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Abstract

Background: Self-reported data are prone to item non-response and misreporting. We investigated to what extent the use of self-reported data for participation in breast (BCS) and cervical cancer screening (CCS) impacted socioeconomic inequalities in cancer screening participation.

Methods: We used data from a large population-based survey including information on cancer screening from self-reported questionnaire and administrative records (n=14,122 for BCS, n=27,120 CCS). For educational level, occupation class and household income per capita, we assessed the accuracy of self-reporting using sensitivity, specificity, and both positive and negative predictive value. In addition, we estimated to what extent the use of self-reported data modified the magnitude of socioeconomic differences in BCS and CCS participation with age-adjusted non-screening rate difference, Odds Ratios and Relative Indices of Inequality.

Results: Although women with a high socioeconomic position were more prone to report a date for BCS and CCS in questionnaires, they were also more prone to over-declare their participation in CCS if they had not undergone a screening test within the recommended time frame. The use of self-reported cancer screening data, when compared to administrative records, did not impact the magnitude of social differences in BCS participation but led to an overestimation of the social differences in CCS participation. This was due to misreporting rather than to item non-response.

Conclusions: Women's socioeconomic position is associated with missingness and the accuracy of self-reported BCS and CCS participation. Social inequalities in cancer screening participation based on self-reports are likely to be overestimated for CCS.

Key-words

Breast Cancer Screening, Cervical Cancer Screening, Social class, Self-reported data, Administrative record, Bias

Introduction

Health surveys based on self-reported questionnaires are common methods for monitoring preventive behaviours, including compliance with cancer screening recommendations and associated factors. However, self-reported data are prone to several types of bias. Firstly, bias can come from non-participation in the survey (selection bias); women participating in health surveys have better health-related behaviours than those who refuse to participate.[1, 2] In addition, results can also be biased due to non-response to some questions (item non-response bias) and errors when self-reporting the date of one's last cancer screening test (reporting bias). It has been shown that when reporting the date of their last cancer screening, some people indeed tend to overestimate their adherence to screening recommendations, which is likely to be accounted for by both memory and social desirability bias. This phenomenon is usually more pronounced for cervical cancer screening (CCS) than for breast cancer screening (BCS), potentially due to the common assumption made by many women that any pelvic examination equates to a Pap smear.[3-7]

Studies report a higher participation in BCS and CCS among women with a high socioeconomic position (SEP).[8-10] However, although some evidence come from administrative data,[11] most of the literature relies on self-reports. One important question is to what extent the bias in self-reported data impacts the magnitude of socioeconomic inequalities in cancer screening participation. This issue has rarely been investigated. To our knowledge the impact of missing questionnaires data on the date of last BCS and CCS has not been assessed in relation to social inequalities in cancer screening participation. Moreover, little evidence exists regarding the association between misreporting and SEP and the scarce literature reports contradictory findings: some studies suggest that the accuracy of self-reporting is not linked to SEP [7, 12] whereas one study reports better accuracy among groups with higher SEP.[4] There is, therefore, no consensus on the impact of self-reported data on the magnitude of social inequalities in cancer screening participation. However, this information would be of interest for both researchers and policy makers in a context where reducing socioeconomic disparities in cancer

screening is a priority for determining public health policies, alongside where health surveys are used to monitor social inequalities in cancer screening participation and associated factors.

Using data from a large population-based survey linked with administrative records (AR) resulting in both self-reported and administrative data on participation in BCS and CCS, we first investigated how accurate self-reported data for BCS and CCS were according to several socioeconomic characteristics. Secondly we assessed the impact of the use of self-reports on the magnitude of social inequalities in participation to BCS and CCS, discriminating between the effect of item non-response bias and the effect of reporting bias.

Methods

The CONSTANCES cohort consists of French adults aged 18-69 at inception. Participants were randomly selected from adults covered by the national social security database, stratified by age, sex, region of France and socioeconomic status. Personal invitations were sent, and those who volunteered to participate (7.3%)[13] were invited for a health examination in one of 22 selected health screening centers throughout France. Upon study entry, data were collected through self-reported questionnaires (social and demographic characteristics, behaviours and occupational factors, general health and healthcare utilisation). Medical history and anthropometric data were collected during a health examination.[14] Self-reported data were paired to the national social security database that gathers AR for health care use.

Recruitment of the Constances cohort started in 2012. Our study population included women recruited from January 2012 to December 2014. We excluded women who were not eligible for BCS and CCS based on the French screening guidelines: women outside the 50-69 age range, with breast or ovarian cancer, Hodgkin lymphoma, or parental history of either breast or ovarian cancer for BCS; and women outside the 25-65 age range, who had undergone a hysterectomy, had cervical or uterine cancer, did

not report any sexual intercourse, or had HIV for CCS. The analysis was based on 27,120 women for CCS and 14,122 women for BCS.

We took information on participation in the CCS and BCS from the self-reported questionnaires completed at study entry and from AR over the three years before entering the study. Using both data sources respectively, we defined participation in cancer screening based on the French recommendations. For CCS, we identified women aged 25 to 65 who had a Pap smear over the past 3 years and for BCS we identified women aged 50 to 69 who had a mammography over the past 2 years. For BCS, we only included bilateral mammographies, making it unlikely that we included a diagnostic mammography. To assess the accuracy of self-reported participation in BCS and CCS, we calculated sensitivity, specificity, and both positive and negative predictive values among women who have self-reported participation in BCS and CCS using the AR as gold-standard. Sensitivity is the probability that a woman who had a record of reimbursement of a cervical Pap smear/mammography in the AR (within the established time frame) would have self-reported the same. Specificity is the probability that a woman who did not have a record of reimbursement of a cervical Pap smear/mammography in the AR (within the established time frame) would have self-reported the same. Positive predictive values refer to the proportion of self-reported responses that agree with the AR for 'having had a cervical Pap smear/mammography' in the established time frame, whilst negative predictive values refer to the proportion of self-reported responses that match the AR for 'not having had a cervical Pap smear/mammography' in the established timeframe.[3] These indices were computed alongside three socioeconomic characteristics: education (Master's degree or higher vs. Bachelor's degree; high school; vocational secondary education; up to primary education), occupational class (higher level professionals and managers vs. lower level professionals; clerical, sales and service workers; manual workers; self-employed, entrepreneurs and farmers; never worked and others), and household income per capita, using the square root method described by the OECD[15] (>3000€ vs 2000€-3000€; 1500€-2000€; 1000€-1500€; <1000€).

To determine to what extent the use of self-reported data modified the magnitude of socioeconomic differences in BCS and CCS participation, we computed the age-adjusted rate for non-participation in cancer screening with direct standardisation using the whole eligible population as reference. Using the highest socioeconomic group as the reference category, we also calculated rate difference (RD) as well as age-adjusted Odds Ratios (ORs) and age-adjusted Relative Indices of Inequality (RII) with their 95% confidence intervals (CI) for BCS/CCS non-participation. RIIs express inequality within the whole socioeconomic continuum [16]. For occupational class, the RIIs were computed without self-employed, entrepreneurs or farmers, as well as those who had never worked to allow for a hierarchical order between categories. We assessed social inequalities on both a relative scale (with OR and RII) and on an absolute scale (with RD), thereby reflecting the different dimensions of health inequalities as recommended.[17] We computed two complementary relative measures: the ORs reflect the effect of being in each socioeconomic category compared to the most favoured one whereas the RIIs assess the gradient of social inequalities while accounting for the size of each socioeconomic category. Finally, the absolute measure demonstrates the burden of social differences in cancer screening non-participation within the population.

All measures were computed for the three socioeconomic characteristics in three different models:
1/ among the total cohort, information on cancer screening participation taken from AR (model 1)
2/ among women who answered the question on cancer screening participation in the questionnaire, information on cancer screening participation taken from AR (model 2)
3/ among women who answered the question on cancer screening participation in the questionnaire, information on cancer screening participation taken from self-reported questionnaire (model 3).
The difference between results from models 1 and 2 was used to show the magnitude of the item non-response bias, the difference between results from models 2 and 3 for the reporting bias, and the

difference between results from models 1 and 3 for the overall bias relating to the use of self-reported data compared to AR.

All analyses were conducted using the SAS V9 Software (Cary, NC) or RStudio V3.2.3.

Results

The percentage of women who did not answer to the question on cancer screening hardly differed between BCS and CCS but was higher among women who did not perform a cancer screening test within the recommended time frame according to the AR (Table 1). This percentage increased with decreasing SEP, regardless of both the SEP indicator used and women's status regarding cancer screening in the AR. The increase in percentage point was nevertheless more pronounced among women who did not perform a cancer screening test within the recommended time frame according to the AR compared to those who did.

Among all women, high sensitivity was found for both BCS and CCS, with the positive predictive value falling close to the sensitivity (Table 1). The specificity was lower, especially for CCS. The negative predictive value was similar for BCS and CCS and close to 70%. Regardless of the SEP variable considered, the sensitivity marginally increased with increasing SEP for BCS but the increase in percentage point was more pronounced for CCS. On the contrary, the specificity substantially decreased with increasing SEP for CCS, but was hardly associated with SEP for BCS. The positive predictive value was positively related with income for CCS and the negative predictive value to occupation for BCS.

We also investigated the magnitude of deviations from cancer screening guidelines. If we consider women who did not have a CCS during the past three years, among poor women (monthly household income per capita<1500€) 15% were seen to exceed this delay by less than three months and 43% by at least 4 years compared to respectively 20% and 36% among rich women (income>3000€). On the

contrary, the respective figures were 16% and 41% for higher level professionals and managers compared to 22% and 35% among lower level professionals. No clear difference was found for education. For BCS, large deviations from the guidelines (≥ 3 years since last mammography) only differed by SEP.

The proportion of women not following the screening recommendations was substantially lower in self-reports compared to AR data for CCS, but hardly differed for BCS (Table 2). The association between SEP and cancer screening was also more pronounced for CCS than BCS although an association was still seen between income and BCS. When judging BCS and CCS participation based on the AR, the ORs, their 95% CI and the RDs were comparable amongst all women (model 1) and women who answered the question on cancer screening (model 2). When restricting the analysis to only women who answered the question on cancer screening, the ORs and their 95% CI were comparable for BCS for both data sources (AR or self-reported questionnaires). For CCS however, the ORs were higher when using self-reported data compared to AR, and the CIs for income did not overlap between models 2 and 3. Similar findings were observed with RIIs. RDs were comparable for both data sources.

Discussion

We investigated to what extent the use of self-reported data for participation in BCS and CCS impacted socioeconomic inequalities in cancer screening participation using AR as the gold-standard. Although women with a high SEP were more prone to self-report a date for both BCS and CCS, they were also more prone to over-declare their participation for CCS when they had not performed a screening test within the recommended time frame. Therefore, in comparison to AR, the use of self-reported cancer screening data did not impact the magnitude of social differences in the participation in BCS but led to an overestimation of social differences in CCS participation.

Before discussing the results, some methodological aspects should be addressed. Although ARs are recognised as high-quality data thanks to their exhaustiveness and lack of reporting bias, we cannot rule out that some mammography or Pap smear tests may have been done for diagnostic purposes or follow-ups from some previous abnormality. In our study, the ARs were taken from national social security database, the data source responsible for the payment of individuals for all medical exams and prescriptions. It could therefore be considered a high-quality database for BCS and CCS as these exams are refunded by the social security system.

In our data, the item non-response rate for the question on most recent cancer screening was similar for BCS and CCS, and was therefore not linked to the exam. Item non-response was globally higher in low SEP groups. However, the social gradient for item non-response, assessed on an absolute scale with percentage point difference, was much more pronounced among women who did not perform a screening test within the recommended timeframe.

As typically reported in the literature, we found higher sensitivity and lower specificity for both CCS and BCS, with a substantially lower specificity for CCS than for BCS.[4, 5] As we used data from a large population-based survey paired with AR, we were able to assess the accuracy of self-reporting in relation to SEP. In line with the literature reports of no or little differences in sensitivity based on SEP,[4, 7, 12] within our data we found increased SEP to associate with a small increase in percentage point in sensitivity for both BCS and CCS. Recall bias is more likely to be pronounced among low SEP groups, which may account for these results. The literature reported no differences in specificity based on SEP, or higher specificity among higher SEP groups.[4, 7, 12] By contrast, we found that specificity decreased with increasing SEP for CCS. This result means that there was a lower proportion of true negatives among high SEP women than among low SEP women. This is somewhat unexpected, as participation in health surveys is usually better among high SEP groups [1, 2, 18] However, women with a high SEP are more likely to be aware of the national guidelines for cancer screening, and therefore more conscious

if and when they are not following them. Consequently, the social desirability bias could be higher in this group.

Overall, our data showed that both the missingness and accuracy of self-reported participation in cancer screening differed by SEP. This was particularly pronounced among women who did not perform a screening test within the recommended timeframe, suggesting different underlying mechanisms within different SEP groups. When not up-to-date with screening recommendations, women with a low SEP more frequently failed to answer to the question on most recent cancer screening. Two phenomena might account for this result: firstly, recall bias, and secondly, a proportion of these women probably also did not want to answer as they know they did not follow the guidelines. By contrast, high SEP women are more likely to be subject to social desirability bias when not up-to-date with screening recommendations: indeed, they were more prone to report a date for BCS and CCS in questionnaires, but they were also more prone to declare a more recent date than the actual one, thereby over-declaring their participation in cancer screening.

Finally, the consequences of non-participation in BCS or CCS on women's health are likely to be more important when the deviations from official guidelines are larger. Our data suggested that these deviations were less pronounced among high SEP women compared to low SEP women, in particular for large deviations (last mammography for more than 3 years, last Pap smear for more than 4 years). This would mean a lower health burden of non-participation in BCS or CCS according to the official guidelines for high SEP women than for low SEP women.

This study only included information on women who participated in the Constances cohort. We were, therefore, unable to assess the impact of selection bias on social inequalities in BCS and CCS participation, and cannot directly extrapolate our results to the whole general population. The participation rate in Constances (7.3%) was comparable to other large population-based cohorts such

as the UK Biobank cohort (500000 participants, participation rate of 5.45%).[1] Women who refuse to participate to health surveys tend to have a lower SEP than women who participate.[1, 2, 18] We would then risk selection bias if low SEP women participating in the study showed higher screening participation that low SEP women who did not, thereby minimising the social inequalities in cancer screening participation.[19] However, regarding the magnitude of the bias seen for cancer screening rate by SEP and socioeconomic disparities in both BCS and CCS, it is impossible to say if the selection bias due to participation in Constances is larger or smaller than the bias resulting from using self-reported compared to AR data. Results for the whole general population could be obtained from AR. However, in France as in most countries, no information on individual characteristics including SEP is available via AR, therefore the investigation of participation in cancer screening in relation to detailed individual characteristics can only be conducted using health surveys.

Consistent with the literature, our data showed larger social inequalities in cancer screening participation for CCS than BCS. This is likely due to the different cancer screening policies: inequalities in participation are usually smaller when there is a nationwide organised screening program,[20, 21] and in France at the time of the survey, a nationwide screening program existed only for BCS. When using self-reported data compared to AR, social differences in cancer screening participation were similar for BCS and more pronounced for CCS. One important question is whether the impact of self-reporting on social inequalities is smaller for BCS as a result of social inequalities or whether this may be due to differences in preventive behaviors. Non-participation in BCS was comparable for AR and self-reported data, whereas non-participation in CCS was substantially decreased in self-reported data when compared to AR. Our results suggest, therefore, that the magnitude of bias in the social inequalities in preventive behaviour seen in self-reported data may, at least partly, depend on the preventive behaviour. Further studies investigating other preventive behaviours are needed to clarify this issue.

Overall, our results suggest that the use of self-reported cancer screening data when compared to AR did not impact the magnitude of social differences for participation in BCS but led to an overestimation of social differences for participation in CCS. This overestimation was observed on a relative scale but not on an absolute scale, reflecting the lower non-participation in CCS seen within self-reported data. In addition, the effect of self-reporting on social inequalities in CCS seemed to be mostly due to misreporting, and not to item non-response (no difference between models 1 and 2). This problem could not, therefore, be resolved by advanced statistical method filling in missing values e.g. multiple imputation.

In conclusion, our findings suggest that misreporting may not be limited to women with a low SEP, but may also exist, in a different form, among women with a high SEP. Overall misreporting could have a non-negligible impact on the social inequalities in cancer screening participation, with differences according to the type of cancer screening. More generally, we can suppose that the effect of misreporting is likely to differ based on the type of preventive behavior, with the impact of self-reporting on social inequalities impossible to assess. Despite being inexistent in too many countries, improving the possibilities of linkage between AR for health care use and AR including SEP, such as fiscal records, is thus urgently needed to adequately monitor social inequalities in health.

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Conflict of Interest

The authors have no conflict of interest.

Key points

- Misreporting in cancer screening participation differs by socioeconomic position (SEP).

- Women with a low SEP more frequently do not answer the question whereas women with a high SEP more frequently over-declare their participation.
- Self-reported data do not impact social differences in breast cancer screening but overestimate social differences in cervical cancer screening.
- Despite bias in self-reported data, health surveys remain an important data source to monitor social inequalities in cancer screening participation.

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Table 1: Number and proportion of women who did not answer the question on cancer screening, sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) for breast and cervical cancer screening among all women and by socioeconomic characteristics. The Constances cohort

	No answer to the question on cancer screening				Sensitivity			Specificity			PPV			NPV		
	Among women not up to date according to the AR *		Among women up to date according to the AR **		Estimate	95% CI		Estimate	95% CI		Estimate	95% CI		Estimate	95% CI	
	N	%	N	%												
BREAST CANCER SCREENING																
All women	399	16.6	1329	11.3	93.8	93.4	94.2	73.1	72.3	73.9	94.7	94.3	95.1	69.5	68.7	70.3
Household income per capita																
<1000€	97	21.4	326	14.5	92.1	90.1	64.1	73.1	69.9	76.3	90.5	88.4	92.6	76.6	73.5	79.7
1000€-1500€	62	18.7	164	13.0	92.4	91.0	93.8	75.9	73.6	78.2	94.0	92.7	95.3	70.9	68.5	73.3
1500€-2000€	47	15.6	180	11.0	93.9	92.8	95.0	81.2	79.3	83.1	96.6	95.7	97.5	70.2	68.0	72.4
2000€-3000€	83	16.4	280	9.5	94.1	93.3	94.9	68.9	67.3	70.5	95.0	94.2	95.8	65.2	63.5	66.9
≥3000€	68	11.8	272	9.1	94.9	94.1	95.7	70.2	68.6	71.8	94.4	93.6	95.2	72.1	70.5	73.7
Occupational class																
Manual workers	20	17.9	83	14.9	92.4	90.2	94.6	77.2	73.7	80.7	95.4	93.7	97.1	66.4	62.5	70.3
Clerical, sales and service	135	18.2	445	12.3	93.4	92.6	94.2	75.1	73.7	76.5	95.1	94.4	95.8	68.6	67.1	70.1
Lower level professionals	107	15.3	380	9.8	94.2	93.5	94.9	73.2	71.8	74.6	95.4	94.8	96.0	68.1	66.7	69.5
Higher level professionals and managers	71	13.5	206	8.7	94.9	94.1	95.7	71.0	69.3	72.7	94.0	93.1	94.9	74.4	72.7	76.1
Education level																
Up to primary education	81	22.3	276	15.9	93.3	92.1	94.5	76.0	74.0	78.0	95.2	94.2	96.2	68.7	66.5	70.9
Vocational secondary education	85	18.3	262	11.6	92.8	91.8	93.8	72.6	70.8	74.4	94.7	93.8	95.6	65.5	63.6	67.4
High school	74	19.0	217	10.9	94.7	93.7	95.7	73.4	71.5	75.3	95.2	94.3	96.1	71.2	69.3	73.1
Bachelor degree	115	14.6	394	9.9	94.0	93.3	94.7	72.0	70.7	73.3	94.7	94.0	95.4	69.3	67.9	70.7
Master degree	37	10.7	138	9.0	94.6	93.5	95.7	72.5	70.4	74.6	94.0	92.9	95.1	74.9	72.8	77.0
CERVICAL CANCER SCREENING																
All women	990	17.7	2236	10.4	95.8	95.5	96.1	51.0	50.4	51.6	89.1	88.7	89.5	74.6	74.0	75.2
Household income per capita																
<1000€	113	17.4	214	13.4	90.7	89.4	92.0	53.3	51.1	55.5	83.4	81.7	85.1	68.9	66.8	71.0

1000€-1500€	172	17.0	362	11.6	94.8	94.1	95.5	54.4	52.8	56.0	87.2	86.1	88.3	76.2	74.8	77.6
1500€-2000€	181	16.8	455	10.0	95.8	95.2	96.4	51.8	50.4	53.2	90.0	89.2	90.8	72.9	71.7	74.1
2000€-3000€	168	17.0	420	9.4	96.5	96.0	97.0	49.8	48.4	51.2	90.5	89.7	91.3	74.5	73.3	75.7
≥3000€	157	14.9	478	9.0	97.4	97.0	97.8	46.3	45.0	47.6	90.7	89.9	91.5	76.4	75.3	77.5
Occupational class																
Manual workers	69	24.4	92	13.6	91.5	89.6	93.4	62.6	59.2	66.0	87.0	84.7	89.3	72.8	69.7	75.9
Clerical, sales and service	380	19.2	734	10.5	94.9	94.4	95.4	50.8	49.7	51.9	88.3	87.6	89.0	71.7	70.7	72.7
Lower level professionals	252	16.5	675	10.0	96.9	96.5	97.3	50.7	49.6	51.8	90.4	89.7	91.1	77.1	76.1	78.1
Higher level professionals and managers	159	13.5	463	8.9	96.7	96.2	97.2	48.1	46.8	49.4	89.7	88.9	90.5	75.5	74.4	76.6
Education level																
Up to primary education	155	26.3	221	15.3	93.1	91.9	94.3	57.6	55.2	60.0	86.0	84.3	87.7	74.9	72.8	77.0
Vocational secondary education	184	21.3	282	10.2	95.1	94.3	95.9	53.5	51.8	55.2	88.1	87.0	89.2	75.1	73.6	76.6
High school	180	20.4	398	11.8	95.9	95.3	96.5	53.2	51.6	54.8	89.6	88.6	90.6	75.4	74	76.8
Bachelor degree	324	15.9	870	9.8	96.3	95.8	96.8	48.1	46.8	49.4	89.1	88.3	89.9	74.9	73.7	76.1
Master degree	123	10.9	426	8.8	96.3	95.8	96.8	48.1	46.8	49.4	89.1	88.3	89.9	74.9	73.7	76.1

AR: Administrative record

CI: confidence interval

* Women who did not perform a breast or cervical cancer screening within the recommended time frame according to the AR

** Women who performed a breast or cervical cancer screening within the recommended time frame according to the AR

Table 2: Rate, Odds Ratios (OR) and Relative Indices of Inequality (RII) with their 95% Confidence Interval (CI) for not following the breast and cervical cancer screening recommendations associated with social characteristics

Population	**All women**				**Women who have answered the question on cancer screening participation**						
Data source for cancer screening	**AR data**				**AR data**				**Self-reported questionnaire**		
	N	**Non-screening rate1**	**RD2**	**Model 1 OR [95% CI]**	**N**	**Non-screening rate1**	**RD2**	**Model 2 OR [95% CI]**	**Non-screening rate1**	**RD2**	**Model 3 OR [95% CI]**
BREAST CANCER SCREENING	**14122**				**12394**						
Household income per capita	11414				10109						
<1000€	883	26,6	10,4	1,85 [1,55-2,20]	734	26,3	10,5	1,88 [1,56-2,28]	25,1	9,7	1,83 [1,51-2,22]
1000€-1500€	1598	20,8	4,6	1,35 [1,16-1,57]	1372	19,7	3,9	1,30 [1,10-1,53]	21,1	5,7	1,46 [1,25-1,72]
1500€-2000€	1935	15,6	-0,6	0,99 [0,85-1,15]	1708	14,9	-0,9	0,97 [0,82-1,14]	17,3	1,9	1,17 [1,00-1,37]
2000€-3000€	3446	14,7	-1,5	0,91 [0,80-1,04]	3083	13,8	-2,0	0,87 [0,76-1,00]	14,5	-0,9	0,95 [0,83-1,09]
≥3000€	3552	16,2	0,0	1	3212	15,8	0,0	1	15,4	0,0	1
RII2				1,70 [1,43-2,03]				1,66 [1,38-2,01]			1,87 [1,55-2,25]
Occupational class	12799				11312						
Never worked and others	69	*		1.74 [1.02-2.99]	55	*		1.97 [1.09-3.57]	*		1.90 [1.04-3.48]
Self-employed, entrepreneurs and farmers	216	*		1.24 [0.88-1.76]	190	*		1.20 [0.82-1.76]	*		1.22 [0.83-1.78]
Manual workers	668	17,1	-1,0	0.92 [0.74-1.16]	565	16,6	-0,7	0.94 [0.74-1.21]	19,1	2,6	1.20 [0.95-1.51]
Clerical, sales and service	4356	16,7	-1,4	0.91 [0.80-1.03]	3776	15,8	-1,5	0.90 [0.79-1.03]	17,4	0,9	1.07 [0.94-1.22]
Lower level professionals	4595	15,3	-2,8	0.82 [0.72-0.93]	4108	14,5	-2,8	0.81 [0.71-0.93]	15,5	-1,0	0.93 [0.81-1.06]
Higher level professionals and managers	2895	18,1	0,0	1	2618	17,3	0,0	1	16,5	0,0	1
RII2 3				0,94 [0,79-1,11]				0,93 [0,77-1,12]			1,19 [0,99-1,43]
Educational level	13871				12192						
Up to primary education	2096	18,3	0,2	1.01 [0.85-1.18]	1739	17,2	-0,6	0.95 [0.80-1.14]	18,8	1,4	1.08 [0.90-1.28]
Vocational secondary education	2730	17,0	-1,1	0.93 [0.80-1.08]	2383	15,9	-1,9	0.88 [0.74-1.04]	17,6	0,2	1.03 [0.87-1.21]
High school	2381	16,4	-1,7	0.89 [0.76-1.05]	2090	15,2	-2,7	0.83 [0.70-0.99]	15,6	-1,8	0.89 [0.75-1.05]
Bachelor degree	4780	16,3	-1,9	0.88 [0.76-1.01]	4271	15,5	-2,3	0.85 [0.74-0.99]	16,3	-1,1	0.93 [0.80-1.08]

Master degree	1884	18,2	0,0	1	1709	17,8	0,0	1	17,4	0,0	1
RII2				1,05 [0,89-1,23]				0,97 [0,82-1,16]			1,12 [0,95-1,33]
CERVICAL CANCER SCREENING	**27120**				**23894**						
Household income per capita	23828				21108						
<1000€	2250	28,9	12,4	2,15 [1,92-2,41]	1923	27,9	12,3	2,17 [1,92-2,46]	21,6	12,1	2,76 [2,39-3,18]
1000€-1500€	4128	25,6	9,1	1,71 [1,55-1,89]	3594	23,5	7,9	1,70 [1,53-1,89]	16,8	7,3	1,99 [1,75-2,26]
1500€-2000€	5622	19,2	2,7	1,26 [1,15-1,39]	4986	18,0	2,4	1,23 [1,11-1,37]	12,8	3,3	1,47 [1,30-1,66]
2000€-3000€	5461	18,1	1,6	1.07 [0,97-1,18]	4873	16,8	1,2	1,05 [0,94-1,19]	11,3	1,8	1,16 [1,02-1,31]
≥3000€	6367	16,5	0,0	1	5732	15,6	0,0	1	9,5	0,0	1
RII2				2,42 [2,15-2,71]				2,42 [2,13-2,74]			3,20 [2,76-3,71]
Occupational class	25100				22217						
Never worked and others	167	*		2.25 [1.62-3.11]	145	*		2.23 [1.57-3.17]	*		2.57 [1.76-3.76]
Self-employed, entrepreneurs and farmers	288	*		1.61 [1.23-2.11]	251	*		1.58 [1.18-2.12]	*		1.58 [1.12-2.22]
Manual workers	962	29,3	10,8	1.81 [1.55-2.11]	801	26,7	9,1	1.69 [1.42-2.00]	23,2	11,9	2.34 [1.95-2.82]
Clerical, sales and service	8964	22,2	3,7	1.26 [1.16-1.36]	7850	20,4	2,8	1.20 [1.10-1.31]	14,5	3,2	1.34 [1.21-1.48]
Lower level professionals	8311	18,3	-0,1	0.99 [0.91-1.07]	7384	17,3	-0,4	0.97 [0.89-1.06]	11,3	0,0	1.01 [0.90-1.13]
Higher level professionals and managers	6408	18,5	0,0	1	5786	17,6	0,0	1	11,3	0,0	1
RII2 3				1,62 [1,45-1,82]				1,49 [1,31-1,69]			1,91 [1,65-2,22]
Educational level	26790				23627						
Up to primary education	2033	28,6	9,4	1.70 [1.51-1.91]	1657	27,0	8,2	1.56 [1.36-1.78]	21,2	9,2	1.89 [1.62-2.20]
Vocational secondary education	3620	25,0	5,8	1.36 [1.22-1.51]	3154	22,7	3,9	1.24 [1.11-1.39]	16,2	4,2	1.41 [1.24-1.61]
High school	4242	20,7	1,5	1.12 [1.02-1.24]	3664	19,1	0,3	1.05 [0.94-1.17]	13,5	1,5	1.18 [1.04-1.34]
Bachelor degree	10950	18,8	-0,4	1.00 [0.92-1.08]	9756	17,7	-1,1	0.96 [0.88-1.04]	11,8	-0,2	1.01 [0.91-1.12]
Master degree	5945	19,2	0,0	1	5396	18,8	0,0	1	12,0	0,0	1
RII2				1,67 [1,49-1,87]				1,47 [1,30-1,67]			1,83 [1,59-2,11]

AR: Administrative record

RD: Rate difference

1: Age-adjusted rates for non-participation in
cancer screening with direct standardisation using
the whole eligible population as reference

2: Adjusted for age

3: Computed without self-employed, entrepreneurs and farmers, and never workers and others to allow a hierarchical order between the categories

* Not computed due to too small numbers