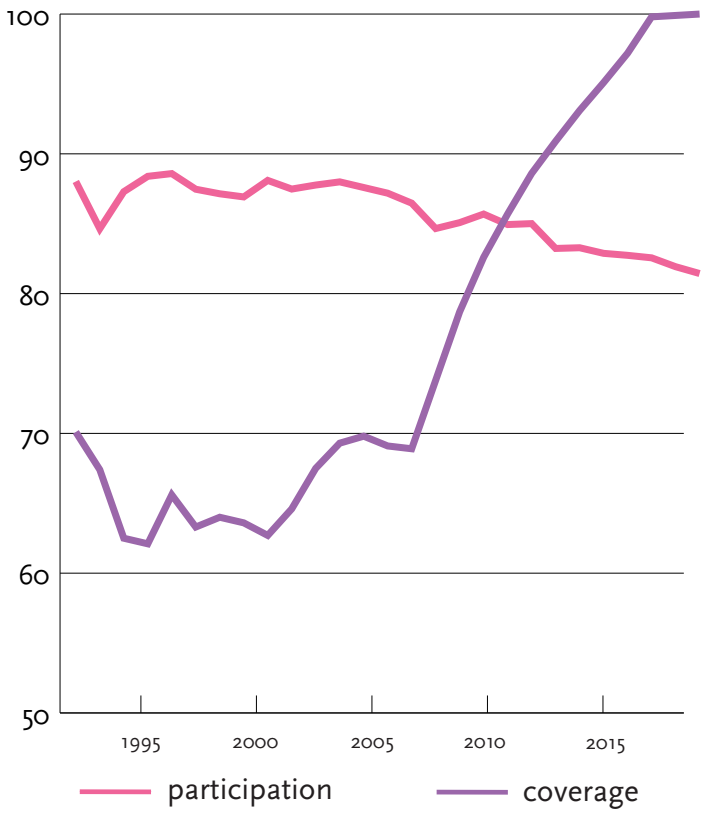

FIGURE 2 **Participation in breast cancer screening (%) by hospital district 2014–2018 (age-standardised, Finland 2014).**

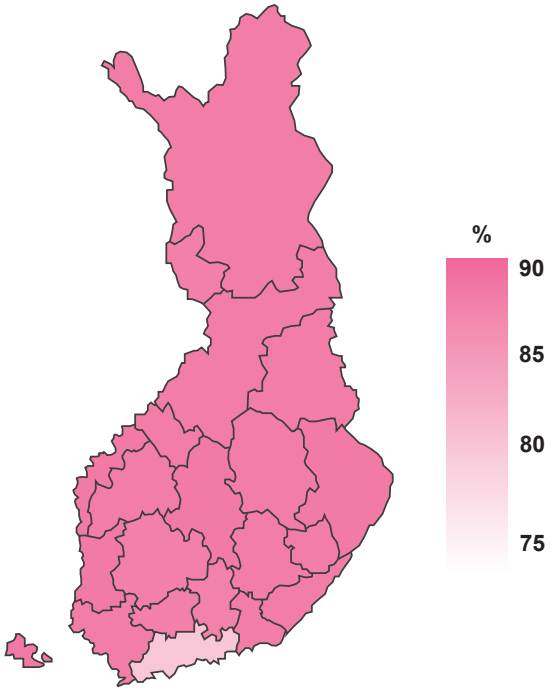

FIGURE 3 **Breast cancer screening recalls (%) by hospital district in 2014–2018 (age-standardised, Finland) 2014).**

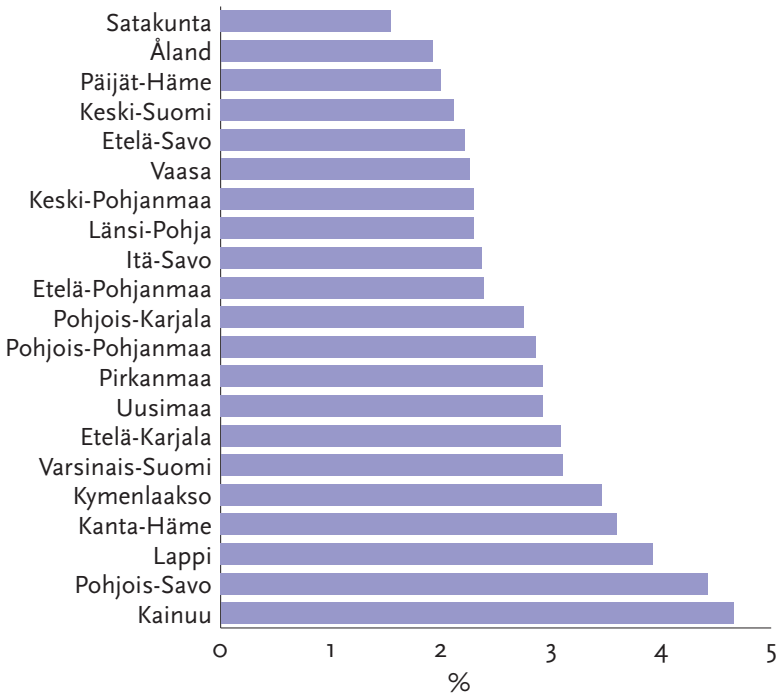

FIGURE 4 **Malignant findings of breast cancer screening (%) by hospital district 2014–2018 (age-standardised, Finland 2014).**

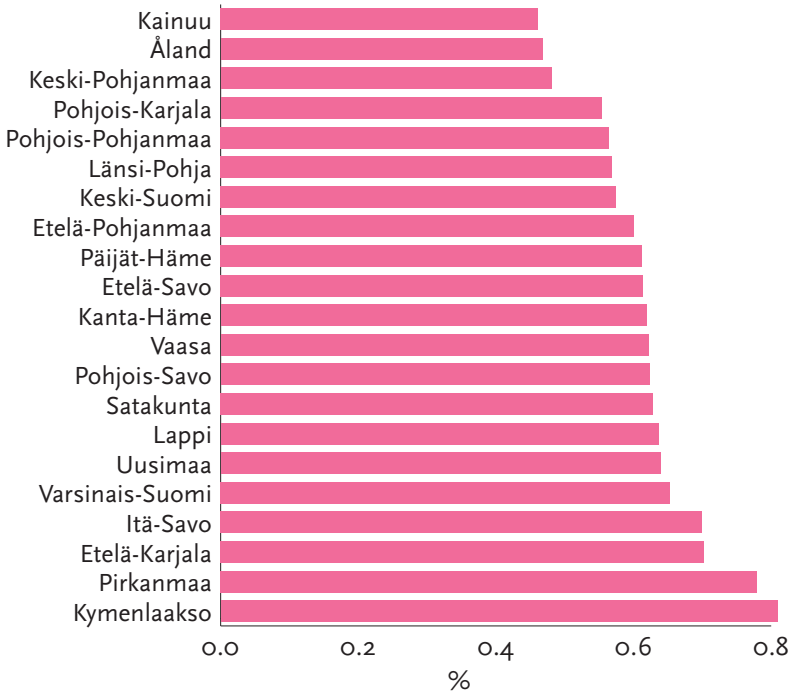

FIGURE 5 **Participation in breast cancer screening (%) by mother tongue 2005–2018 (age-standardised, Finland 2014).**

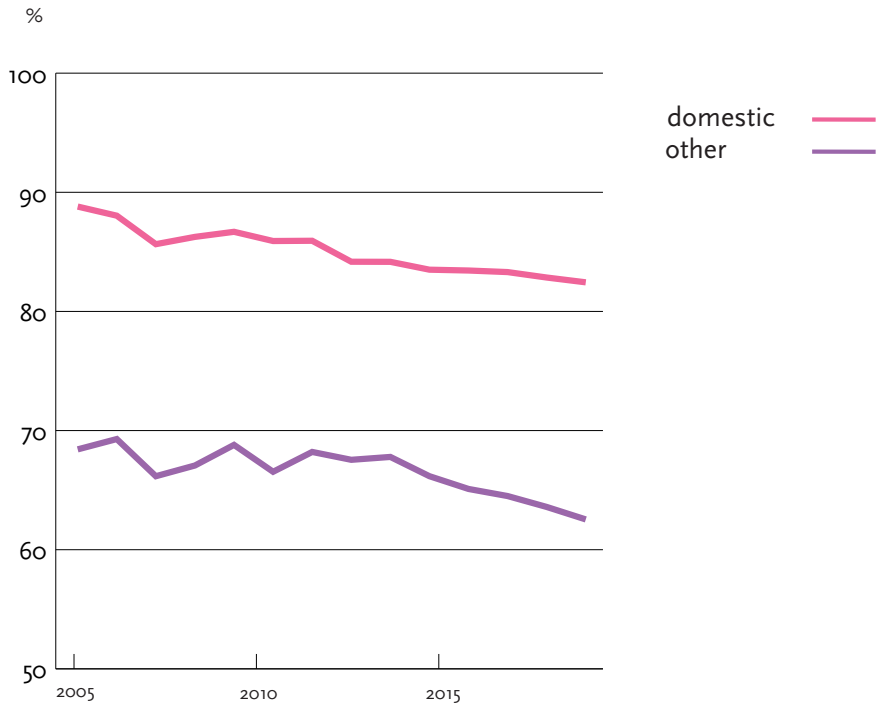

FIGURE 6 **Participation in breast cancer screening (%) by socioeconomic status 2005–2018 (age-standardised, Finland 2014).**

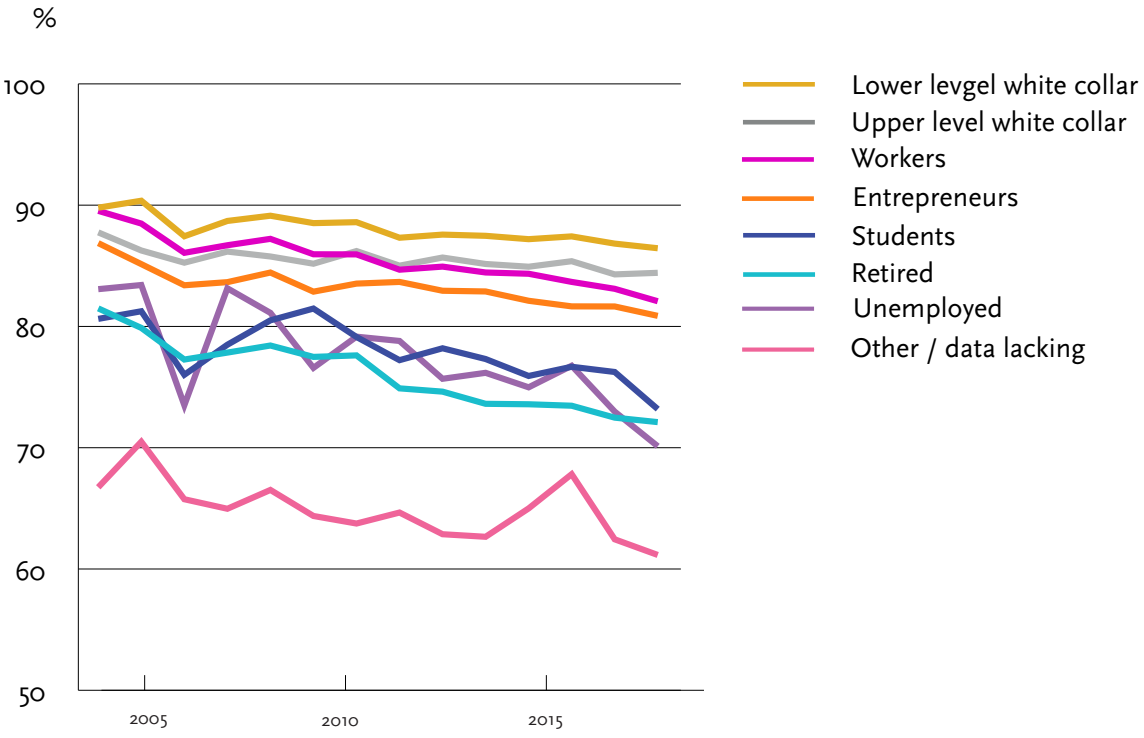

FIGURE 7 Participation in breast cancer screening (%) by level of education 2005–2018 (age-standardised, Finland 2014).

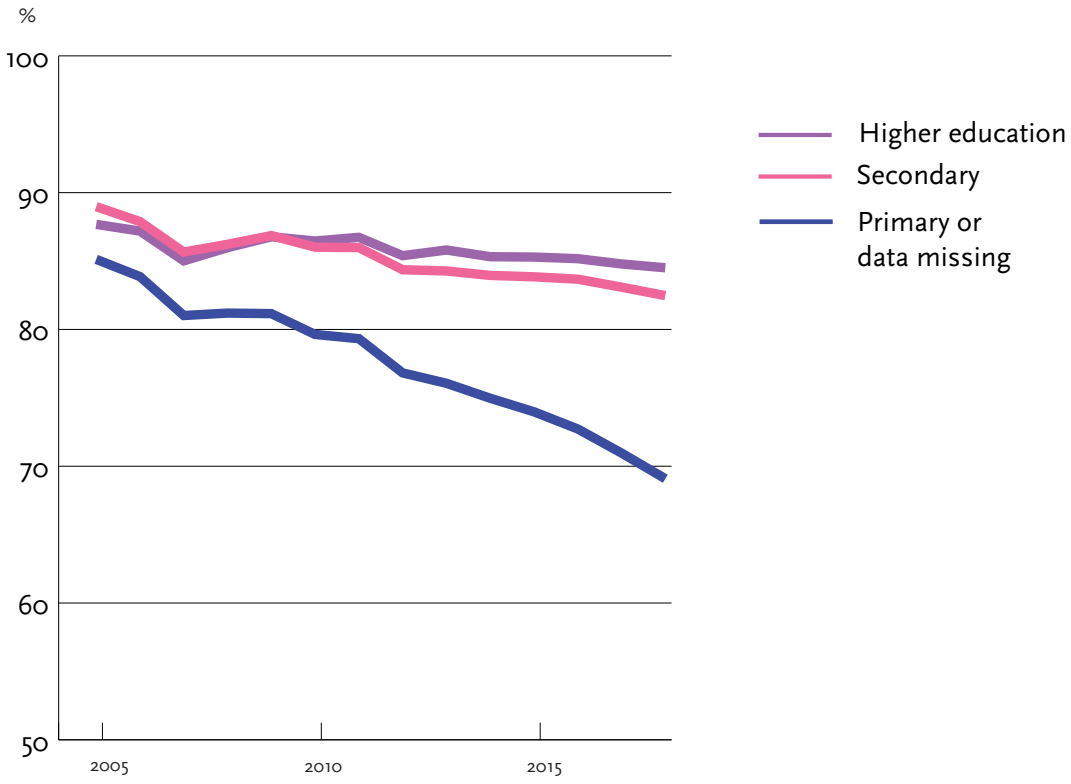

FIGURE 8 Total unit costs for ten years of specialised breast cancer treatment

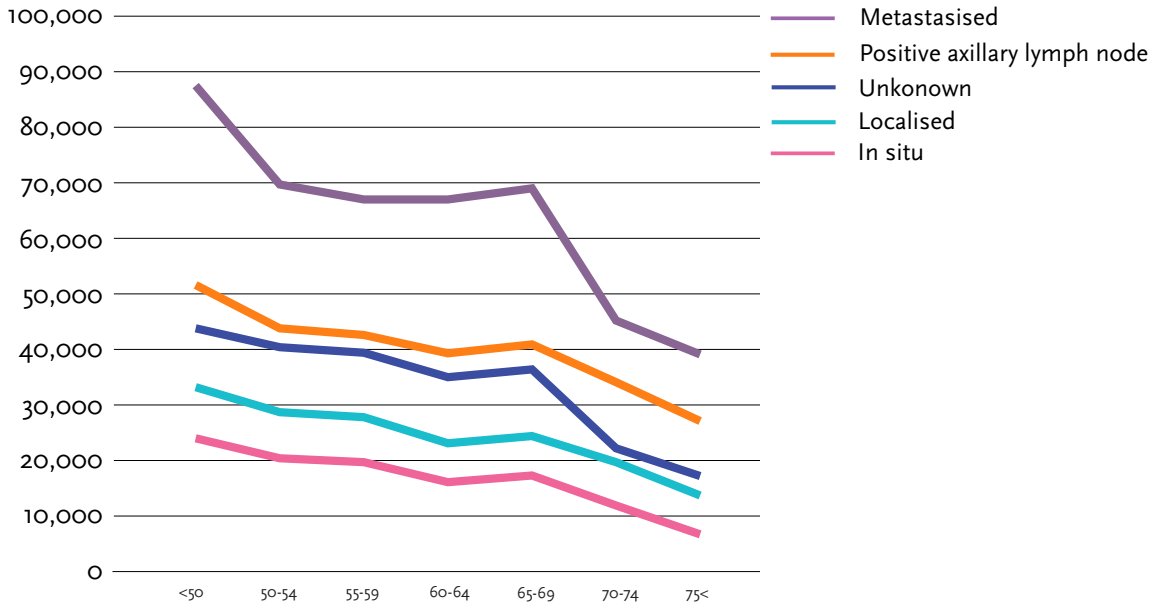

TABLE 1 Coverage of breast cancer screening 2017–2018.

Age group	Target population	Invited during the screening round	Population coverage
50–54	181,604	181,533	100.0
55–59	185,615	185,738	100.1
60–64	186,408	186,454	100.0
65–69	189,371	189,329	100.0
Total	742,998	743,054	100.0

TABLE 2 Breast cancer screening invitations and examinations in 2018.

Age group	Invited	Screened	
	n	n	%
50–54	109,009	87,839	80.6
55–59	75,002	60,641	80.9
60–64	110,318	90,428	82.0
65–69	79,091	65,193	82.4
Total	373,420	304,101	81.4

TABLE 3 Breast cancer screening results by age group in 2018.

Age group	Screened	Recall		Core needle biopsy		Referral for surgery		Malignant finding	
	n	n	%	n	%	n	%	n	%
50–54	87,839	3,622	4.1	954	1.1	631	0.7	399	0.5
55–59	60,641	1,350	2.2	415	0.7	392	0.6	306	0.5
60–64	90,428	2,166	2.4	777	0.9	758	0.8	621	0.7
65–69	65,193	1,588	2.4	694	1.1	690	1.1	581	0.9
Total	304,101	8,726	2.9	2,840	0.9	2,471	0.8	1,907	0.6

TABLE 4 **Breast cancer screening invitations and inspections by hospital district in 2014–2018.**

Hospital district	Invitations	Screened	
	n	n	%*
Åland	10,767	9,414	87.4
Etelä-Karjala	48,933	41,770	85.4
Etelä-Pohjanmaa	68,530	58,517	85.4
Etelä-Savo	39,786	33,808	84.9
Itä-Savo	17,160	14,491	84.4
Kainuu	29,051	24,923	85.9
Kanta-Häme	62,786	52,115	83.1
Keski-Pohjanmaa	25,342	21,580	85.2
Keski-Suomi	82,390	70,831	86.0
Kymenlaakso	63,841	54,334	85.1
Lappi	44,322	37,367	84.3
Länsi-Pohja	23,226	19,307	83.1
Pirkanmaa	172,647	143,493	83.1
Pohjois-Karjala	62,143	53,373	85.9
Pohjois-Pohjanmaa	122,341	104,543	85.4
Pohjois-Savo	90,229	77,244	85.6
Päijät-Häme	79,153	65,488	82.7
Satakunta	80,009	69,299	86.6
Uusimaa	531,404	404,816	76.3
- Helsinki	202,092	150,175	74.5
- excluding Helsinki	329,312	254,641	77.5
Vaasa	52,024	447,20	86.0
Varsinais-Suomi	164,632	138,296	84.0

* age-standardised, Finland 2014

TABLE 5 **Breast cancer screening results by hospital district in 2014–2018.**

Hospital district	Screened	Recall		Referral for specialised medical treatment		Malignant finding	
	n	n	%*	n	%*	n	%*
Åland	9,414	182	1.9	51	0.5	44	0.5
Etelä-Karjala	41,770	1,309	3.1	448	1.1	297	0.7
Etelä-Pohjanmaa	58,517	1,441	2.4	430	0.7	354	0.6
Etelä-Savo	33,808	754	2.2	316	0.9	205	0.6
Itä-Savo	14,491	347	2.4	124	0.9	103	0.7
Kainuu	24,923	1,180	4.7	188	0.8	115	0.5
Kanta-Häme	52,115	1,917	3.6	390	0.8	320	0.6
Keski-Pohjanmaa	21,580	513	2.3	173	0.8	108	0.5
Keski-Suomi	70,831	1,535	2.1	546	0.8	401	0.6
Kymenlaakso	54,334	1,913	3.5	599	1.1	439	0.8
Lappi	37,367	1,490	3.9	411	1.1	233	0.6
Länsi-Pohja	19,307	453	2.3	133	0.7	111	0.6
Pirkanmaa	143,493	4,301	2.9	1,331	0.9	1,114	0.8
Pohjois-Karjala	53,373	1,488	2.8	331	0.6	296	0.6
Pohjois-Pohjanmaa	104,543	3,064	2.9	746	0.7	575	0.6
Pohjois-Savo	77,244	3,483	4.4	694	0.9	476	0.6
Päijät-Häme	65,488	1,320	2.0	470	0.7	405	0.6
Satakunta	69,299	1,082	1.5	589	0.9	434	0.6
Uusimaa	404,816	12,276	2.9	2,999	0.8	2,524	0.6
-Helsinki	150,175	4,844	3.1	1,130	0.8	974	0.7
-excluding Helsinkiä	254,641	7,432	2.8	1,869	0.7	1,550	0.6
Vaasa	44,720	1,032	2.3	373	0.8	275	0.6
Varsinais-Suomi	138,296	4,397	3.1	1,173	0.8	906	0.7

* age-standardised, Finland 2014

TABLE 6 **Participation and results of breast cancer screening by mother tongue 2017–2018.**

Mother tongue	Invited	Screened		Recall		Referral for specialised medical treatment		Malignant finding	
	n[1]	n[2]	%[1]*	n	%[2]*	n	%[2]	*n	%[2]*
Domestic	709,986	586,883	82.7	17,493	2.9	4,832	0.8	3,732	0.6
Other	32,834	20,705	63.1	662	2.9	128	0.7	92	0.5

* age-standardised, Finland 2014

TABLE 7 Participation and results of breast cancer screening by socioeconomic status in 2017–2018.

Sosio-ekonomic status	Invited	Screened		Recall		Referral for specialised medical treatment		Malignant finding	
	n[1]	n[2]	%[1]*	n	%[2]*	n	%[2]*	n	%[2]*
Entrepreneurs	37,920	31,105	81.3	965	2.9	185	0.6	127	0.5
Upper level white-collar	100,721	85,225	84.4	2,862	3.1	656	0.8	509	0.7
Lower level white-collar	218,350	189,179	86.7	5,868	2.9	1,381	0.8	1,034	0.7
Workers	75,125	61,602	82.6	1,749	2.6	456	0.8	336	0.6
Students	5,076	3,694	74.6	154	3.5	28	0.8	19	0.6
Retired	231,029	183,401	72.3	4,886	3.2	1,817	0.9	1,491	0.7
Unemployed	57,782	42,968	71.6	1,349	2.6	361	0.9	258	0.7
Other/Data missing	18,612	11,203	62.0	361	3.0	84	0.8	56	0.5

* age-standardised, Finland 2014

TABLE 8 Participation and results of breast cancer screening by level of education in 2017–2018.

Educational level	Invited	Screened		Recall		Referral for specialised medical treatment		Malignant finding	
	n1	n[2]	%[1]*	n	%[2]*	n	%[2]*	n	%[2]*
Primary or data missing	127,351	91,872	70.1	2,584	3.0	817	0.8	649	0.6
Secondary	310,746	257,242	82.8	7,376	2.8	2,094	0.8	1,610	0.6
Higher education	306,518	259,263	84.7	8,234	3.0	2,057	0.8	1571	0.6

* age-standardised, Finland 2014

TABLE 9 Association between breast symptoms observed at screening and breast cancer and overall mortality at long-term follow-up. The control group was made up of screening participants who did not have breast symptoms.

Symptom	Age-standardised risk ratio (95 % confidence interval)	
	Breast cancer mortality	Overall mortality
Tumour	3.14 (2.59–3.79)	2.72 (2.35–3.17)
Skin retraction	3.88 (2.40–6.27)	3.27 (2.25–4.75)
Discharge from the breast	1.40 (0.82–2.39)	1.52 (1.04–2.22)