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Predictors of non-participation in cervical screening in Denmark

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ABSTRACT

Purpose: The aims of this study were to identify demographic and socio-economic predictors of non-participation in cervical screening in Denmark, and to evaluate the influence of health care use on screening participation.
Methods: A population based register study was undertaken using data from the Central Population Register, the national Patobank, and Statistics Denmark. The study included women aged 25–54 years on 1st of January 2002, living in Denmark during the next 5 years, and without a history of total hysterectomy, $N = 1{,}052{,}447$. Independent variables included age, civil status, nationality, level of education, and use of health care. Associations with non-participation in screening were determined with logistic regression.
Results: Main predictors of non-participation were limited or no contact with dental services (odds ratio (OR) = 2.36), general practitioners (OR = 1.75), and high age (OR = 1.98). Other important factors for non-participation were primary school education only (OR = 1.53), not being married (OR = 1.49), and foreign nationality (OR = 1.32).
Conclusion: A 2–1.5-fold difference in non-participation in cervical screening in Denmark was found across various population sub-groups. Increased screening compliance among women with primary school education only, and limited or no use of primary health care services in general could potentially diminish the current social inequalities in cervical cancer incidence, and thus decrease the overall high incidence of this disease in Denmark.

1. Introduction

Denmark historically had a high incidence rate of cervical cancer at about 30 per 100,000 (World Standard Population, ASW). This rate started to decrease after the implementation of screening, and it has now reached 10 per 100,000 ASW [1,2]. In the period of 2007–2011, an annual average of 373 women were diagnosed with cervical cancer, and 105 women died from the disease [2].

In Denmark, regional screening programs for cervical cancer started in the late 1960s. The first national recommendations on screening were issued in 1986 recommending invitation every third year of all women aged 23–59 years. By 1996, organized screening programs had been implemented in all of Denmark [3,4]. The Danish National Board of Health issued new recommendations on cervical screening in 2007 that were thereafter gradually implemented [4]. Women aged 23–49 years were now offered screening every third year, and women aged 50–65 years now every fifth year. Screening could stop for a woman above the age of 65 years if she had two negative tests in the preceding ten years. Triage with Human Papillomavirus (HPV) DNA test was recommended for women above the age of 30 years with atypical squamous cells of undetermined significance (ASCUS), alternatively triage with HPV mRNA for women with ASCUS or low grade squamous intraepithelial lesion (LSIL). These recommendations were updated in 2012 [5]. Women aged 60–64 could now be screened with an HPV DNA test instead of cytology, and leave the screening program if this test was negative.

Invitations include a personal letter and an information folder that is used nationally. Two reminders are issued to non-replying women [4]. All cytology and HPV-testing is registered in the national Patobank by the woman's personal identification number. All Danish women are targeted by the organized screening program; however, invitations are issued only if no test has been registered within the recommended time intervals. For tests taken without invitation, it is not possible to distinguish screening tests from tests taken due to symptoms. Screening is primarily undertaken by general practitioners (GPs) but also by gynecologists in private practice. Screening, as well as follow-up and treatment, is free of charge for the woman [6].

The incidence of cervical cancer is internationally known to vary, being high in low income countries and low in high-income countries [7,8]. A Danish study from 2008 showed an increasing

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incidence and a decreasing survival of cervical cancer with decreasing socio-economic status [9]. In Denmark, the coverage rate of the screening program is currently 76% [10]. Diverging results have been found regarding the influence of socio-economic factors on participation in cervical screening. Internationally, major differences have been reported [11–16]. However, two European studies based on self-reported data found socio-economic inequality only in screening participation in countries with opportunistic screening, not in countries with nationwide population-based program [17,18].

The aims of the present study were to determine whether individual demographic and socio-economic characteristics predicted participation in cervical screening in Denmark, and to evaluate the influence of use of health care services on screening participation.

2. Materials and methods

2.1. Data

The study population was identified using information from the Central Population Register. This register holds information on date of birth and addresses for all persons with a permanent address in Denmark since 1968. The information is stored using unique personal identification numbers, which are also used in other public registers. We retrieved data on all women aged 25–54 years on 1st of January 2002 and living in Denmark during the entire period 1st of January 2002 to 31st of December 2006. Based on data from the Danish Pathology Data bank women with a history of hysterectomy were excluded, resulting in a study population of 1,052,447 women. Our study population thus included women targeted by the organized screening program during a 5 year period.

Information on screening participation was retrieved from the Danish Pathology Data bank, which has nationwide data on all cervical cytology from Denmark since 2001. This includes tests analyzed in hospital laboratories and private practice, (except cytology from private practice before 2006 in one county), and it includes test taken after invitation as well as tests taken opportunistically. The 868,957 women with at least one cervical cytology test registered during the period 1st of January 2002 to 31st of December 2006 were defined as screening participants, and the remaining 183,490 women were defined as non-participants. We are thereby using "at least one screening smear within these 5 years" as the definition of coverage, as we wished to allow for some delay in participation.

The independent variables included civil status, nationality, education, contact with health care services, and hospitalization (Table 1 for specifications). These data were retrieved from the source registers in Statistics Denmark.

2.2. Statistical methods

Crude, age-adjusted and multivariate-adjusted logistic regression analyses were performed to determine odds ratios (OR) for non-participation in screening by level of the independent variables. In the multivariate-adjusted model we mutually adjusted for age, civil status, nationality, education, hospitalizations, and contact with general practitioners, specialists and dental services. Two-sided 95% confidence intervals (CI) were calculated. The statistical analyses were performed using SAS 9.1.

3. Results

In total, 183,490 (17.4%) women had not had a test done during the observed 5 year period (Table 2). In comparison with all women, the non-participants were more often non-married and of foreign nationality. They were furthermore older, had lower education level, and had less contact with dental services, general practitioners and specialists. The association with days in hospitals was less straightforward.

Table 1
Independent variables included in the analysis.

Name of variable	Measured as
Age	Status 1st of January 2002
Civil status	Status 1st of January 2002
Nationality[a]	Status 1st of January 2002
Level of education (same classification as [34])[b]	Highest obtained, by the end of 2001
Days in hospital	Total amount of days in hospital from the 1st of January 1997 until the 31st of December 2001, i.e. the 5 years preceding the observation period
Contact with primary physician	Contacts during the calendar-year of 2001
Contact with specialist	Contacts during the calendar- year of 2001
Contact with dental services	Contacts during the calendar-year of 2001

[a] All legal immigrants are granted a unique personal identification (CPR) numbers which gives them the same access to health care as any other citizen. Female immigrant/descendent aged 25–54 years, in Denmark, by January 1st 2004, were most often from Turkey, Germany, Bosnia–Herzegovina, Poland, Iraq, and Norway [40].

[b] The grouping of education is a spectrum reflecting the length of the education hold by the person: Lower primary: One to seven years of primary school; Higher primary: Eight to ten years of primary school; Vocational: Three to four years secondary education aiming mainly at practical work: hotels and restaurants, hairdressers, hospitals, etc.; Secretary/sales: Three to four years secondary education aiming mainly at secretarial and sales personnel; Secondary/lower tertiary: Mainly teachers and nurses; Academics: MA, MSc and above; Unknown: Missing data on education; includes also educations otherwise not classifiable.

The mutually adjusted OR of non-participation increased with age, using 25–29 years as baseline (Table 3). Women aged 30–34 and 35–39 years, had ORs of 1.13 (95% CI: 1.11–1.15) and 1.15 (95% CI: 1.13–1.17), respectively. Women aged 40–44 years, 45–49 years and 50–54 years had ORs of 1.27 (95% CI: 1.24–1.29), 1.80 (95% CI: 1.77–1.84) and 1.98 (95% CI: 1.95–2.02), respectively. The mutually adjusted OR of non-participation was 1.49 (95% CI: 1.47–1.51) for non-married women as compared with married women, and 1.32 (95% CI: 1.29–1.34) for immigrants/descendants as compared with Danish women. The mutually adjusted OR of non-participation was higher for women with primary school education only, at 1.53 (95% CI: 1.50–1.56), compared with women with a secretarial or sales education. Using the same baseline, women with secondary/lower tertiary and academic educations, had adjusted ORs of 0.94 (95% CI: 0.92–0.96) and 0.90 (95% CI: 0.88–0.92), respectively, for non-participation.

Women hospitalized for 1–25 days had a mutually adjusted OR of non-participation of 0.93 (95% CI: 0.91–0.94) as compared with non-hospitalized women. Women hospitalized more than 25 days on the other hand had an OR of 1.30 (95% CI: 1.25–1.34) compared with the non-hospitalized women. The mutually adjusted OR of non-participation for women with 0–1 contacts with a general practitioner was 1.75 (95% CI: 1.74–1.77) as compared with women with more than one contact. Concerning contacts with specialists, the mutually adjusted OR of non-participation was 1.14 (95% CI: 1.12–1.16) for women having had 0–1 contacts, as compared with those having more than one contact. Women with no contact with dental services had a mutually adjusted OR of 2.36 (95% CI: 2.34–2.39) of non-participation, as compared with women with contact to dental services.

4. Discussion

4.1. Overall findings

Within the nationwide, population-based, organized cervical screening program in Denmark, non-participation was strongly