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Deprivation and mass screening: Survival of women diagnosed with breast cancer in France from 2008 to 2010

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ABSTRACT

Background: Some studies have investigated the role of socio-demographic inequalities in the association between screening and survival. However, in France, no study has been conducted to describe the socio-demographic characteristics and survival of women with breast cancer based on their participation to mass screening. The aim of this study was to assess the impact of socio-demographic inequalities on the association between participation in mass screening program and survival of women with breast cancer.

Methods: Data for 2,244 women aged 50–74 years diagnosed with breast cancer over the period 2008–2010 were obtained from the cancer registry and the screening structure of Gironde. We used the aggregated European Deprivation Index (EDI) to define the deprivation level of women. Net survival rates were estimated with the Pohar-Perme method, with and without correcting for lead-time bias.

Results: Survival rates were lower for non-attenders than for screen-detected women (83.8% vs 97.3%, $p < 0.0001$), even after correcting for lead-time bias. Among the most deprived women, the survival rate was significantly different between non-attenders and screen-detected women (78.1% vs 95.6%, $p = 0.0002$), suggesting an important effect of mass screening in this group.

Conclusion: The introduction of incentive actions in deprived areas could play a key role in the adherence of women to mass screening and in improving their survival in case of a breast cancer diagnosis.

1. Introduction

Breast cancer is the most common cancer in women worldwide and is the leading cause of cancer mortality in this population [1]. In France, the incidence and mortality of breast cancer in women in 2015 was estimated at over 54,000 new cases and around 12,000 deaths [2]. Prognosis is good with a 5-year relative survival rate close to 87% [3]. This favorable prognosis is related to therapeutic improvements and the implementation of mass screening programs (MSPs). In France, the latter was implemented in the early 1990s and its use widespread in 2004 in most of the French departments. In the French MSP, all women aged between 50 and 74 years are invited to perform a bilateral mammography with physical examination every two years.

The first objective of MSP is to reduce breast cancer mortality in the

Abbreviations: AGIDECA, Association Girondine pour le Dépistage des Cancers; AJCC, American Joint Commitee on Cancer; CI, confidence interval; CNIL, Commission Nationale Informatique et Liberté; EDI, European Deprivation Index; IRIS, Ilots Regroupés pour l'Information Statistique; IQR, interquartile range; MSP, mass screening program; Q1-Q5, quintile 1-quintile 5 of the distribution of the European Deprivation Index; RNIPP, Répertoire national d'identification des personnes physiques; SBR, Scarff Bloom and Richardson; SD, standard deviation; TNM, tumor nodes metastasis

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general population. In France, the participation rate in MSP is around 50%, which is below the standard European target of 70% necessary to observe a real effect of screening on mortality rates in the general population [4]. The low participation rate may be explained by an important use of opportunistic screening (estimated at around 10%) [5] and by socio-demographic inequalities [6]. Indeed, studies conducted in several countries have indicated that the level of socio-economic deprivation affects screening uptake in women with breast cancer [4,7–10].

The role of socio-demographic inequalities on the survival of women with breast cancer according to participation in MSP has been little described. A few studies showed that screen-detected women had the same survival whatever the deprivation level, and that the survival of non-attender women decreased with higher deprivation levels [11,12]. Conversely, another study showed that the survival of both screen-detected and non-attender women decreased when deprivation levels increased [13]. However, most studies were performed without adjusting for lead-time. Lead-time is the time gained due to screen detection before symptomatic state as opposed to symptomatic detection. By correcting for lead-time, the survival difference between screen-detected and symptomatic breast cancer can be attributed to prognostic factors such as stage. For this reason, further investigations are needed to better understand the effect of socio-demographic inequalities on the survival with the correction for lead-time.

In France, only a few studies have compared cancer characteristics in women participating in MSP and those that do not undergo screening. One French study showed that women living in the most deprived areas participated less to mammography screening and were diagnosed with a more advanced stage of cancer [14]. In addition, no study has described the socio-demographic characteristics and survival of women with breast cancer based on their participation in a MSP.

We undertook this study i) to describe socio-demographic characteristics of women with breast cancer according to their participation in the MSP, and ii) to examine the role of socio-demographic inequalities on the association between participation in MSP and survival of women with breast cancer and after correcting for lead-time bias.

2. Methods

2.1. Patients and data

All women with a primary invasive or *in situ* breast cancer diagnosed between 1 January 2008 and 31 December 2010 were included in the study. Women had to be aged between 50 and 74 years and live in the Gironde department at the time of diagnosis to be able to participate.

All cases were identified from the general cancer registry of the Gironde department according to international rules [15]. For each woman with breast cancer, prognostic variables were considered including age of diagnosis, tumor size, tumor behavior (*in situ* or invasive), Scarff Bloom and Richardson (SBR) histological grade, TNM stage of diagnosis (AJCC), vital status and date of last news (on vital status).

An active search for the vital status on 31 July 2017 was carried out for all cases. The information was collected via an electronic request to the French national civil registration file (RNIPP). Patients were censored at the date of last news or death.

The women included in this study were those eligible for the French MSP. The screening program implemented in 2004 in France, proposes a clinical breast examination and a bilateral mammogram every two years to women aged between 50 and 74 years. Furthermore, mammograms are the object of two readings aimed at reducing the false-negative rate. In Gironde, the breast cancer screening program is coordinated by “AGIDECA”, the organization for cancer screening of Gironde.

Data on screening were obtained from the AGIDECA database, which aims to be accurate. In this study, thanks to a crossover between AGIDECA and registry data, women were categorized into 4 groups based on their participation in the MSP:

- women who had never presented to mass screening: “non-attenders”;
- women who had partially participated in the MSP: breast cancer diagnosed at least 2 years after the last screening: “lapsed attenders”;
- women who had participated in the MSP and whose breast cancer was diagnosed through the MSP: “screen-detected”;
- women who had participated in the MSP and whose breast cancer was symptomatic and was diagnosed in the interval between two screening rounds: “with interval cancers”.

In order to take into account socio-demographic inequalities, we used an aggregate indicator of deprivation: the French EDI (“European Deprivation Index”) [16]. This index provides a score calculated for each small geographical unit of the French territory (around 2000 inhabitants) named IRIS (“Ilots Regroupés pour l’Information Statistique”: Merged Islet for Statistical Information). This score is obtained by geocoding the residence address and is calculated using several variables associated with objective and subjective poverty. The score of deprivation was categorized into quintiles according to their departmental distribution: quintile 1 corresponds to the most affluent areas and quintile 5 to the most deprived areas. In 2011, the Gironde department counted 838 IRISs. It is a department in the Nouvelle-Aquitaine region of the southwest France. With an area of 10,000 km^2, Gironde is the largest department in metropolitan France. It has a total population of 1,500,000 inhabitants, half of them living in the metropolitan area in and around Bordeaux, the prefecture.

This study was approved by the French regulatory authorities (the “Commission Nationale Informatique et Libertés”).

2.2. Statistical analysis

Fisher exact tests and Student tests were used to compare the four groups according to socio-demographics data and tumor characteristics.

Net survival rates at 1 and 5 years were estimated with the Pohar-Perme method using the expected mortality in the French general population, obtained from mortality tables. Net survival is the survival that would be observed if the breast cancer was the only possible cause of death [17].

To account for the potential effect of lead-time bias in the screen-detected group, we applied the method established by Duffy et al. in 2008 [18]. This method allows estimating the additional survival time due to screening, which is then deducted to the observed survival time for each woman who has participated in the MSP. We estimated the survival of screened women with and without correction for lead-time bias.

All analyses were carried out using the statistical software SAS version 9.4 and R version 3.4.0 for net survival (relsurv Package).

3. Results

3.1. Population characteristics

During the 2008–2010 period, 2,244 women aged 50–74 years were diagnosed with primary breast cancer in Gironde. The median age at diagnosis was 61.6 years (interquartile range (IQR) [55.8–67.5]) (Table 1). Overall, 57.3% of women were screen-detected, 13.7% had interval cancer, 5.5% were lapsed attenders and 23.5% were non-attenders. There were 297 deaths overall, 23.9% of which were among non-attenders and 9.4% among screen-detected. The median follow-up time was 7.7 years (IQR: [6.8–8.6]).

The median tumor size was greater among non-attenders and

Table 1
Characteristics of women aged 50–74 with breast cancer according to their participation in mass screening in Gironde (2008–2010), n = 2,244.

	Non-attenders (n = 528) n (%)	Screen-detected (n = 1,285) n (%)	With interval cancers (n = 307) n (%)	Lapsed attenders (n = 124) n (%)	p-value
Age group at diagnosis (years)					< 0.01
50 – 59	231 (43.7)	525 (40.8)	155 (49.9)	39 (31.5)	
60 – 69	209 (39.6)	542 (42.2)	114 (37.1)	64 (51.6)	
70 – 74	88 (16.7)	218 (17.0)	40 (13.0)	21 (16.9)	
Follow-up time (years)					< 0.0001
Mean (SD)	6.6 (2.7)	7.5 (1.8)	7.4 (2.0)	7.2 (1.9)	
Median [Q1-Q3]	7.4 [6.3 ; 8.7]	7.7 [6.9 ; 8.6]	7.7 [6.9 ; 8.7]	7.7 [6.9 ; 8.4]	
Deprivation quintile					0.8355
1 – Most affluent	121 (22.9)	302 (23.5)	82 (26.7)	38 (30.6)	
2	97 (18.4)	250 (19.5)	55 (17.9)	23 (18.6)	
3	95 (18.0)	228 (17.7)	56 (18.3)	21 (16.9)	
4	98 (18.6)	230 (17.9)	48 (15.6)	15 (12.1)	
5 – Most deprived	117 (22.1)	275 (21.4)	66 (21.5)	27 (21.8)	
Vital status at the end of follow-up					< 0.0001
Dead	126 (23.9)	121 (9.4)	39 (12.7)	11 (8.9)	
Tumor size (mm)					< 0.0001
Mean (SD)	25.3 (22.4)	16.9 (13.4)	21.0 (18.0)	17.9 (16.6)	
Median [Q1-Q3]	18.0 [11.0 ; 30.0]	13.0 [9.0 ; 20.0]	16.0 [10.0 ; 25.0]	13.0 [8.0 ; 21.0]	
SBR histological grade					< 0.0001
I	54 (10.2)	243 (18.9)	37 (12.1)	21 (16.9)	
II	225 (42.6)	537 (41.8)	149 (48.5)	48 (38.8)	
III	122 (23.1)	192 (14.9)	64 (20.8)	21 (16.9)	
Unkwown	126 (24.1)	310 (24.4)	57 (18.6)	34 (27.4)	
TNM stage (AJCC)					< 0.0001
In situ (/2)	55 (10.4)	200 (15.6)	21 (6.9)	22 (17.8)	
0[a]	4 (0.8)	4 (0.3)	0 (0.0)	0 (0.0)	
I	165 (31.3)	658 (51.2)	125 (40.7)	59 (47.6)	
II	152 (28.8)	305 (23.7)	94 (30.6)	23 (18.5)	
III	64 (12.1)	68 (5.3)	42 (13.7)	12 (9.7)	
IV	63 (11.9)	12 (0.9)	8 (2.6)	5 (4.0)	
Unknown	25 (4.7)	38 (3.0)	17 (5.5)	3 (2.4)	

AJCC: American Joint Commitee on Cancer.
[Q1-Q3]: interquartile range.
SBR: Scarff Bloom and Richardson.
SD: standard deviation.
[a] Paget's diseases.

interval cancer women with respectively 18.0 mm (IQR: [11.0–30.0]) and 16.0 mm (IQR: [10.0–25.0]) compared to the size among screen-detected, 13.0 mm (IQR: [9.0–20.0]). Most tumors were moderately differentiated and over 80.0% of women had a malignant tumor. Over 50.0% of screen-detected women had a localized cancer (TNM = I) (51.2%) versus 31.3% of non-attender women ($p < 0.0001$). At the other end, TNM stage IV, was assigned to 0.9% of women in the screen-detected group, to 2.6% in the interval cancer group, to 4.0% in the lapsed attenders groups and to 11.9% in the non-attenders group ($p < 0.0001$).

3.2. Survival

The 1-year net-survival rate in the non-attender women group was lower than that in others groups (96.5% *vs* 100.0%; 99.1% and 99.3%). The 5-year net survival rate of non-attender women was also significantly lower than that of both screen-detected women (83.8% *vs* 97.3%, $p < 0.0001$) and that of others groups (83.8% *vs* 95.3% and 94.7%, $p < 0.0002$) (Table 2).

There are no significant differences in the net survival rate at 1 year depending in deprivation quintiles. However, women living in the most affluent areas (quintile 1) had a net survival rate at 5 years significantly higher than those living in the most deprived areas (quintile 5) (95.6% *vs* 91.7%, $p < 0.03$) (Table 3).

The 5-year net survival rate of screen-detected women was identical in each deprivation quintile (Table 4). Similarly, no significant difference was found between quintiles for the groups of women with interval cancer or lapsed attender women. For non-attenders, net survival rates at 5 years decreased as the level of deprivation increased and a significant difference was observed between quintile 1 and 5 (91.1% *vs* 78.1%, $p < 0.01$).

Moreover, when comparing non-attender to screen-detected women in each quintile, a significant difference between the two groups from the quintile 2 ($p < 0.006$) was observed. The difference was all the more significant as the level of deprivation increased (quintile 5, screen-detected: 95.6% *vs* quintile 5, non-attenders: 78.1%, $p < 0.0002$) (Table 4, Fig. 1).

After adjustment for lead-time, the survival rate at 5 years decreased from 97.3% to 93.0% (Table 2). The net 5-year survival rate for the most affluent women (quintile 1) was 92.7% and for the most deprived women (quintile 5) the survival rate was 91.9% (Table 4). These net survival rates remained higher than those of non-attender women in each quintile (91.1% and 78.1%).

A significant difference was observed between non-attenders and screen-detected women in quintile 3 to 5 ($p < 0.04$) (Fig. 1).

4. Discussion

In this study, we classified women according to their participation in breast cancer MSP. The net survival rate at 5 years showed that screen-detected women had higher survival rates than non-attender women (97.3% *vs* 83.8%). According to socio-demographic inequalities, women from the most affluent areas had higher survival rates than those from the most deprived areas (95.6% *vs* 91.7%).

Furthermore, a significant survival difference was observed among non-attender women between quintile 1 and quintile 5 (91.1% *vs*

Table 2
Net survival rate estimates according to history of screening in women aged 50–74 years in Gironde (2008–2010), n = 2,244.

	n (%)	Death at 1 year (%)	Net survival at 1 year (%) [95% CI]	Death at 5 years (%)	Net survival at 5 years (%) [95% CI]
Non-attenders	528 (23.5)	21 (4.0)	96.5 [94.8 ; 98.2]	96 (18.2)	83.8 [80.4 ; 87.4]
Screen-detected	1,285 (57.3)	3 (0.2)	100.0 [100.0 ; 100.0]	72 (5.6)	97.3 [96.0 ; 98.6]
Screen-detected (corrected for lead time)	1,285 (57.3)	22 (1.7)	98.8 [98.1 ; 99.5]	111 (8.6)	93.0 [91.1 ; 94.9]
With interval cancers	307 (13.7)	4 (1.3)	99.1 [97.8 ; 100.0]	23 (7.5)	95.3 [92.3 ; 98.4]
Lapsed attenders	124 (5.5)	1 (0.8)	99.3 [97.7 ; 100.0]	10 (8.1)	94.7 [89.7 ; 99.8]

CI: confidence interval.

78.1%), contrary to screen-detected women. Finally, a significant difference was observed between non-attenders and screen-detected women in quintiles 2 to 5.

After adjusting for lead-time, survival rates of screen-detected women remained higher than those of non-attenders. This difference between non-attenders and screen-detected (after correction) women remained significant in quintiles 3 to 5.

4.1. Comparison with others studies

Many studies have assessed the survival according to participation in breast cancer screening programs. In the United Kingdom, Allgood et al. showed that the 10-year overall survival rate of screen-detected women was 85.9% versus 65.3% of non-attender women [19]. Lawrence et al.'s study revealed a higher 10-year net survival rate for screen-detected women (89.6%) compared to non-attender women (51.9%) [20]. In 2016, Woods et al. compared the participation in MSPs among Australian and English women. The study revealed a better net survival rate at 5 years for screen-detected Australian women (98.5%) compared to non-attenders (89.5%). Results were similar among English women, with a better net survival for screen-detected (97.5%) than non-attenders (79.8%) [21]. Another study compared survival rates among screen-detected women, women with interval cancer and non-attenders. Five-year net survival rates were 96.9% for screen-detected women and 84.6% for non-attenders [22]. These rates were similar to those obtained in our study (97.3% and 83.8%). Indeed, our results agree well with the abovementioned studies, and confirm the lower survival rates among non-attenders compared to screen-detected women.

Few studies have assessed the risk of lead-time bias in women participating in MSPs. In our study, we have seen a decrease in the survival rate after correction. Similarly, Allgood et al. reported a survival rate for screen-detected women of 85.9% versus 79.8% after correcting. This rate remained higher than that of non-attenders (65.3%) [19]. Results are consistent among studies [13,21,23,24].

Regarding the deprivation level of women, the majority of studies revealed that most affluent women have better survival rates than most deprived women. McKenzie et al. reported a 5-year survival rate of 90.8% for most affluent women versus 83.6% for most deprived women [22]. Morris et al. found similar results, with a 5-year survival rate of 90.0% and 86.7% for most affluent and most deprived women, respectively [13].

Our main result of interest is the survival according to screening and socio-demographic inequalities. Most studies have shown better survival rates among screen-detected women compared to non-attender women regardless of the deprivation level [13,25]. Kumachev et al. reported higher 5-year survival rates in affluent quintiles (85.7%) than in deprived quintiles (80.0%) among screen-detected women [25]. Morris et al. used the Townsend score and Index of Multiple Deprivation according to geographical area of residence at the time of diagnosis. They showed that most affluent women had higher net survival rates at 5 years than non-attenders in all deprivation quintile [13]. In our study, we observed improved survival rates among screen-detected women compared to non-attenders in particular, among those most deprived. The absence of a difference in survival between screen-detected and non-attender women among the most affluent could be explained by the presence of an opportunistic screening in France. Indeed, most affluent women possibly adhere more to the latter, allowing them to have a high survival rate regardless of their participation in an MSP. Similar results were reported in two other studies. Indeed, Davies et al. showed that the difference in survival between women with high and low levels of deprivation was substantially smaller among screen-detected women (97.9% for most affluent and 94.1% for most deprived) compared to non-attender women (85.5% and 73.9%). In New Zealand, Séneviratne et al. studied the survival of screen-detected and non-attender women according to the deprivation index, called NZDep2006. An improved survival rate at 5 years was reported among screen-detected women, but the difference between the most affluent and the most deprived women was not significant [11].

4.2. Limits and forces

To our knowledge, this is the first French study to compare the survival of women with breast cancer according to their participation in an MSP and socio-demographic inequalities. We used data from a cancer registry, which is a reliable and exhaustive source of all cancer cases. This allowed us to have few missing data and to avoid potential selection bias. Furthermore, since the objective of screening is to diagnose breast cancer earlier, it seemed appropriate to include patients with *in situ* breast cancer in our study. However, we carried out sensitivity analyses to estimate net survival rates at 5 years excluding *in situ* tumors and the results were similar probably due to the fact that the

Table 3
Net survival rate estimates according to quintiles of deprivation in women aged 50–74 years in Gironde (2008–2010), n = 2,244.

	n (%)	Death at 1 year (%)	Net survival at 1 year (%) [95% CI]	Death at 5 years (%)	Net survival at 5 years (%) [95% CI]
Q1 – Most affluent	543 (24.2)	3 (0.6)	99.9 [99.3 ; 100.0]	39 (7.2)	95.6 [93.3 ; 97.9]
Q2	425 (19.0)	7 (1.6)	98.8 [97.6 ; 100.0]	37 (8.7)	93.9 [91.2 ; 96.8]
Q3	400 (17.8)	6 (1.5)	99.0 [97.8 ; 100.0]	38 (9.5)	93.1 [90.1 ; 96.2]
Q4	391 (17.4)	6 (1.5)	98.7 [97.5 ; 99.9]	34 (8.7)	94.0 [91.1 ; 96.9]
Q5 – Most deprived	485 (21.6)	7 (1.4)	99.0 [97.9 ; 100.0]	53 (10.9)	91.7 [88.8 ; 94.7]

CI: confidence interval.
Q: quintiles.

Table 4
Net survival rate estimates according to history of screening and deprivation level in women aged 50–74 years in Gironde (2008–2010), n = 2,244.

		Non-attenders (n = 528)	Screen-detected (n = 1,285)	Screen-detected (Corrected for lead time) (n = 1,285)	With interval cancers[a] (n = 307)	Lapsed attenders[a] (n = 124)
Q1 – Most affluent (n = 543)	**n (%)**	121 (22.9)	302 (23.5)	302 (23.5)	82 (26.7)	38 (30.6)
	Death at 5 years (%)	13 (13.5)	16 (22.2)	27 (24.3)	8 (34.8)	2 (20.0)
	Net survival at 5 years (%) [95% CI]	91.1 [85.4 ; 97.0]	97.4 [94.8 ; 100.0]	92.7 [89.0 ; 96.6]	92.8 [86.5 ; 99.7]	96.0 [89.1 ; 100.0]
Q2 (n = 425)	**n (%)**	97 (18.4)	250 (19.5)	250 (19.5)	55 (17.9)	23 (18.6)
	Death at 5 years (%)	18 (18.8)	16 (22.2)	23 (20.8)	2 (8.7)	1 (10.0)
	Net survival at 5 years (%) [95% CI]	83.5 [75.8 ; 91.9]	96.2 [93.1 ; 99.4]	92.1 [87.8 ; 96.5]	97.5 [92.6 ; 100.0]	96.4 [88.6 ; 100.0]
Q3 (n = 400)	**n (%)**	95 (18.0)	228 (17.7)	228 (17.7)	56 (18.3)	21 (16.9)
	Death at 5 years (%)	20 (20.8)	11 (15.3)	21 (18.9)	4 (17.4)	3 (30.0)
	Net survival at 5 years (%) [95% CI]	80.8 [72.6 ; 89.9]	97.3 [94.4 ; 100.0]	90.7 [85.5 ; 96.3]	95.4 [88.6 ; 100.0]	87.0 [72.5 ; 100.0]
Q4 (n = 391)	**n (%)**	98 (18.6)	230 (17.9)	230 (17.9)	48 (15.6)	15 (12.1)
	Death at 5 years (%)	18 (18.8)	9 (12.5)	13 (11.7)	5 (21.7)	2 (20.0)
	Net survival at 5 years (%) [95% CI]	83.6 [75.8 ; 92.0]	98.6 [96.0 ; 100.0]	96.2 [92.8 ; 99.8]	92.1 [83.7 ; 100.0]	89.8 [73.9 ; 100.0]
Q5 – Most deprived (n = 485)	**n (%)**	117 (22.1)	275 (21.4)	275 (21.4)	66 (21.5)	27 (21.8)
	Death at 5 years (%)	27 (28.1)	20 (27.8)	27 (24.3)	4 (17.4)	2 (20.0)
	Net survival at 5 years (%) [95% CI]	78.1 [70.3 ; 86.7]	95.6 [92.5 ; 98.9]	91.9 [88.1 ; 95.8]	96.4 [90.5 ; 100.0]	95.1 [85.3 ; 100.0]

CI: confidence interval.
Q: quintiles.
[a] Results to be interpreted with caution due to the small sample size in each subgroup.

stages detected by screening are mostly stage I.

The study however is limited in that the area-based deprivation index to measure socio-economic level does not take into account the individual data. Indeed, this approach has generated an ecological bias and an intra-IRIS correlation. Another limitation is the lack of deprivation component in the French mortality tables. It is probable that the expected mortality rates among the women living in the most deprived areas have been underestimated and, as a result, the excess of mortality overestimated [26].

A third limitation concerns the lead-time bias. While correction of the lead-time bias represents a strength of this study, since it allowed us to estimate the real effect of the screening on the survival of women, too much correction of this bias could underestimate the difference in the survival time. While the method of Duffy et al. is the most used to correct the lead-time bias, some elements (duration of asymptomatic stage estimated, stage of diagnosis not considered) suggest that there is too much correction in survival time for some women. Moreover, we did not discuss the subject of over-diagnosis in our study.

Finally, an important limitation occurs in the group of non-attender women. Indeed, some of the non-attender women underwent

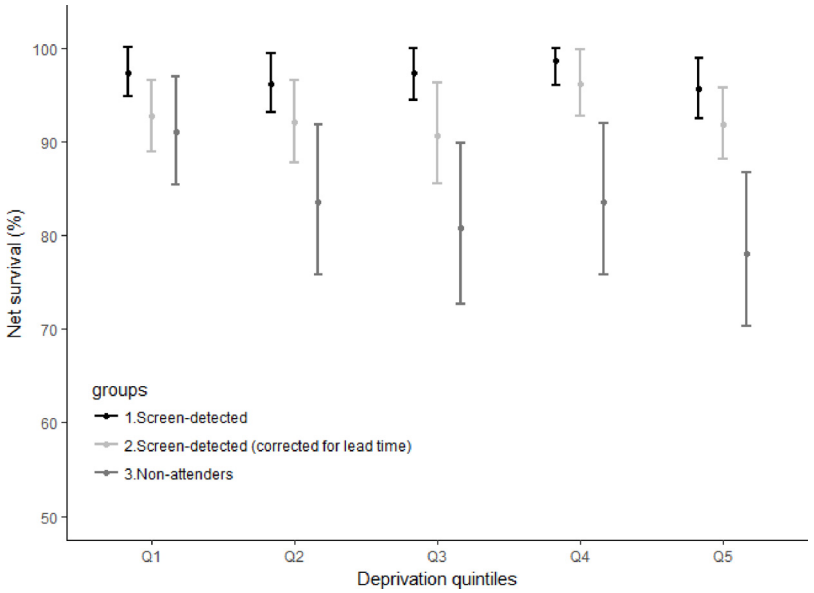

Fig. 1. Estimation of the 5-year net survival rate of women aged 50–74 years with breast cancer between 2008 and 2010, according to the 2 comparison groups and deprivation quintiles in the Gironde department, n = 1,813.

opportunistic screening. This screening coexists with MSP but it is difficult to assess its effectiveness and the actual participation rate [27]. Therefore, in our study, we were only able to compare women who had participated in an MSP with those who had not through data from AGIDECA. This would lead to an overestimation of the survival rate in the group of women who had never participated to any screening. However, since participation in MSPs is greater among most affluent women, we can assume that this is also the case for opportunistic screening. This may explain partly the close survival rates between screen-detected women and non-attenders in the group of most affluent women.

5. Conclusion

In conclusion, we found that women with breast cancer participating in a MSP in Gironde, France, from 2008 to 2010, had improved 5-year net survival rates compared to non-attenders, even after correcting for lead-time bias.

Net survival rates were lower for non-attender women in most deprived areas, whereas screen-detected women had a good survival regardless of deprivation. Indeed, the potential effect of MSP on survival seemed more important for women in most deprived areas.

Breast cancer awareness should be improved within these deprived areas. The introduction of incentive actions in deprived areas could play a role in sensitizing women on the importance of clinical follow-up and early diagnosis of breast cancer. This could promote adherence to MSP and improve survival in case of a breast cancer diagnosis.

Conflict of interest statement

None declared.

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Contribution

Study concepts: G. Coureau; B. Amadeo.
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