Organised population-based programmes and change in socioeconomic inequalities in mammography screening: A 1992–2012 nationwide quasi-experimental study

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ABSTRACT

Organised mammography screening programmes may reduce socioeconomic inequalities in breast cancer screening, but evidence is contradictory. Switzerland has no national organised mammography screening programme, but regional programmes were progressively introduced since 1999, giving the opportunity to conduct a nationwide quasi-experimental study. We examined the evolution of socioeconomic inequalities in mammography screening in Switzerland and if exposure to regional organised programmes reduced socioeconomic inequalities. Data of 10,927 women aged 50 to 70 years old were collected from the Swiss Health Interview Survey, a nationally representative cross-sectional survey repeated 5 times (1992–2012). Socioeconomic characteristics were assessed using education, income, employment status, and occupational class. Adjusted prevalence ratios of up-to-date mammography screening were estimated with Poisson regressions and weighted for sampling strategy and non-participation bias. In the absence of organised screening programmes (1992–1997), prevalence of mammography screening increased by 23% and was associated with tertiary education and working part time. During the period of progressive introduction of regionally organised programmes (2002−2012), prevalence of mammography screening increased by 19% every 5 years and was associated with exposure to regional programmes and with independent/artisan occupations. Tertiary education and working part time were no longer associated. Exposure to organised programmes did not modify socioeconomic inequalities except for employment status: not employed women benefitted more from organised programmes compared to women working full time. In conclusion, socioeconomic inequalities in mammography screening decreased over time but organised programmes did not greatly modify them, except women not employed whose prevalence passed employed women.

1. Introduction

Breast cancer is the major cause of cancer death among women living in Europe (Boyle and Ferlay, 2005; Ferlay et al., 2013), although mortality rates have been decreasing since 1990 (Boyle et al., 2003; Torre et al., 2015). This decline is due to early detection of potential tumours through serial radiological examination (Paap et al., 2011; Weedon-Fekjær et al., 2014) and improved treatments (Autier et al., 2011; Bosetti et al., 2012). Organised screening programmes aimed not only at an early detection of neoplasms, but also at ensuring an equal access to screening service, independent of socioeconomic conditions. A study comparing European countries with different screening models only found socioeconomic inequalities in countries without a nationwide mammography screening programme (Palència et al., 2010).

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However, variations in healthcare systems, health promotion and population health across countries make it challenging to provide convincing evidence of decreasing socioeconomic inequalities related to organised screening programmes. According to country-specific studies (Aarts et al., 2011; Chamot et al., 2007; Pletscher, 2016; Puddu et al., 2009; Renard et al., 2014), the implementation of organised programmes increases the overall mammography screening attendance. Despite this beneficial impact on attendance among women with low socioeconomic characteristics, organised screening programmes simultaneously had higher attendance rates among women with high socioeconomic characteristics (Aro et al., 2001; Vernon et al., 1990). A meta-analysis confirmed the decisive role of a high education level for mammography screening uptake (Damiani et al., 2015), along with other socioeconomic, socio-demographic and health-related factors (Cabeza et al., 2007; Carrasco-Garrido et al., 2014; Chamot and Perneger, 2003; Documet et al., 2015; Eisinger et al., 2015; Kang et al., 2014; Martín-López et al., 2013; Maruthur et al., 2009). Hence, relative and absolute socioeconomic inequalities seem to persist after introduction of organised programmes (Renard et al., 2014; Sandoval et al., 2017).

This study is important for three reasons. First, up to now, there was no data available about a possible impact of organised screening programmes on countrywide socioeconomic inequalities for Switzerland. Second, unlike other European countries, Switzerland does not have a nationwide organised screening programme. According to the federal constitution, the 26 Swiss "cantons" (hereafter, "regions") have the administrative independence to manage their health system. Regions have the responsibility to supervise their public health services (De Pietro et al., 2015) and can choose to implement, or not, such mammography programmes at any point of time. Thus, some Swiss regions do have organised breast cancer programmes, while others still rely on opportunistic screening. Since 1999, organised programmes offering examinations for women aged 50–70 every 2 years were progressively launched, covering a total of 12 regions in 2012 (Bulliard et al., 2012; Bulliard et al., 2003). This ecological quasi-experimental context allows analysing the evolution of socioeconomic inequalities in mammography screening over time in the different regions. Third, there is a need for evaluation of public health interventions on socioeconomic inequalities in health (The Marmot Review, 2010). Such an evaluation is needed in Switzerland since the Swiss Medical Board recently recommended against mammography programmes (Swiss Medical Board, 2013). Using the 1992–2012 Swiss Health Interview Survey (SHIS), we examined the time trend of socioeconomic inequalities in mammography screening in Switzerland and determined if exposure to regional programmes reduced socioeconomic inequalities in mammography screening.

2. Methods

2.1. Study design

We used the SHIS, a cross-sectional survey repeated every 5 years in 1992, 1997, 2002, 2007 and 2012, assessing the health status and health behaviours of the general population living in Switzerland. The SHIS is a nationally representative survey of randomly selected residents following a two-stage stratified sampling strategy (Fedewa et al., 2015; Guessous et al., 2016). The five SHIS waves included a total of 88,355 respondents (overall participation rate: 64.6%; for participation rate by waves, see Table S2 in Supplementary materials). The final sample size was 10,927 after excluding men (N = 40,231), women aged < 50 and > 70 years old (N = 32,709), and respondents with missing data on the outcome variable, on socioeconomic characteristics, on sociodemographic indicators, on health status, and on health services uses.

2.2. Dependent variable

Participants were asked if they received a mammogram (yes, no) and when. We computed a variable of "up-to-date mammography screening", if the last mammogram had been made in the past 2 years. To avoid misclassification due to threshold effect with starting age of screening (50 years), we ran a sensitivity analysis restricting the sample to women aged 52–70. In the last two SHIS waves (2007, 2012), participants were additionally asked for the reason of mammography screening uptake: screening (without symptoms), diagnosis (with symptoms), or another reason. This information was used for sensitivity analysis (see Supplementary materials).

2.3. Exposure to organised mammography screening programmes

Respondents' residency according to Swiss region was used to separate women exposed and not exposed to organised screening programmes (for more details about the progressive implementation, see Table S1 in Supplementary materials). During the period of opportunistic screening only (1992–1997), all participants were assigned to the unexposed group.

2.4. Socioeconomic characteristics

Four socioeconomic characteristics were used: education (primary, secondary, tertiary), monthly household income in USD (≤2000, 2001–4000, 4001–6000, > 6000), employment (full time, part time, not employed) and, among women employed, occupational class (overseer, qualified worker, skilled worker; independent, artisan; employee, non-manual professions; superior and intermediate professions). Educational levels corresponded to the International Standard Classification of Education 1997 (United Nations Educational, 2006). Monthly household income was given in Swiss francs (CHF), as 1 CHF equals approximately 1.16 Euro or 1 USD in 2017. Monthly household net income was weighted for the number of household members and the number of children 14 years old or younger. Not employed included women unemployed, at home, retired and other women out of the labour force. Occupational classes were based on the Erikson social class scheme (Erikson et al., 1979) and were classified according to job duties, setting/environment and management responsibilities. These socioeconomic characteristics refer to the "social and economic factors that influence what positions individuals or groups hold within the structure of a society" (Galobardes et al., 2006).

2.5. Control variables

Due to their potential associations with mammography screening (Cabeza et al., 2007; Carrasco-Garrido et al., 2014; Chamot and Perneger, 2003; Documet et al., 2015; Eisinger et al., 2015; Kang et al., 2014; Martín-López et al., 2013; Maruthur et al., 2009), the following variables were used as covariates: age (50–64, 65–70), nationality (Swiss, not Swiss), region of residence according to language (German, French, Italian), marital status (single, married, widow, divorced or separated), number of people living in the household (1, 2 or more), number of children 14 years old or younger living in the household (yes, no), type of insurance coverage for hospital stay (standard, half-private and fully private), number of close relations providing emotional support (many people, one person, no), self-rated health (very bad, bad, so-so, good, very good), body mass index (underweight, normal weight, overweight, obese), physical symptoms (no or a few, some, important), currently smoking (yes, no), visit to a general practitioner or family doctor in the last 12 months (yes, no).

2.6. Statistical analysis

Socioeconomic inequalities in mammography screening were