CERVICAL CANCER SCREENING PROGRAMME IN FINLAND

ANNUAL REVIEW 2018

MASS SCREENING REGISTRY 50 YEARS

The cervical cancer screening programme has been underway for over 50 years and has been effective. Despite the excellent results, there is still need for screening. Cervical cancer screenings focus specifically on precancerous lesions. When these are treated, the cancer itself can be averted completely.

SUMMARY

In all, 273,000 women were invited to the cervical cancer screening programme in 2016. Of those invited, 191,000 attended the screening. This is 70% of all invitations. Approximately 94% of those screened received a normal test result, 5% received a recommendation for follow-up screening, and 1.2% were referred to colposcopy or other further examinations.

Despite the high-quality screening programme, the numbers on precancerous lesions of cervical cancer have not decreased. The numbers of precancerous lesions detected through the programme have even increased slightly, so screening is still needed.

There are still great regional differences both in attendance at screening and in screening results. Socio-economic status and immigration background also play a role. Screening would still seem to have problems indicating health inequality. Solving these problems calls for interventions, research and follow-up.

1. INTRODUCTION

OVER FIVE DECADES OF MASS SCREENINGS

The screening programme to prevent cervical cancer started in Finland in 1963. Screening was originally carried out in three municipalities. By the end of the decade, the programme was expanded to nationwide scope among the target population at the time, i.e. women aged 40–50 years (Moring et al. 1996, Hakama 1970). Many municipalities also invited women aged 30 and 35 years to screening. The programme was based on a Pap smear performed on a gynaecological exfoliative sample.

The pathologists and gynaecologists involved in the launch of the screening programme were trained under the guidance of Georges Papanicolaou, developer of the Pap smear test, in his laboratory in New York (HS 16.3.2015). From the outset, the screening programme was characterised by strict criteria regarding the sensitivity and accuracy of the screening test. The pathologists and gynaecologists involved in screening and further assessment, as well as in treatments for precancerous lesions, also collaborated closely on multidisciplinary research.

In the early days of screening, proper understanding of the benefits and harms of the screening programme was lacking. Something was known about the effects that a screening programme launched in British Columbia, Canada, in the late 1940s, had had on the incidence of cervical cancers (Saxen 1967).

There was no certain knowledge about the natural course of the disease, the optimal target group or the screening interval, nor about the overdiagnosis or overtreatment brought about by screening. However, mass screenings had become a trend, and testing spread explosively to other health care sectors as well. Argumentation for and against screening and the associated treatments of precancerous lesions was lively.

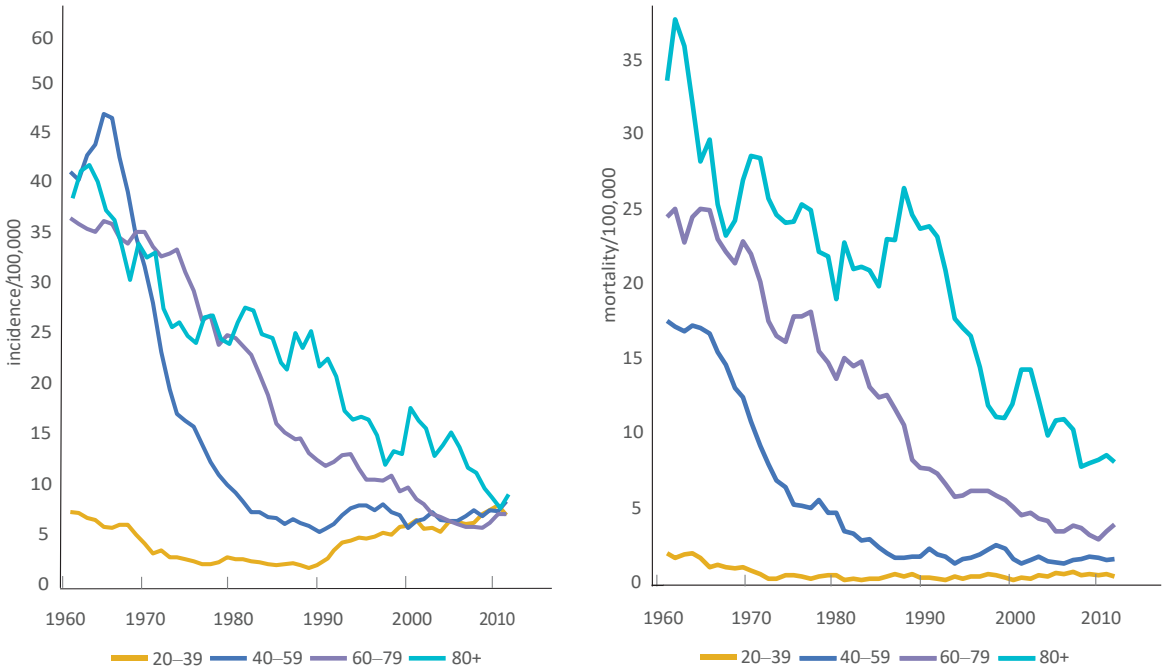
The Mass Screening Registry was established in conjunction with the Finnish Cancer Registry in 1968 to assess the effectiveness of gynaecological mass screenings. It was necessary to determine how many of the precancerous lesions detected could actually develop into cancer, and to confirm whether mass screenings reduce cervical cancer incidence and mortality (Moring et al. 1996). The Mass Screening Registry also collected individual-level data on the screening programme in a centralised manner, produced screening statistics, participated in invitations to screenings with municipalities, and instructed screening actors. The current year is the 50th anniversary of the establishment of the Mass Screening Registry.

Uncertainty about the usefulness of the screening programme marked the debate throughout the 1960s. However, the results obtained later supported the good effectiveness of the programme. Follow-up of about 400,000 women who had attended the screening programme in the 1960s revealed in 1976 that attendance at screening had helped to reduce the incidence of cervical cancer by about 80% (Hakama & Räsänen-Virtanen, 1976). Gradually, the impact of screening began to be visible in cancer statistics as well: cervical cancer incidence and mortality began to decline dramatically after 1970, and the favourable trend continued until the mid-1990s (Figure 1). Finland, and the whole world, had received an example of a well-functioning cancer screening programme.

Since the 1990s, however, the incidence of cervical cancers has increased slightly in the age group of women under 40 years — at least in part because of the increase in the background risk associated with changes in sexual behaviour and women's smoking (Anttila et al. 1999). This is a good indication showing that the need for screening has not diminished despite good results.

Since the 1990s, attention has been paid to ensuring that all women included in the target group are invited to screening (invitational coverage) and that attendance remains high. In addition, effort has been made to target screening and other early diagnosis services at the correct age groups in terms of effectiveness. In the Public Health Decree of 1992, women aged 55 and 60 years were included in the age groups to be invited for screening. Among the novelties introduced after the turn of the millennium are the evaluation and adoption of new test methods to supplement the traditional Pap smear. The effectiveness of the screening programme has also been compared to testing outside the programme. The first such effectiveness study was completed at the turn of the millennium and was based on questionnaire material (Nieminen et al. 1999). Later it has been possible to evaluate the services outside the screening programme increasingly often by means of the Mass Screening Registry, the Finnish Cancer Registry and other electronic databases in health care. The vaccination programme to prevent HPV infections, launched in 2013, also poses new challenges to the organisation of screenings. When the vaccinated birth cohorts eventually reach the target age for the screening programme, screening practices will need to be reassessed.

FIGURE 1 Incidence of cervical cancer and mortality by age group in Finland, 1960–2015.



ANNUAL REVIEW

The implementation and quality of screening can be viewed as a time series from 1991 onwards, when the screening laboratories adopted an electronic database. This annual review, drawn up in 2018, includes information on the outcomes of cervical cancer screening nationally and in 21 hospital districts. Information is given for the year 2016 and for the most recent five-year period reported to the registry. For the first time, screening statistics are also presented for population groups illustrating social inequality. The groups are formed according to the mother tongue and socio-economic status, and are based on data from the Population Register Centre and Statistics Finland. Apart from screening statistics, the review describes topical research projects and discusses the benefits and harms of screening and other early diagnostics during the screening period of more than 55 years.

2. CERVICAL CANCER SCREENING IN FINLAND

The aim of screening is to detect precancerous lesions of cervical cancer. When these lesions are treated, the development of cancer can be averted altogether. Through screening, cervical cancers can also be detected at the earliest possible stage, when cancer therapies are conserving and the prognosis is good. The aim of the programme is to reduce cervical cancer incidence and mortality.

Municipalities are responsible for organising the screening programme. The programme includes a personal invitation, the primary screening test (mostly Pap, in some municipalities HPV) and, if needed, colposcopy and surgery. The screening test is free of charge for those invited. Further examinations are subject to the outpatient clinic fee. Treatments and examinations performed in specialised medical care are subject to patient fees, and municipalities are required to pay the costs specified in the hospital's price list. Individual data on all phases of screening are sent to the Finnish Cancer Registry for the evaluation of quality and effectiveness. This also enables the monitoring and correction of shortcomings and problems.

THE SCREENING PROCESS

In accordance with the Government Decree on screening, women aged 30–60 years are invited to the cervical cancer screening programme every five years. Some municipalities also invite women aged 25 and/or 65 years.

Municipalities select the body implementing the screening, which can be the municipality itself or some other actor. The screening test is performed by invitation at a health centre or screening laboratory and analysed in a pathology laboratory. The pathology laboratory also sends women the result letters and provides referrals to further examinations, if needed.

It is recommended that women with borderline test results (ASC-US, LSIL for women under 30 years, or a positive HPV test result without referral to further examinations) are invited to follow-up screening. At present, follow-up screening within the screening programme is usually done 12–24 months after the previous screening invitation. Women with a more severe result are referred to colposcopy and biopsy. Referral may also be received on the basis of a slight change that has recurred 2–3 times. Further examinations, the necessary surgical procedures, and treatments for precancerous lesions and cervical cancers, are performed in specialised medical care (Salo et al. 2014.

MAIN FINDINGS

In 2016, altogether 273,000 invitations to screening were sent, and 191,000 women participated in the programme (attendance rate 70%, Table 1). The coverage of the invitations sent every five years to the national target group, women aged 30–64 years, was very close to 100%. About 94% of those screened

received a normal test result. About 5% received a recommendation for follow-up screening, while referrals to colposcopy and other further examinations totalled 2,400 — corresponding to about 1.2% of the women screened (Table 2, Figure 2). Follow-up screenings were also performed on the basis of symptoms (such as bleeding during intercourse). A total of 720 histologically confirmed precancerous lesions — 3.8 lesions per thousand women screened — were identified and treated within the programme. The programme also detected 31 cervical cancers, about 1.6 cancer cases per ten thousand women screened. For about 13% of the women screened, the primary screening method used was the HPV test. HPV testing was the most common in the regions of Pirkanmaa and Kanta-Häme, where HPV-tested women accounted for over 80% of the total.

COMPARISON AGAINST EARLIER YEARS

The coverage of screening invitations is currently high (Figure 3). Practically all municipalities invite the national target population, women aged 30–64 years, to screening every five years. Attendance at screening declined for a long time, but this unfavourable trend has levelled off in recent years. Attendance rates have been particularly low in the younger target group (25–35 years), where the situation now seems to have improved the most (Figure 4). It is likely that the generally lower attendance among young women is largely the result of opportunistic Pap testing, which is specifically focused on young age groups.

The number of histologically confirmed HSIL findings has been rising constantly for many years (Figure 5). The number of cervical cancers detected in screening in 2016 — 31 cases — is greater than in any other year during the monitoring period. In 2000–2015, the median for cancer cases was 16.5.

3. CERVICAL CANCER SCREENING BY HOSPITAL DISTRICT

Attendance at screening has varied rather much between hospital districts, ranging between 62 and 79% in 2012–2016 (Figure 6). The reasons for the regional differences are not fully known. Good invitation practices are essential for improving the attendance rate and knowledge of screening (Virtanen et al. 2015; Current Care Guidelines 2016). However, they are not followed throughout, which contributes to regional differences in attendance at screening.

The screening results have also varied widely between hospital districts, mainly due to differences in diagnostic criteria for screening laboratories. The percentage of women with borderline results ranged between 1.5 and 9.7% (Figure 7), while the percentage of women referred to colposcopy ranged between 0.5 and 2.5% (Figure 8).

Correspondingly, the percentage of histological HSIL or more severe results varied between 0.1 and 0.5% (Figure 9). The figures also include follow-up screenings. The share of referrals and more severe lesions was particularly great in Pirkanmaa, where the HPV test was generally used as the primary test. In Pirkanmaa, the first screening round in HPV screening was still underway in 2016. Thanks to the more sensitive screening test, it has been possible to diagnose cancers and precancerous lesions at an earlier stage, which means that screening has led to further examinations more often than before, and thus to greater numbers of findings.

4. CERVICAL CANCER SCREENING BY POPULATION GROUP

Attendance at screening and the results were also examined according to the mother tongue and socio-economic background. The women invited to screening were divided into two categories, depending on their mother tongue. Finnish, Swedish and Sámi were counted as domestic languages. Missing information on the mother tongue was classified in the same category as other languages. Socio-economic status was examined by using the latest information available (mostly from 2014).

Women whose mother tongue was a domestic language attended screening more actively than the speakers of other languages. On the other hand, referrals to colposcopy as well as precancerous lesions were slightly more common among women whose mother tongue was not a domestic language (Table 3). When analysing the socio-economic background, it became evident that attendance was the weakest among students, pensioners and the long-term unemployed, as well as among those whose socio-economic background was unknown. In relative terms, students, the long-term unemployed, workers and the unknown category had the greatest numbers of referrals and precancerous lesions (Table 4).

The results suggest that the screening programme involves significant differences indicating health inequalities. Those of other language groups, including, for example, many first and second generation immigrants, attend screenings less often than the rest of the population. The long-term unemployed are also less likely to attend screening than the population active in working life and covered by occupational health care. In both groups, the potential benefit of screening could be even greater than among the rest of the population.

5. BENEFITS AND HARMS

The most significant benefits of cervical cancer screening are related to the prevention of cervical cancers and deaths caused by them, as well as to improvement of the treatment prognosis and the quality of life through more conserving therapies. The harms of screening include false positive or negative test results, as well as the extra burden caused by testing and the treatment of precancerous lesions, which give rise to both concern and extra costs. The balance between benefits and harms depends essentially on the quality of activities and the age groups at which screening and early diagnosis are targeted.

PRECANCEROUS LESIONS AND THE IMPACT OF PREVENTING CERVICAL CANCERS

In 2004–2008, an average of 2,900 precancerous or less severe CIN1 changes requiring follow-up or treatment were detected in Finland (Salo et al. 2013). Of these, 57% were found among women under 35 years. Only some of the changes were found in the screening programme. Among women under 35 years, an estimated 16% of all CIN changes would advance to cancer during the lifetime, while the corresponding figure for women over 35 years is about 60% (van Oortmarssen and Habbema, 1991). On the basis of these figures, about a thousand changes advancing to cancer over a long period of time would be detected every year. Correspondingly, about 1,900 non-advancing changes, indicating overdiagnosis of precancerous lesions, would be detected. This would be about 65% of all CIN/AIS changes. The majority of non-advancing changes are found in people under 35 years of age.

According to statistics kept by the Finnish Cancer Registry, about 170 cases of cervical cancer are detected in Finland per year. If, as described above, it is assumed that screening eliminates about a thousand cases of cancer per year, nearly 85% of cancers would be prevented. At present, the number of cervical cancer deaths determined on average per year is slightly over 50. Assuming that mortality has diminished approximately at the same rate as incidence, cervical cancer deaths would number about 300 each year without screening. Thus, about 250 deaths per year would be prevented.

In addition, when assessing the burden of cervical cancer in the female population, it should be taken into account that CIN/AIS changes also occur in the non-tested population. For example, about 13% of women aged 25–69 years did not have a Pap test during the follow-up period of 2004–2008 (Salo et al. 2013). Similarly, the coverage of screening for people over 70 years has been 10–40%, so only a relatively small proportion of all precancerous lesions and early cancers has been detected through screening in this age group.

In addition to the population-based screening programme, the benefits and harms of screening also include the effects of services used outside the programme. Apart from the effect of screening that reduces the incidence of cervical cancer, mortality figures include, among others, development in cancer therapies and improvement of the treatment prognosis through earlier diagnoses.

All estimation methods involve uncertainties because there is no systematic knowledge base on changes in risk factors and, for example, on the prevalence of hysterectomies in the population. Uncertainty is also included, for example, in the comparability of diagnostics for precancerous conditions.

Screening often enables more conserving cancer treatments that have a favourable effect on patients' quality of life. However, no research data on this topic is available in Finland as yet.

HARMS AND BENEFITS DURING THE LIFE CYCLE

Overdiagnosis is known to occur mainly in the precursor stage of cervical cancer. On the basis of the figures of Salo et al. (2013), it can be estimated that the lifetime probability of the detection of precancerous lesions in a female population aged 15–84 years is about 8%.

Very often, screening reveals slight and unclear cell changes that are abnormal and still need to be followed. For example, in the screening programme for women aged 30–64 years, the probability of obtaining such a result at least once in a lifetime is about 34% (Pankakoski et al. 2017). If the extensive use of services outside the programme is also taken into account, the probability of all results of this type is likely to be much greater.

On the other hand, among the current female population aged 0–85 years, the probability of being diagnosed with cervical cancer at some point during the life is only about 0.5% (Engholm et al. 2018). Before the start of the screening programme, the corresponding probability was about 2%. The background risk is likely to have increased substantially over the decades of screening. Thus, without any screening, the likelihood of cancer would be considerably higher at present.

6. TESTING OUTSIDE THE SCREENING PROGRAMME

In Finland, many Pap tests are taken outside the official screening programme. These are not centrally registered, which makes it more difficult to assess the quality of activities associated with cervical cancer prevention. For research purposes, data on tests taken outside screening have been collected into the Mass Screening Registry for the years 1991–2014. Material was obtained from the reimbursement register of Kela, from the Finnish Student Health Service, and from pathology laboratories analysing Pap smears. In addition to laboratories, data on precancerous lesions and colposcopies have

been obtained from the register on social welfare and healthcare kept by the National Institute for Health and Welfare.

The age distribution of the women tested was similar to that of an earlier report (Salo et al. 2014), i.e. testing outside the screening programme was particularly common among young women. Figure 10 shows the ages of women tested outside screening in 2000–2014. Opportunistic Pap testing was the most common among women aged 20–29 years. During the screening years (e.g. ages 30, 35, 40 years), the numbers of opportunistic tests were slightly less than in other years. The screening programme was the likely reason for the dips visible in age groups every five years, since some women probably did not have the test taken in the year when they had attended screening. In addition to frequent testing, young women were the most probable group to have more than one Pap smear taken outside the screening programme during the five-year period 2010–2014 (Figure 11). The data collected can be used to assess the effectiveness of screening.

7. THE EFFECTIVENESS OF SCREENING IS AGE-DEPENDENT

According to a study conducted by the Finnish Cancer Registry, Pap testing did not reduce the risk of cervical cancer in women under 30 years of age (Makkonen et al. 2017). By contrast, the risk for women aged 35 and over was significantly lower. It was concluded that the cancer-preventing effect of Pap tests outside the screening programme was slight (Table 5).

The results of the study support the current guidelines that Pap smears should not be taken from symptomless women under the age of 25 years. Prudence should also be exercised in the screening of women aged 25–29 years. In addition, a Pap test should not be taken routinely from symptomless women outside the screening programme, as cervical cancer screening is both more effective and more cost-effective when implemented in the screening programme. HPV vaccination has been found to prevent a significant percentage of the precancerous lesions of cervical cancer caused by HPV types 16 and 18 (Arbyn et al. 2018). In the light of current knowledge, vaccination is the most promising alternative for reducing cancer among young women.

By contrast, among older women aged 55–69 years, attendance at the screening programme reduced the risk of cervical cancer by 63% and mortality by 71% (Lönnberg 2012). International research findings also suggest that screening should be continued until at least 65 years of age. The risk of cancer is particularly great among women who have no longer attended screening since the age of 50 or who have previously been found to have abnormal results (Wang et al. 2017).

8. NORDIC SCREENING INDICATORS

Launched in 2016, the Nordscreen project has developed an openly available web-based service (www.nordscreen.org), where one can examine the development of indicators for cervical cancer screening in the various Nordic countries and Estonia. The development of comparable screening indicators and public reporting support improvement of the quality of screening programmes.

Nordic screening programmes differ from each other, and direct comparison between them is challenging without uniformly defined indicators. As of yet, the statutory screening register in Finland only contains information on the invitation-based screening programme, whereas in the other Nordic countries, the registers also contain information on similar tests taken outside the actual screening programme. The knowledge base also varies, for example, with regard to colposcopies and histologically confirmed precancerous lesions.

The process and result indicators under development are based on international research projects and recommendations. The individual-level screening data used as the basis for tabular indicators are derived from national screening registers that are comprehensive and of high quality by international comparison.

Initially, the project will focus on cervical cancer screening programmes, but if possible, it will be expanded to include screening programmes for breast and colorectal cancers.

9. RECOMMENDATIONS AND CONCLUSIONS

Screening to prevent cervical cancers has been underway in Finland for over fifty years, and has proved to be very effective as well as cost-effective. However, the number of histologically confirmed findings of precancerous lesions has been increasing for a long time, and the number of cervical cancers detected in the screening programme in 2016 was higher than in previous years. These results suggest that the risk of cervical cancer in Finland has risen and there is still a need for screening despite the excellent results achieved. Adoption of the HPV test has also contributed to the increased numbers of findings.

There have been marked differences in the quality of diagnostics, and apparently also in practices, between the actors of Finland's national programme. In consequence, there are still great regional differences in screening indicators between hospital districts. Some of the differences are also caused by the screening test, since the regions using the HPV test had larger numbers of findings regarding referrals, precancerous lesions and cancers.

Unification of the screening programme requires the creation of a proper national and regional steering structure. One of the objectives of the steering structure must be to develop quality assurance for the screening programme. The practices and quality assurance of therapies for cancer and precancerous lesions must be developed simultaneously. More training should also be provided for healthcare actors and national, regional and local decision-makers. At present, there are many local and regional decision-makers, since decisions concerning the implementation of screening are largely made by municipalities and joint municipal authorities. The regional ownership and service production structure of screening must be developed so that implementation decisions would be made for a population base that is large enough vis-à-vis the screening organisation.

A positive feature is that attendance at the invitation-based screening programme has been rising, especially among women under the age of 45. However, attendance must still be improved. A good attendance rate depends essentially on invitational practices. The invitation letter should give a specific time and place for the sampling, and those who have not attended the screening should be sent a reminder letter (Virtanen et al. 2015). A large number of municipalities and other actors do not yet follow such guidelines. The annual target for national and regional attendance should preferably be at least 85% (Anttila et al. 2015). This would reduce testing outside the screening programme and would enable the effectiveness of screening in the future as well.

A substantial proportion of Pap tests and diagnoses for the precancerous lesions of cervical cancer are done outside the official screening programme, also among women at the screening age. Testing outside the screening programme is of great importance for the balance of benefits and harms associated with the prevention of cervical cancers. It is still possible to improve this balance quite considerably — especially by ensuring that the present Current Care Guidelines are followed.

For research purposes, much material on tests — also outside screening — has been collected into the Mass Screening Registry. In the future, the data on all tests, diagnostic examinations and therapies associated with the detection of cervical cancers or precancerous lesions should be entered into the Mass Screening Registry congruently with the screening programme. Only then can the quality, effectiveness, and costs of the entire activity be assessed in a comprehensive manner.

Screening has been found to be more effective in older than in younger age groups. Testing of the screening programme type should not be done at all among women under 25 years. On the other hand, on the basis of international research evidence, testing should be continued in the older female population after the end of the screening programme as well. This is especially important when the individual screened has previously been found to have abnormal results or has not attended screenings regularly. Research evidence also supports expansion of the national screening programme so that it covers older women aged 65–69 years.

The ongoing international cooperation is very important for producing comparable screening indicators. Screening for cervical cancers has been organised differently in the Nordic countries and Estonia, and it is also possible that the quality and effectiveness of activities vary. Comparable monitoring tools will help to improve future activities markedly.

Collaboration is also useful for developing increasingly better statistical tools for the various uses of the tests (e.g. screening, testing of symptom bases) and different test methods.

For the first time ever, this annual review assessed the association between social inequality and attendance at screening and screening findings. Preliminary results suggest that screening still has significant problems indicating inequalities in health. For instance immigrants, the long-term unemployed, and women whose socio-economic status is unknown have a lower attendance rate than other population groups. On the other hand, the immigrant population had a higher frequency of findings indicating precancerous lesions of cervical cancer than the rest of the population.

Immigrants are a heterogeneous group. It therefore includes women who would benefit from screening more than the population at large. In the future, inequality should also be reviewed from the perspective of the integrity of the screening process, treatment decisions, the effectiveness of screening, and the use of tests and services outside the programme. In the future, the provision of information concerning social and health inequalities must be included in the continuous evaluation and routine statistics production carried out by the Mass Screening Registry. At the same time, indicators describing inequality must be developed and validated.

AUTHORS

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TERMINOLOGY

BIOPSY	Tissue removed from the living body
CANCER INCIDENCE	The number of new cancer cases per population at risk, or per person-time of the population at risk, during a given period.
COLPOSCOPY	An examination of the cervix using a special magnifying device.
COVERAGE	Proportion of those invited to screening (invitational coverage) or those attending screening (screening coverage) in relation to the whole target population. Screening coverage can also be assessed for activities outside the screening programme using the same calculation rules.
CYTOLOGY SAMPLE	Cell sample
HISTOLOGY SAMPLE	Tissue sample
HPV	Human Papilloma Virus
HPV TEST	Detects high-risk HPV types from a gynaecological cell sample. The sample is collected in the same way as a Pap smear specimen. If the HPV test is positive, the same sample is used to conduct a Pap test.
MORTALITY	The number of deaths per population at risk, or per person-time of the population at risk, during a given period.
OPPORTUNISTIC TESTING	The testing of symptomless persons outside the organised screening programme (in private or public health care). Symptom-related testing and patient follow-up are also performed outside the screening programme.
OVERDIAGNOSIS	The diagnosis of a cancer or a precancerous lesion that would not affect the person's health during her lifetime.
PAP TEST	Examination of a cytology sample
SCREENING PROCESS	Progression of the screening from the definition of the target population and sending invitations all the way to testing, possibly further examinations, treatments and patient follow-up.
SCREENING RESULTS	
ASC-US	Atypical squamous cells of undetermined significance
AGC-NOS	Atypical glandular cells not otherwise specified
LSIL	Low-grade squamous intraepithelial lesion
HSIL	High-grade squamous intraepithelial lesion
AIS	Adenocarcinoma in situ
LSIL OR MORE SEVERE	LSIL, HSIL, AIS, cancer
HSIL OR MORE SEVERE	HSIL, AIS, cancer

LIST OF FIGURES AND TABLES

FIGURE 2 Screening results for women aged 25–69 years in 2016

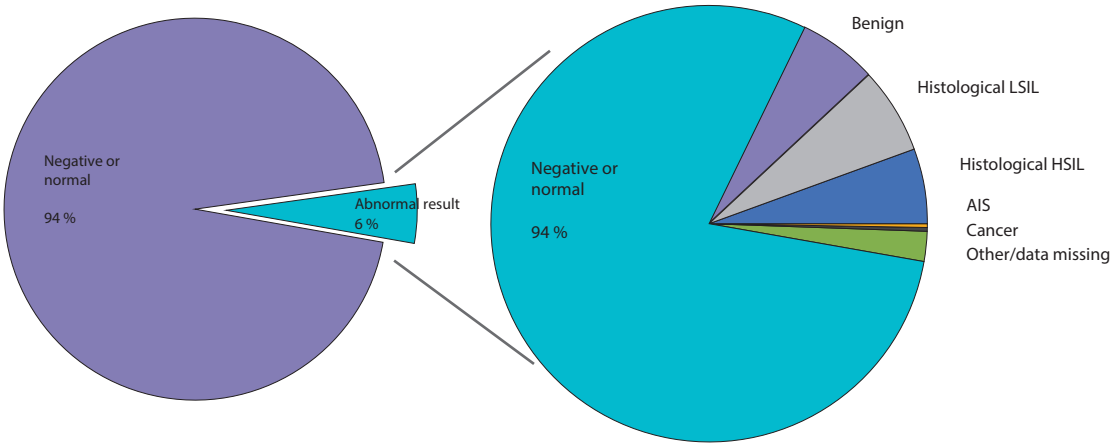

FIGURE 3 Invitational coverage for cervical cancer screening (%) and attendance (% at screening among women aged 30–64 years in 1991–2016, routine invitations.

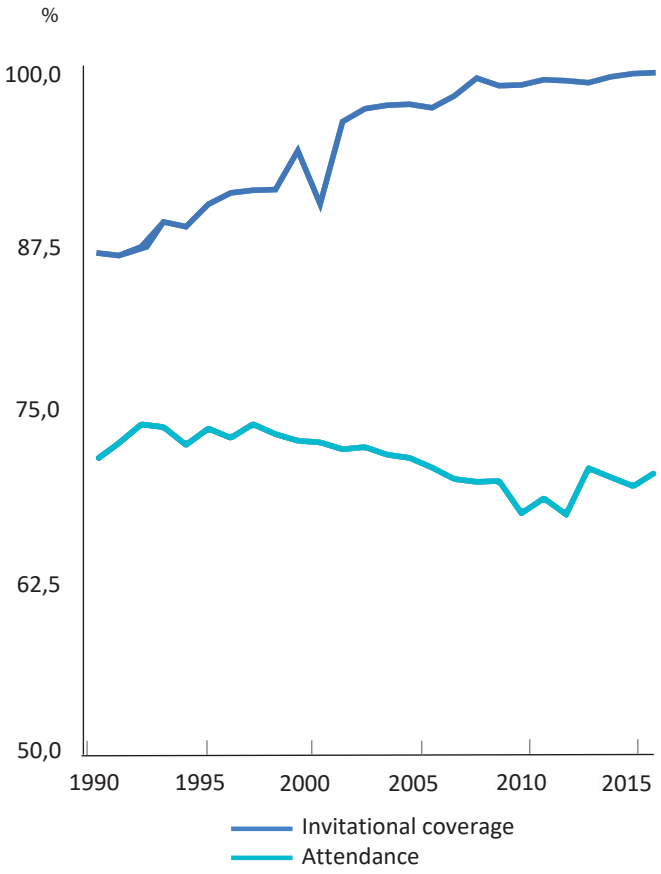

FIGURE 4 **Attendance at cervical cancer screening (%) by age group 1991–2016, routine invitations.**

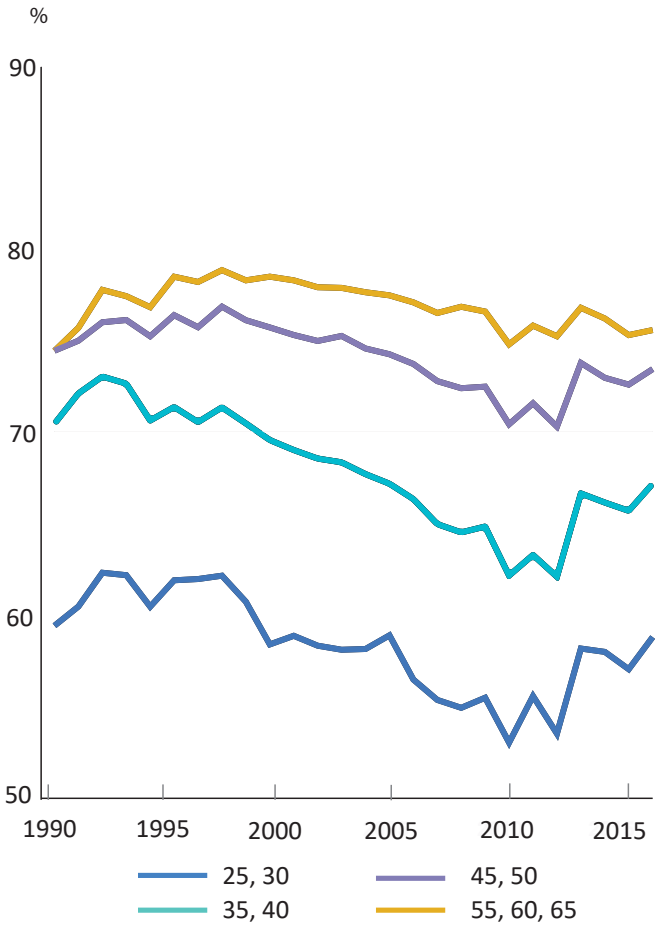

FIGURE 5 **Histologically confirmed HSIL or a more severe result.**

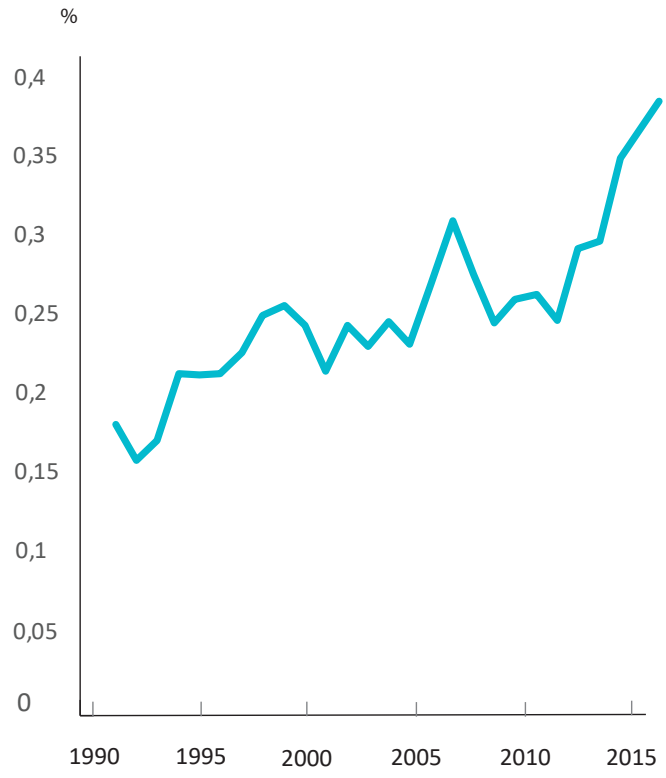

FIGURE 6 Screening coverage for women aged 30–60 years in 2012–2016, by hospital district, routine invitations.

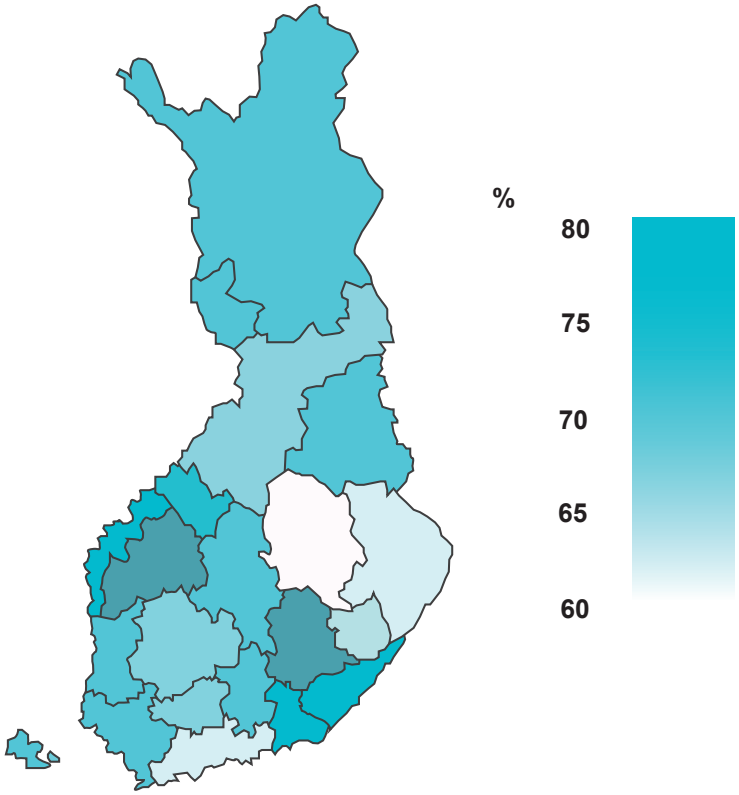

FIGURE 7 Borderline results (%), women aged 25–69 years, by hospital district in 2012–2016.

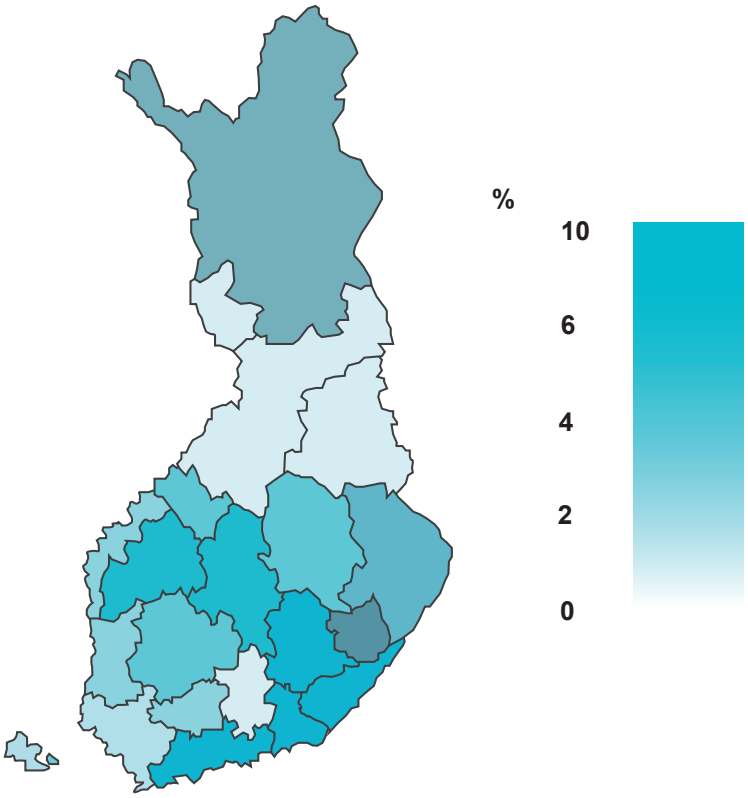

FIGURE 8 **Referrals to colposcopy (%) for women aged 25–69 years, by hospital district in 2012–2016.**

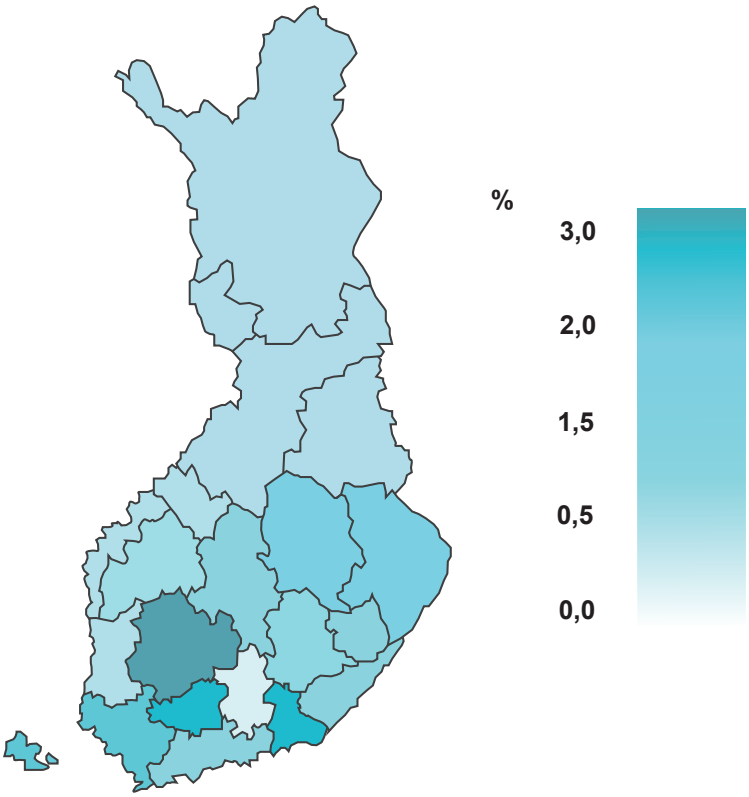

FIGURE 9 **Histological HSIL or a more severe result (%) for women aged 25–69 years, by hospital district in 2012–2016.**

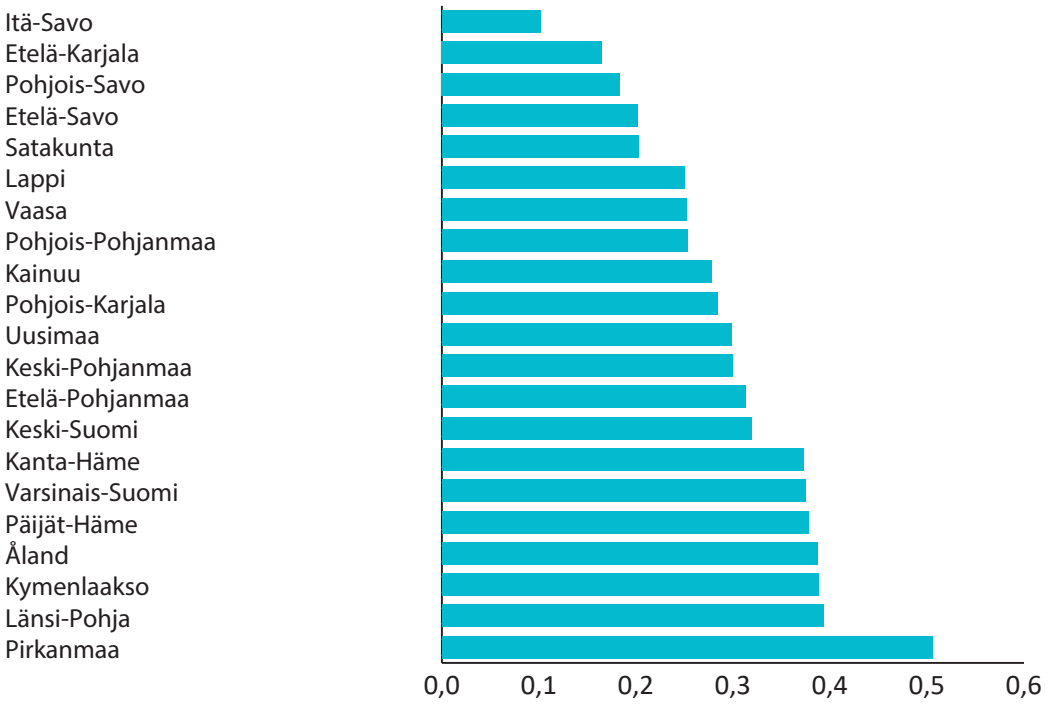

FIGURE 10 Pap tests outside the screening programme, by age in 2000–2014.

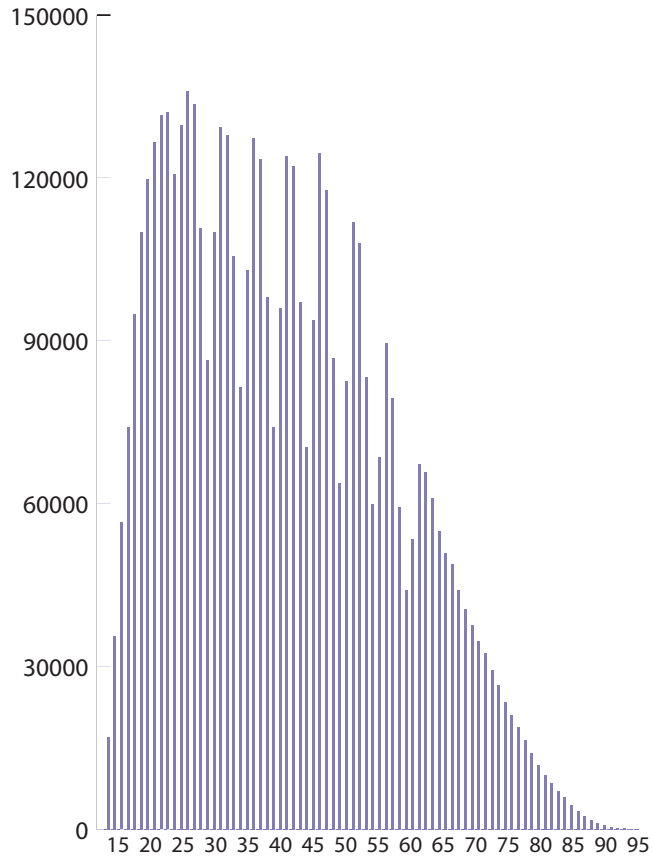

FIGURE 11 Women who had had a Pap test outside the screening programme during the past five years (2010–2014) and the number of tests per woman.

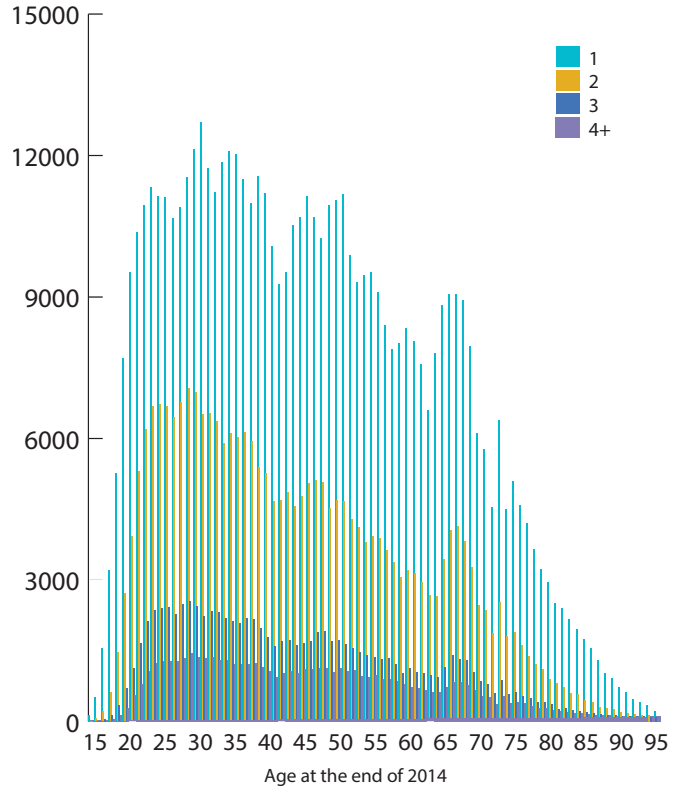

TABLE 1 Target population, invited, screened and HPV-tested women in 2016.

	Target population 31.12.2015	Invited	Invitational coverage	Screened	Screened of invited	HPV-teted
Routine screening: ages 25–65	315 236	256 866	82	179 950	70	23 265
Routine screening: ages 30–60	243 978	243 203	100	171 508	71	23 262
Routine and follow-up screening: ages 25–69	315 236	272 953	87	191 250	70	23 948

TABLE 2 Screening results in 2016.

	Screenings	Negative or normal	Negative or normal (%)	Borderline	Borderline (%)
Routine screening: ages 25–65	180 044	170 188	95	8 241	4,6
Routine screening: ages 30–60	171 598	162 236	95	7 875	4,6
Routine and follow-up screening: ages 25–69	191 344	179 604	94	9 316	4,9
	Referral to colposcopy	**Referral to colposcopy (%)**	**Histological HSIL or more severe**	**Histological HSIL or more severe (%)**	**Insufficient/ missing**
Routine screening: ages 25–65	1 583	0,9	557	0,3	32
Routine screening: ages 30–60	1 455	0,8	533	0,3	32
Routine and follow-up screening: ages 25–69	2 390	1,2	720	0,4	34

TABLE 3 Invitations to cervical cancer screening, screenings and the main results according to the mother tongue in 2016.

Mother tongue	Invitations	Screenings		Borderline		Referral to colonoscopy		Histological HSIL or more severe	
	n	n	%	n	%	n	%	n	%
Domestic	250 979	178 460	71	8 634	4,8	2 187	1,2	642	0,36
Other	21 974	12 790	58	682	5,3	203	1,6	78	0,61
Total	272 953	191 250	70	9 316	4,9	2 390	1,2	720	0,38

TABLE 4 Invitations to cervical cancer screening, screenings and the main results according to the socio-economic status in 2016.

Socio-economic status	Invitations	Screenings		Borderline		Referral to colposcopy		Histological HSIL or more severe	
	n	n	%	n	%	n	%	n	%
Entrepreneurs	16 380	11 502	70	544	4,7	107	0,9	38	0,33
Upper-level empl.	50 636	37 561	74	1 745	4,6	376	1,0	94	0,25
Lower-level empl.	107 817	79 572	74	3 893	4,9	1 018	1,3	290	0,36
Workers	35 723	24 854	70	1 273	5,1	332	1,3	128	0,52
Students	10 683	6 369	60	348	5,5	125	2,0	41	0,64
Pensioners	15 481	9 361	60	397	4,2	88	0,9	23	0,25
Long-term unemp.	25 551	16 521	65	789	4,8	245	1,5	70	0,42
Unknown	10 682	5 510	52	327	5,9	99	1,8	36	0,65
Total	272 953	191 250	70	9 316	4,9	2 390	1,2	720	0,38

TABLE 5 Association between organised/opportunistic Pap testing and the risk of cervical cancer among women aged 25–39 years.

Test performed	Cases		Controls		Corrected model	
	n	%	n	%	OR	95 % CI
No test/data missing	96	45,3	385	29,5	1	
Only organised screening	41	19,3	383	29,3	0,52	0,36 - 0,77
Only opportunistic testing	52	24,5	306	23,4	0,86	0,60 - 1,25
Both	23	10,8	233	17,8	0,48	0,29 - 0,79
Total	212	100	1 307	100		