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Cervical cancer (over)screening in Belgium and Switzerland: trends and social inequalities

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Background: Cervical cancer screening (CCS) by means of Pap smears has led to a decrease in cervical cancer incidence and mortality. In the absence of organized programmes, CCS is opportunistic in Belgium and Switzerland. This might result in a high level of CCS overuse, as screening practices do not conform to the recommended 3-yearly screening interval and the target age-ranges (Belgium: 25–64, Switzerland: 20–70). This study aimed to assess trends in CCS uptake and overuse in Belgium and Switzerland and their social determinants, in the light of reimbursement initiatives, which were implemented in both countries. **Methods:** Data from five waves of the Belgian Health Interview Survey (1997–2013) (*N*=11 141) and Swiss Health Interview Survey (1992–2012) (*N*=32 696) were used. We performed Poisson regressions to estimate adjusted prevalence ratios (APR), controlled for socio-economic and socio-demographic characteristics and health status. CCS overuse was operationalized as screening more than once every 3 years and screening above recommended age-range. **Results:** CCS uptake remained relatively stable over time, with a mean coverage of 70.9% in Belgium and 73.1% in Switzerland. Educational and income gradients were found in both countries. Concerning CCS overuse, women above screening-eligible age showed consistently high screening rates, but screening within the past year declined significantly in both countries, matching the temporal implementation of the reimbursement initiatives. **Conclusions:** Although no increase in CCS coverage could be established, CCS has become more efficient in both countries as Pap smear overuse at the population level has declined after the implementation of reimbursement measures tackling CCS overuse.

Introduction

Incidence and mortality in cervical cancer have declined since the 1970s in high-income Western-European countries.[1–3] These trends have been linked to the introduction of cervical cancer screening (CCS) by means of Pap smears.[4–6] Consequently, the European Union has recommended 25- to 64-year-old women to undergo CCS screening on a 3-yearly interval.[4] In organized systems, eligible women are periodically invited to undergo screening, whereas in opportunistic systems, the initiative to comply to the screening recommendations is left to physicians and individual women.[7] If women undergo Pap smears more than once within the recommended 3-yearly interval or outside the 25- to 64-year-old target age-range, this could be considered CCS overuse, which has been found to be more likely in opportunistic systems.[4] In the first form of CCS overuse, women within screening-eligible age undergo CCS too frequently.[8–13] In the second form, past research had identified both women below the recommended age[14,15] and women above the recommended age[16–18] for screening. CCS overuse entails several detrimental aspects, such as low cost-effectiveness at population level,[4,19] heterogeneous quality,[20] psychological distress[21] and false positives due to over-diagnosis.[15]

A decline in CCS overuse has been reported in observational and intervention studies in some European countries,[16,22,23] both within and outside of the recommended age-range. In order to further picture trends in CCS overuse and to identify potential pathways to explain a possible reduction in overuse of preventive services, more research is needed.[16] This research offers foothold in this lacuna by (i) making a cross-country inquiry into the evolution of CCS uptake and overuse, and (ii) linking the time trends to government initiatives. This is facilitated by comparing Belgium and Switzerland. These Western-European countries both rely on opportunistic screening,[4,7,24] and have implemented a similar initiative to limit overuse at national level. However, these countries have different preventive healthcare systems. The Swiss healthcare system is more liberal and fragmented between regions than the Belgian system which is more uniformly coordinated by the federal government. The Swiss system also relies much more on out-of-pocket expenditure compared to the Belgian one when considering preventive care.

CCS overuse has been observed in Belgium since the 1990s,[9,25] and has declined from a 3-yearly average of 1.88 smears per women in 2000[26]—1.18 smears in 2010–12.[27] In Switzerland, it was estimated that a screening coverage of ~70% is achieved by the 1–1.2 million Pap smears that are taken annually.[28,29] Nevertheless, 520 000 smears would be enough to cover 100% of the eligible population.[28,29] In both countries, similar policy incentives affecting CCS overuse were implemented. The Swiss government has, according to the 1996 Swiss health insurance law, reimbursed one CCS every 3 years for 18- to 69-year-old women.[30] More than a decade later, in Belgium, reimbursement was limited to one Pap smear every 2 years since 2009, and to once every 3 years since 2013.[27,31] We expect to establish a corresponding impact of these policy measures in both countries. Furthermore, attention is directed towards inequalities in screening uptake. Previous research in Belgium and Switzerland has found that adherence to CCS guidelines is related to the individual's education, financial situation and socio-demographic profile.[4,7,32] Women with the lowest probability of partaking in CCS generally have a lower educational attainment, a lower household income, an older age, no partner and live in a rural area.[4] These disparities are shown to be persisting over time.[7,33,34] Accordingly, we expect social inequalities to be consistent—both for CCS uptake and for CCS overuse.

In summary, this study aims at assessing the prevalence and trends in CCS uptake and CCS overuse in Belgium and Switzerland, in the light of governmental reimbursement initiatives. Furthermore, it builds on previous research concerning the social gradient in preventive health behaviour by examining whether manifestations of socio-economic inequalities are comparable in Belgium and Switzerland.

Methods

Sample

Data used for this study were obtained from the Belgian Health Interview Survey (BHIS) and the Swiss Health Interview Survey (SHIS). Both cross-sectional surveys contain five waves: 1997, 2001, 2004, 2013 for Belgium; and 1992, 1997, 2002, 2007, 2012 for Switzerland. For the BHIS, a random multistage probability sample was drawn from the National Register to select households and their members. Data were collected through face-to-face interviews and a self-administered questionnaire. For the SHIS, respondents were invited for participation based on a stratified random selection. Data were collected through telephone interviews and a self-administered questionnaire. In order to take the national context into consideration, sample age-ranges were defined according to the country-specific screening recommendation guidelines. For Belgium, 9314 women within recommended age (25–64) and 1827 women above recommended age (65–75) were examined. For Switzerland, 30 773 women within recommended age (20–70) and 1923 women above recommended age (71–75) were examined. More information on respondent selection criteria is available (see Supplementary material 1).

Dependent variables

In both national surveys, participants were asked how long ago they had had a CCS. Answers to this question were computed into two dependent variables. At the individual level, the first dependent variable, up-to-date CCS, measures whether the respondent was screened within the last 3 years (yes = 1, no = 0). This dependent variable also corresponds with our first operationalization of overuse, i.e. overuse as screening uptake above the screening-recommended age-range. The outlying age categories were 65–75 for Belgium and 71–75 for Switzerland. Women below screening-eligible age were not taken into account in this research due to insufficient sample sizes for this age-group. At the population level, the second dependent variable, CCS overuse, measures whether the respondent was screened within the last year (yes = 1, no = 0), among women who have been screened within the last 3 years. This dependent variable operationalizes our second definition of screening overuse based on the screening frequency and understands overuse as screening more than once within the recommended 3-yearly time frame.[30,35] Hence, if women answered 'yes' to this question, they were classified in the overuse category. Among the screening women, if the proportion of women who stated that they were screened within the last year was >33.33% (under the assumption of an even distribution over the 3 years) we used this as a proxy indicator of overuse at the population level (for a detailed outline of this operationalization, see Supplementary material 2).

Independent variables

Indicators of interest and covariates were selected based on their potential association with CCS, as indicated by previous research.[7,34] We included the following indicators of interest: education, monthly household income, employment status, age, nationality and urbanization. To control for known associations with CCS, we took into account the following covariates: having a partner, self-rated health, smoking, body mass index (BMI) and having visited a physician within the last 12 months[7,36–38] (for an operationalization of these variables, see Supplementary material 3).

Statistical analyses

Prevalence rates of CCS uptake and CCS overuse were reported using weighted proportions and were stratified by year. Socio-economic inequalities in CCS uptake and CCS overuse were examined by estimating adjusted prevalence ratios (APR) and their corresponding 95% confidence intervals (CI) using Poisson regression models. Robust variance estimators were used to make sure that the errors were not heteroskedastic. Models were adjusted for the above-mentioned independent variables. Survey wave was included in our models as a continuous variable to take fluctuations over time into account. A detection for multicollinearity among socio-economic variables using variance inflation factors showed no issues. Employment status was not included in the model for the 65–75 years old due to too little variation across categories. Trends were examined for both definitions of CCS overuse. Analyses were weighted for survey sampling and non-participation bias and were conducted with SPSS 22 and STATA 15. To assess the robustness of our findings, we replicated the analysis testing different coding schemes for variables containing multiple categories (education with three or five categories, employment in two or three categories and included in the model with women above screening-eligible age, age and income as continuous and categorical variables). We conducted an analysis on the CCS uptake and CCS overuse models with samples limited to women aged 28–64 and 68–75 in Belgium and 23–70 and 74–75 in Switzerland to check for misclassification due to threshold effects. The interpretation of the results remained the same (results in Supplementary material 4).

Results

Pap smear uptake according to participants' characteristics

Table 1 shows that screening coverage in Belgium was higher among women with higher education (79.0%) compared to women with lower (54.3%) or intermediate (69.1%) education. In Switzerland, lower educated women (57.8%) showed remarkably lower screening rates compared to women with an intermediate (72.8%) and a higher level of educational attainment (76.2). The income gradient in CCS uptake was more pronounced in Belgium compared to Switzerland. In Belgium, women with the lowest and highest income showed a difference in screening coverage of about 25% points (first quintile: 54.2%; fifth quintile 79.0%), whereas this difference

Table 1 Weighted proportions[a] of CCS in the past 3 years among 11 141 women aged 25–75 from the BHIS waves and 32 696 women aged 20–75 from the SHIS waves, according to women's characteristics

	Belgium							Switzerland						
Survey wave	**1997–2013**	**1997**	**2001**	**2004**	**2008**	**2013**		**1992–2012**	**1992**	**1997**	**2002**	**2007**	**2012**	
N	**11 141**	**2534**	**2414**	**2330**	**1913**	**1950**		**32 696**	**5469**	**3982**	**7648**	**7066**	**8531**	
	%	**%**	**%**	**%**	**%**	**%**	***P*-values[b]**	**%**	**%**	**%**	**%**	**%**	**%**	***P*-values[b]**
Education							<0.001							<0.001
Lower	54.3	57.0	54.5	50.9	52.9	56.1		57.8	56.4	61.7	59.0	52.9	57.3	
Intermediate	69.1	70.8	66.6	72.0	70.0	66.0		72.8	74.0	78.0	72.5	70.3	70.6	
Higher	79.0	77.4	75.7	80.1	80.0	81.0		76.2	76.7	80.6	77.6	73.5	76.6	
Household income							<0.001							<0.001
First quintile	54.2	54.1	54.4	51.1	53.0	58.5		63.3	60.1	66.6	64.2	66.5	62.0	
Second quintile	60.3	61.0	57.2	59.3	56.9	67.8		71.4	77.8	72.0	71.4	68.4	69.3	
Third quintile	66.1	71.8	61.5	65.0	63.6	67.3		71.4	65.9	79.4	71.3	67.7	72.7	
Fourth quintile	73.5	74.4	71.4	75.3	75.0	72.0		75.1	78.4	77.6	74.4	70.8	74.4	
Fifth quintile	79.0	76.1	75.0	79.1	83.4	80.2		77.8	80.7	83.5	75.7	75.2	77.6	

a: Crude rates, unadjusted for other indicators of interest and confounders.
b: Weighted Pearson chi-square test for the entire studied period. *P*-values are lower than 0.001, which indicate that the categories of the variables are significantly different from each other.

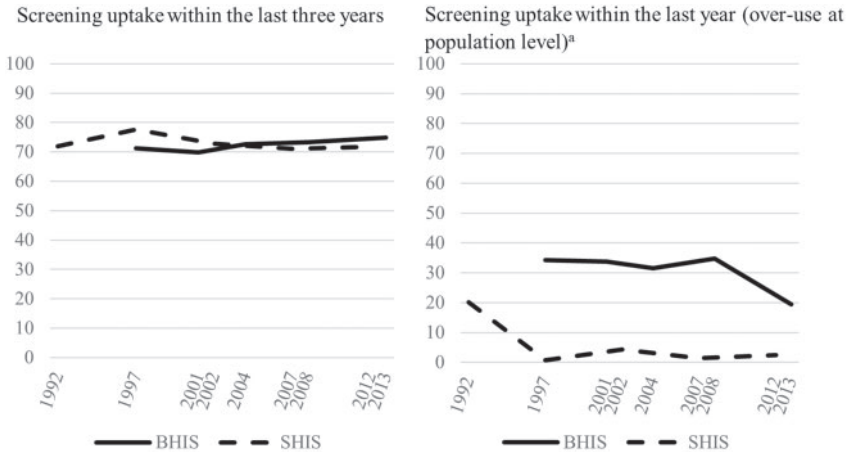

Figure 1 CCS uptake, weighted prevalence among eligible women in Belgium (BHIS waves 1997–2013) and Switzerland (SHIS waves 1992–2012). Screening uptake within the last 3 years, APR for time: Belgium = 95% CI 1.00–1.02, and Switzerland = 95% CI 0.98–0.99 (see table 2). Screening uptake within the last year, APR for time: Belgium = 95% CI 0.94–0.97, and Switzerland = 95% CI 0.90–0.93 (see table 3). APR's adjusted for education, household income, employment status, age, nationality, urbanization, having a partner, self-rated health, smoking, BMI and physician visit in the last 12 months. (a) Women who had a Pap smear within the last year—33.33%

consisted of 15% points in the Swiss sample (first quintile: 63.3%; fifth quintile: 77.8%).

Trends in CCS uptake and CCS overuse

Firstly, CCS uptake among screening-eligible women has remained stable over the five survey waves in Belgium, with a mean screening coverage of 70.9% (figure 1, Supplementary material 5). No increase in screening coverage could be established (APR = 1.01, 95% CI = 1.00–1.02, table 2). The mean screening coverage in Switzerland was slightly higher at 73.1%. Changes over time were significant in Switzerland, with a slight decrease over the studied period (APR = 0.99, 95% CI = 0.98–0.99, table 2). Secondly, CCS overuse among screening-eligible women remained stable in Belgium between 1997 and 2008, with about one-third of the women with an up-to-date Pap smear performing CCS overuse at population level (figure 1, Supplementary material 5). In the subsequent period, between 2008 and 2013, only about one-fifth of the women with an up-to-date Pap smear performed CCS overuse at population level. In Switzerland, CCS overuse was substantial in 1992, where one-fifth of the women with an up-to-date Pap smear performed overuse at population level. This proportion declined strongly in the subsequent years, and almost no overuse was present between 1997 and 2012. CCS overuse declined significantly by 4% (APR = 0.96, 95% CI = 0.94–0.97) in Belgium, and 9% (APR = 0.91, 95% CI = 0.90–0.93) on average by survey wave in Switzerland (table 3). Thirdly, the mean proportion of non-eligible women with an up-to-date Pap smear was 38.0% in Belgium and 38.6% in Switzerland, so screening among women above the recommended age-group was substantial (see Supplementary material 6). These proportions did not change significantly over the studied period (see Supplementary material 7).

Inequalities and trends in CCS and CCS overuse

Cervical cancer screening

In both countries, women with a lower educational level, lower household income, who were older and who were foreign had a lower probability to have had a Pap smear within the past 3 years (table 2). In Switzerland, women living in rural areas had a lower screening prevalence, and in Belgium, CCS was lower among non-employed women. As shown by the time-interaction term, prevalence for employment status fluctuated significantly over the five waves in Belgium ($P < 0.05$), however no clear trend was observed (Supplementary material 8). In Switzerland, the time-interaction term indicated that

Table 2 Weighted and APR for up-to-date Pap smear[a], among 9314 women aged 25–64 from the BHIS and 30 773 women aged 20–70 from the SHIS, according to women's characteristics, with trends over time

	Belgium		*P*-values for trend over 1997–2013[b]	Switzerland		*P*-values for trend over 1992–2012[b]
	Up-to-date Pap smear[a] (yes vs. no)			Up-to-date Pap smear[a] (yes vs. no)		
	APR	95% CI		APR	95% CI	
Socio-economic characteristics						
Education (ref: lower)			0.200			0.513
Intermediate	1.09	1.04–1.15		1.14	1.10–1.17	
Higher	1.17	1.11–1.23		1.13	1.09–1.17	
Household income (ref: first quintile)			0.541			0.191
Second quintile	1.14	1.06–1.22		1.05	1.02–1.08	
Third quintile	1.15	1.07–1.23		1.07	1.04–1.10	
Fourth quintile	1.16	1.08–1.24		1.09	1.06–1.12	
Fifth quintile	1.19	1.11–1.27		1.09	1.06–1.13	
Employment status (ref: employed)			0.024			0.589
Unemployed	1.05	0.98–1.12		0.97	0.91–1.04	
Non-employed	0.94	0.90–0.99		1.01	0.99–1.03	
Socio-demographic characteristics						
Age (ref BE: 25–34; ref CH: 20–29)			0.191			<0.001
BE: 35–44; CH: 30–39	1.01	0.97–1.05		1.15	1.12–1.18	
BE: 45–54; CH: 40–49	1.01	0.97–1.06		1.15	1.12–1.18	
BE: 55–64; CH: 50–59	0.90	0.85–0.96		1.08	1.04–1.11	
CH: 60–70				0.87	0.84–0.90	
Nationality (ref: national)			0.429			0.579
Foreign	0.87	0.80–0.93		0.90	0.87–0.92	
Urbanization (ref: urban)			0.575			0.992
Rural	1.00	0.96–1.04		0.95	0.93–0.97	
Survey wave	1.01	1.00–1.02		0.99	0.98–0.99	
Constant	0.44	0.39–0.49		0.42	0.40–0.45	

Variables used for adjustment: having a partner, self-rated health, smoking, BMI and physician visit in the last 12 months.
a: Up-to-date Pap smear: Pap smear within the last 3 years.
b: *P*-values for time trends were estimated as follows: for each predictor, we estimated separately one multivariate model including all predictors plus the interaction term between the predictor and the wave. We reported only the *P*-values.
APR, adjusted prevalence ratios.

the prevalence for age fluctuated significantly over the five waves ($P < 0.001$), with the gap between women aged 60–70 and those between 20 and 29 diminishing over time (Supplementary material 8).

CCS overuse

For CCS overuse in terms of screening frequency, in both countries, women with an older age and living in a rural area had a lower likelihood of being screened within the last year (table 3). No educational inequalities and negligible income inequalities were found. In Switzerland, foreign women had a higher prevalence of being screened within the last year. For CCS overuse in terms of screening-recommended age, no inequalities were found among women above screening-eligible age (Supplementary material 7). Only in Switzerland, women living in a rural area were less often screened. No significant fluctuations over time could be established.

Discussion

In this study, the evolutions of CCS uptake and overuse were compared between Belgium and Switzerland, which both have opportunistic screening strategies. Trends over a 20-year period were assessed using five waves of the BHIS and SHIS. Pap smear uptake remained relatively stable in both countries over the studied period, with a slight decrease in CCS uptake in Switzerland. CCS overuse at population level declined remarkably in both countries, but not simultaneously. An enquiry into the 3-yearly distribution of up-to-date Pap smears has indicated that CCS overuse at population level has shifted from screening within the last year to screening between 1 year ago and 2 years ago. In Switzerland, overuse at population level declined tremendously between 1992 and 1997 and remained stable thereafter. A similar shift was observed in Belgium in the period between 2008 and 2013. These results match the findings from a study on individual health insurance data in Belgium over the same period,[27] which identified a decline in CCS overuse since 2009. In Belgium, the shift was preceded by the limited-reimbursement initiative implemented in 2009.[27] In Switzerland, the observed phenomenon was preceded by the 1996 Swiss health insurance law, which initiated a regime that reimburses one Pap smear every 3 years for 18- to 69-year-old women.[30] Hence, as part of the shifts from a high proportion of women undergoing CCS within the last year to the second year might be attributed to the reimbursement initiatives in both countries, our findings support the idea that reimbursement initiatives can effectively alter CCS overuse. We recommend further explorations on this relation. Furthermore, our findings are in line with the general declining trend of CCS overuse that has been found in longitudinal data in six observational studies.[16] In spite of the declining trend in CCS overuse at population level, screening uptake among women above screening-eligible age showed no decline over the studied period. Screening uptake above the recommended age-range remains substantial, with nearly half of the 65- to 75-year-old women performing screening in Belgium, and two-fifths of the 71- to 75-year-old women doing so in Switzerland.

Next, we found educational and income gradients in CCS uptake, with higher uptake among higher educated and wealthier women. This finding is in line with previous studies.[4,7,9] Possible explanatory mechanisms for the higher screening uptake of highly educated women are: a higher health literacy and a more future-oriented attitude.[39] These factors promote a more preventive healthcare-oriented decision-making. Furthermore, in our study, no socio-economic gradient in Pap smear overuse could be established, nor in terms of screening frequency, neither in terms of screening above eligible age. No changes over time in socio-economic inequalities were found.

Table 3 Weighted and APR for CCS overuse[a] in the past year, among 6676 women aged 25–64 from the BHIS and 22 099 women aged 20–70 from the SHIS, according to women's characteristics, with trends over time

	Belgium		*P*-values for trend over 1997–2013[b]	Switzerland		*P*-values for trend over 1992–2012[b]
	Overuse[a]			Overuse[a]		
	APR	95% CI		APR	95% CI	
Socio-economic characteristics						
Education (ref: lower)			0.674			0.728
Intermediate	1.03	0.96–1.10		1.00	0.94–1.07	
Higher	1.06	0.99–1.14		1.02	0.95–1.11	
Household income (ref: first quintile)			0.831			0.294
Second quintile	1.10	1.00–1.20		1.00	0.94–1.07	
Third quintile	1.05	0.95–1.14		1.01	0.95–1.08	
Fourth quintile	1.05	0.96–1.15		1.05	0.99–1.12	
Fifth quintile	1.07	0.98–1.18		1.07	0.99–1.15	
Employment status (ref: employed)			0.899			0.352
Unemployed	1.09	0.99–1.19		0.89	0.75–1.05	
Non-employed	1.00	0.93–1.08		1.03	0.98–1.08	
Socio-demographic characteristics						
Age (ref BE: 25–34; ref CH: 20–29)			0.230			0.237
BE: 35–44; CH: 30–39	0.93	0.88–0.99		0.96	0.91–1.02	
BE: 45–54; CH: 40–49	0.95	0.89–1.01		0.95	0.90–1.01	
BE: 55–64; CH: 50–59	0.82	0.75–0.90		0.91	0.85–0.97	
CH: 60–70				0.82	0.75–0.89	
Nationality (ref: national)			0.232			0.180
Foreign	1.03	0.94–1.13		1.06	1.00–1.13	
Urbanization (ref: urban)			0.070			0.936
Rural	0.92	0.87–0.97		0.95	0.91–1.00	
Survey wave	0.96	0.94–0.97		0.91	0.90–0.93	
Constant	0.42	0.36–0.51		0.15	0.13–0.18	

Variables used for adjustment: having a partner, self-rated health, smoking, BMI and physician visit in the last 12 months.
a: Overuse among screeners (<1 vs. 1–3).
b: *P*-values for time trends were estimated as follows: for each predictor, we estimated separately one multivariate model including all predictors plus the interaction term between the predictor and the wave. We reported only the *P*-values.
APR, adjusted prevalence ratios.

Several strengths and weaknesses of this study must be acknowledged. Firstly, a strength of the research lies in having operationalized CCS overuse in a 2-fold manner. Apart from screening outside of the recommended age-range, which had already been established in the literature as an indicator of overuse,[14,17] this study has also addressed CCS overuse in terms of screening frequency at the population level, and combined both approaches. This 2-fold operationalization of overuse is an innovative approach in survey-based research, as it has only been previously included in research where data on individual health records were available.[9,11] Secondly, this research has linked CCS overuse-related policy initiatives to trends in CCS uptake. Nevertheless, in the absence of a direct indicator, we were not able to measure the impact of the policy changes directly. Furthermore, as other institutional factors (prevention policies and healthcare system features) might have played their role in the decreasing CCS overuse, the impact of reimbursement initiatives must be interpreted with caution. We recommend future studies to examine how the shift in CCS overuse at the population level has evolved in the subsequent years, beyond the available survey waves for this research. Thirdly, the estimation of CCS overuse in terms of frequency is an approach at the aggregated level. Consequently, our results do not provide information on overuse at the individual level. Fourthly, the choice of predictors for CCS was based on the availability of comparable questions and indicators in the BHIS and SHIS datasets. Crucial information on incentives for Pap smear uptake is missing, as it was not possible to include indicators, such as having symptoms of cervical lesions, or having had sexual intercourse. Fifthly, in the BHIS and SHIS, the participation in CCS is self-reported information, which might be subject to recall bias and an overestimation of uptake, as people tend to underestimate the time since their previous participation in preventive services. Lastly, women below screening-eligible age were not taken into account in this research due to a lack of respondents in that age-group in the SHIS. It is recommended for future research to include these women at the bottom of the age-spectrum in the assessment of CCS overuse.

In conclusion, this population-based comparative study points at the relevance of restricting reimbursement conditions as a means to reduce Pap smear overuse. Whereas CCS uptake remained relatively stable over the studied period in Belgium and Switzerland, CCS overuse in terms of screening frequency at the population level has shown a declining trend. On the one hand, screening has become more efficient as the amount of Pap smears taken has become less concentrated in a select group of women. At the same time, the overall screening coverage has not increased. Socio-economic inequalities in CCS uptake remain relevant in the Belgian and Swiss opportunistic screening regimes. For CCS overuse, no socio-economic inequalities were identified.

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Data availability

This study used the data from the Belgium Health Interview Survey and the Swiss Health Interview Survey. The Belgian data are available for researchers, but according to the Belgian legislation an authorization has to be obtained from the Belgian Commission for the Protection of Privacy. The Swiss data are available for fee (1600 Swiss Francs, plus 7.7% tax) and users must request permission

from the Swiss Federal Statistical Office (sgb12@bfs.admin.ch). Data must be destroyed after 5 years.

Conflicts of interest: None declared.

Key points

- Restricting reimbursement in Belgium and Switzerland seemed effective in reducing CCS overuse in terms of screening frequency, which implies an improved efficiency from a public health perspective.
- Educational and income gradients were found in CCS uptake in both countries, and persisted over time. This indicates that the Belgian and Swiss healthcare systems need to pay more attention to health inequalities.
- No educational or income gradient was found in CCS overuse.

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