

Trends in educational inequalities in smoking in northern, mid and southern Italy, 1980–2000

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Abstract

Background. We aimed to determine the direction and magnitude of socioeconomic inequality in smoking in Italy over the last two decades, focusing on both national and macro-regional patterns.

Methods. We used data from six National Health Interview Survey from 1980 to 2000, whose sample size ranged between 60,000 and 140,000. We calculated age-adjusted prevalence rates of current smoking and estimated odds ratios (OR) and relative indexes of inequality (with 95% confidence intervals) using logistic regression analysis.

Results. In men aged 25–49, the OR of current smoking of low compared to high educated was 1.26 (95% CI: 1.16, 1.37) in 1980 and 1.71 (95% CI: 1.62, 1.80) in 2000. A reversal of the association between education and tobacco use from positive (OR = 0.43) to negative (OR = 1.12) was found for women of the same age group. Changes in educational inequalities in smoking were similar between different macro-regions for men, whereas among women, smaller differentials over all the study period were found in southern regions compared to central and northern regions, despite similar direction in trends.

Conclusions. The gap between high- and low-educated groups has widened, especially in the youngest generations. Southern regions lag behind central and northern Italy in the progression of the smoking epidemic.

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Introduction

Socioeconomic differences in smoking largely contribute to inequalities in health in several industrialized countries because of the strong impact smoking has on health [1]. Since the social gradient in smoking is not fixed but rapidly changes over time [2], the study of time trends in smoking among different socioeconomic groups can be of interest for several reasons. Firstly, it provides policy-makers with up-to-date information so that adequate countermeasures can be taken; secondly, it permits prediction of future trends; and thirdly, it enables researchers and policy-makers to assess the impact of tobacco-related policies on different popula-

tion subgroups and to identify which interventions are more effective in reducing social inequalities [3–5].

In Italy, socioeconomic inequalities in smoking increased over the period between 1980–1994 but the gender pattern was clearly distinct [6]. Lower-educated men smoked more than those in higher social categories and the gap tended to increase; on the other hand, women of a higher educational level smoked more than those of a lower level and the gap tended to decrease. At the beginning of the 1990s, a positive association between smoking and educational level was reported among women aged 45–74, whereas the association was reverse among younger women [7].

According to the model described by Lopez et al. [8], smoking diffuses within societies like an epidemic with four distinct stages. At first, smoking is a relatively extraordinary behavior, and it is more frequent among higher socioeconomic groups. During the successive three to four decades, this habit becomes more and more widespread among both

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high and low socioeconomic groups. After prevalence rates have peaked at about 50–80% among males, they start to decline, especially among the high educated. Similar patterns are present among females, with a delay of 10–20 years compared to men, as well as a lower peak rate. As the most recent data for Italy were derived from a Health Interview Survey carried out in 1994, it is unknown whether trends in Italy continued to follow the predictions of the model. Furthermore, published studies have predominantly assessed socioeconomic differences in tobacco use at a national level only, all ages together, thus neglecting possible heterogeneity in the social gradient in smoking by age and among northern, mid and southern Italy. Differences in prevalence rates [9–11], as well as in the social and economic contexts between different Italian regions [12], may have interacted with the progression of the epidemic, thus modifying the relationship between social class and smoking. A closer look at the variation within a country in which the economic and social dualism between North and South has deep historical roots [12] may provide support for the epidemic model, or alternatively challenge its predictions. In this study, we tested the hypothesis that the inequality in smoking varied in size within Italy, being larger in the richer and more economically developed North, and smaller in the less developed Southern regions.

Using large-scale surveys covering a long period, we aimed at measuring whether inequalities in smoking have increased or decreased in Italy, focusing on both national and macro-regional levels of analysis. More specifically, our first objective was to assess changes between 1980 and 2000 in the prevalence of tobacco use at national level in different educational groups, with reference to gender and distinct age categories; secondly, we aimed to measure whether (changes in) the social gradient in smoking varied between regions of northern, central and southern Italy.

Data and methods

We used data from six National Health Interview Surveys carried out by the Italian National Statistical Institute (ISTAT) in 1980, 1983, 1986–1987, 1990–1991, 1994 and 1999–2000. The design of these surveys has already been described [6,13]. In brief, these are interview-based questionnaires whose sample sizes were defined to obtain representative estimates of the non-institutionalized population at a regional level. The number of respondents for each interview ranged from about 60,000 (1994) to nearly 140,000 (1999–2000). Non-response rate was lower than 15% in all surveys [6, 14]. We used three of the five macro-regions according to the ISTAT classification (northwestern, northeastern and central Italy) [15], and grouped islands and southern regions (south). The study was restricted to participants 25–79 years of age.

Educational level was used as an indicator of socioeconomic status and measured as the highest level success-

fully completed. We used four different educational classes: less than elementary and elementary, lower secondary, upper secondary and post-secondary. Among older surveys, the educational distribution was highly skewed, with a very small proportion of respondents having a higher education (Table 1). Over the study period, the average education levels of Italian men and women increased. This occurred especially in the younger generations (people aged 25–49 years) and was particularly marked among women.

Our main outcome measure was the proportion of current smokers. We considered both regular and occasional use of tobacco, since this distinction was not made in all surveys. Age-adjusted prevalence rates of current smoking were calculated using direct standardization by 5-year age group, with the Italian population estimates on 1/1/2001 as the standard [15]. To obtain summary measures of inequalities, we compared the lower- and higher-educated groups using two measures of relative effect: the odds ratio (OR) and the relative index of inequality (RII) [16].

The ORs were estimated using a logistic regression model, with the odds of being a current smoker as the dependent variable. Educational level and age were the covariates. In the regression model, educational achievement was categorized in two levels, low (elementary and lower secondary education) and high (upper secondary and post secondary education). Age was used as a nominal variable with 5-year age groups.

A main issue with trend analyses and comparisons between age groups is that educational distributions change over time. To take this into account, we also applied a measure complementary to the OR, the RII. In this measure, the prevalence of smoking is related in a regression analysis to the relative position of persons on the educational hierarchy. Thus, RII takes into account the (changing) distribution of the population in each educational level. Further details on this measure are provided in another

Table 1
Distribution of the population by educational level and age category (Italy, 1980–2000)

Age category and educational level	Percentage (%) and total number of respondents			
	Men		Women	
	1980	1999–2000	1980	1999–2000
<i>25–49 years</i>				
Elementary	47.9	8.7	59.4	11.6
Lower secondary	27.5	40.7	21.7	35.2
Upper secondary	18.6	40.9	14.9	42.4
Post-secondary	5.9	9.7	3.9	10.8
Total	12,265	25,284	12,518	25,816
<i>50–79 years</i>				
Elementary	77.8	57.0	85.7	70.3
Lower secondary	11.2	20.2	8.4	14.7
Upper secondary	7.0	17.0	4.9	11.5
Post-secondary	3.9	5.8	1.1	3.5
Total	10,124	21,937	11,363	24,682

Table 2
Standardized prevalence rates and odds ratios^a of current smoking among men and women by educational level (Italy, 1980–2000)

Age category and educational level	Standardized prevalence rates of current smoking (%)					
	Men			Women		
	1980	1999–2000	Diff.	1980	1999–2000	Diff.
<i>25–49 years</i>						
Elementary	64.7	50.2	–14.5	17.2	24.6	+7.4
Lower secondary	65.2	45.0	–20.2	30.9	27.1	–3.8
Upper secondary	61.6	34.2	–27.4	37.7	24.6	–13.1
Post-secondary	53.6	26.9	–26.7	40.5	21.7	–18.8
OR (95% CI)	1.26 (1.16, 1.37)	1.71 (1.62, 1.80)		0.43 (0.39, 0.47)	1.12 (1.06, 1.19)	
RII (95% CI)	1.41 (1.24, 1.60)	2.89 (2.62, 3.19)		0.21 (0.18, 0.24)	1.19 (1.07, 1.33)	
<i>50–79 years</i>						
Elementary	53.6	25.6	–28.0	6.2	9.2	+3.0
Lower secondary	48.3	26.0	–22.3	19.4	16.5	–2.9
Upper secondary	49.8	24.4	–25.4	22.8	19.2	–3.6
Post-secondary	42.9	24.4	–18.5	25.3	20.0	–5.3
OR (95% CI)	1.24 (1.10, 1.41)	1.08 (1.00, 1.16)		0.26 (0.21, 0.31)	0.52 (0.47, 0.57)	
RII (95% CI)	1.55 (1.29, 1.87)	1.08 (0.95, 1.22)		0.06 (0.04, 0.08)	0.23 (0.19, 0.27)	

^a The odds ratios are calculated by using two broad educational groups (elementary + lower secondary vs. upper secondary + post-secondary). The reference category is the latter group.

publication [16]. Because changes over time for the RII gave results similar to those for the OR, we report the estimates of RII at the national level only, whereas at a regional level of analysis we report the OR only.

Due to data limitations, regional trends were estimated for the period starting in 1983 instead of 1980. To evaluate potential interactions, all analyses were stratified by gender and two broad age groups (25–49 and 50–79).

STATA release 7 was used to perform all analyses [17].

Results

Over the period between 1980 and 2000, prevalence rates of smoking decreased in all educational groups among men (Table 2). Among women, the use of tobacco decreased among the high educated while it increased for the lowest educated.

Among men aged 25–49, the decline in smoking was larger among the high educated, despite the rates of smoking in this group were already lower than those of the less

educated in 1980. The OR of current smoking of lower educated compared to high-educated men aged 25–49 was 1.26 (95% CI: 1.16, 1.37) in 1980 and 1.71 (95% CI: 1.62, 1.80) in 2000. Among women of the same age category (Table 2 and Fig. 1), we found a reversal of the association between smoking and educational level from positive to negative (OR increased from 0.43 to 1.12).

Among older men, ORs decreased over the study period (Table 2 and Fig. 1). Confidence intervals for the ORs did overlap, thus, this trend was not statistically significant. Smoking was more prevalent among high-educated women in the age group 50–79; however, social differentials attenuated over time (OR increased from 0.26 to 0.52).

Table 3 shows the time trends in the prevalence of smoking for men and women aged 25–49 for each macro-region. Among men, trends were similar in all macro-regions, with a decrease in the use of tobacco for all educational levels and larger declines among the more educated. The ORs of current smoking increased over the study period in all macro-regions (Fig. 2). Among 25- to 49-year-old women, the prevalence in tobacco use was on the

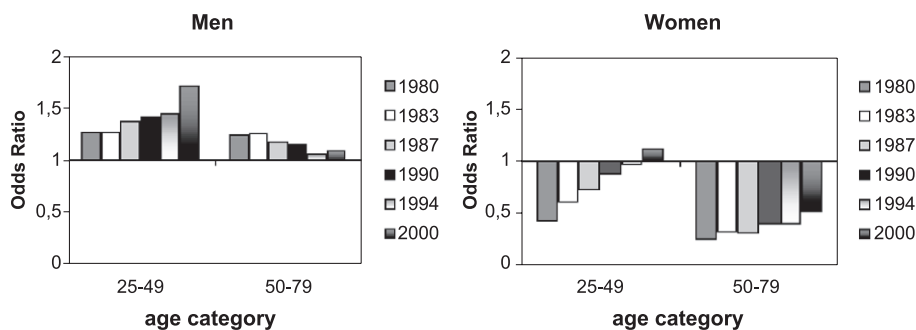


Fig. 1. Odds ratios of current smoking of low vs. high educated (Italy, 1980–2000).

Table 3
Standardized prevalence rates and odds ratios of current smoking among men and women aged 25–49 by educational level (Italian macro-regions, 1983–2000)

Macro-region and educational level	Standardized prevalence rates of current smoking (%)					
	Men			Women		
	1983	1999–2000	Diff.	1983	1999–2000	Diff.
<i>Northwest</i>						
Elementary	60.4	56.0	– 4.4	25.3	28.9	+ 3.6
Lower secondary	52.3	45.3	– 7.0	31.2	32.2	+ 1.0
Upper secondary	48.6	31.9	– 16.7	30.9	23.5	– 7.4
Post-secondary	42.2	23.9	– 18.3	26.8	19.7	– 7.1
OR (95% CI)	1.45 (1.22, 1.71)	1.99 (1.77, 2.24)		0.91 (0.74, 1.11)	1.56 (1.38, 1.78)	
<i>Northeast</i>						
Elementary	47.4	39.7	– 7.7	27.4	33.2	+ 5.8
Lower secondary	49.6	38.0	– 11.6	30.4	28.6	– 1.9
Upper secondary	48.5	31.7	– 16.8	35.7	23.9	– 11.8
Post-secondary	38.0	23.1	– 14.9	30.4	18.7	– 11.7
OR (95% CI)	1.11 (0.96, 1.29)	1.43 (1.27, 1.60)		0.72 (0.61, 0.86)	1.32 (1.16, 1.50)	
<i>Central</i>						
Elementary	58.5	47.9	– 10.6	23.4	26.0	+ 2.6
Lower secondary	58.5	46.2	– 12.3	32.9	34.2	+ 1.3
Upper secondary	54.8	35.2	– 19.6	40.0	27.7	– 12.3
Post-secondary	44.9	27.7	– 17.2	35.8	27.3	– 8.5
OR (95% CI)	1.33 (1.17, 1.52)	1.65 (1.46, 1.86)		0.58 (0.50, 0.67)	1.26 (1.11, 1.44)	
<i>South</i>						
Elementary	62.5	51.2	– 11.3	12.0	21.6	+ 9.6
Lower secondary	61.0	47.4	– 13.6	22.6	22.0	– 0.6
Upper secondary	58.5	36.5	– 22.0	29.9	24.0	– 5.9
Post-secondary	53.7	29.3	– 24.4	30.2	20.9	– 9.3
OR (95% CI)	1.25 (1.08, 1.44)	1.72 (1.59, 1.86)		0.43 (0.36, 0.51)	0.89 (0.81, 0.97)	

rise for the low educated, while it decreased for the high educated. Estimates of ORs differed between macro-regions between 1983 and 2000 (Table 3 and Fig. 2). Fig. 2 shows that the ORs were higher in northern regions than in central and southern Italy for all surveys, suggesting a delay in the trends towards wider differentials. A higher prevalence of smoking in the low educated was already present in 1986 in the northwest, while it emerged in 1994 in northeast and in 2000 in central Italy. In the south, the prevalence rates of low and high educated converged over time, but still in 2000, tobacco use was more common in high-educated women.

Table 4 and Fig. 2 describe trends in smoking prevalence for respondents aged 50–79 for the different macro-regions. Among men, use of tobacco decreased in all educational levels in each macro-region, with larger decreases among the lower educated in almost all of the macro-regions. The ORs decreased in all macro-regions but the decrease did not reach statistical significance. For women of the same age group, social differentials in the prevalence of smoking attenuated over time across all macro-regions, with ORs constantly lower than 1 over the study period. Similar to the pattern observed for younger women, ORs were constantly larger in northern regions and smaller in the south.

Discussion

Summary of the results

In Italy, prevalence rates of smoking decreased in all educational groups in men between 1980 and 2000: among those aged 25–49, the decreases were largest among the high educated; however, among older men, larger declines were observed among the lower educated. Among women, use of tobacco diminished for the high educated and increased for the lowest educated. A reversal of the initially positive association between education and tobacco use was found for women aged 25–49 while in older women the prevalence of smoking was larger among the high educated, with a decreasing gap over time. There was no clear geographical variation in changes in the social gradient in smoking among men. Among women, the ORs of current smoking between 1983 and 2000 were constantly higher in northern regions than in central and southern Italy, suggesting a delay in the trends towards wider differentials.

Evaluation of data problems

We used data from six consecutive Health Interview Surveys, whose large sample sizes enabled us to obtain

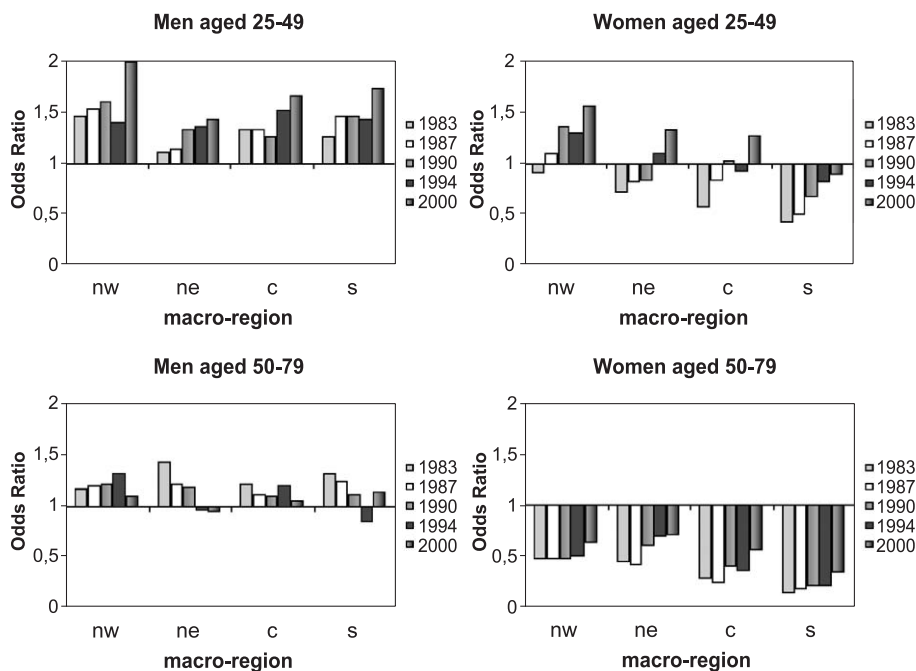


Fig. 2. Odds ratios of current smoking of low vs. high educated (Italian macro-regions, 1980–2000); nw, northwest; ne, northeast; c, central; s, south.

precise estimates of the OR of current smoking with narrow confidence intervals.

Apart from random error, several systematic errors may have biased our estimates. First, the accuracy of self-reporting of smoking has been questioned [18–20]. However, our estimate of the educational inequality in tobacco use would have been biased only if under-reporting of smoking was differential among educational levels. To this regard, there is no consistent evidence in the literature. A study that used information about self-reported smoking and serum cotinine level found no significant differences in the misclassification of smokers between social classes [21]. Another study leads to the opposite conclusion [22]. The observed time-trends may have been an artifact if misclassification of smoking changed differently over time among different educational groups, a possibility that is not very likely.

Our study used information about current smoking only, since not all surveys reported the distinction between regular and occasional tobacco use. It is not clear whether intermittent smoking is equally common among high and low educated, since contrasting results are present in the literature [23,24]. If this was the case, the inclusion of both occasional and daily smokers would not have affected absolute socioeconomic differences, while leading to smaller relative differences.

Increased mortality among smokers could also have affected our estimates, especially in the case of elderly respondents. If smokers had died earlier than nonsmokers, especially in the case of the low educated, it is possible that at each point in time (i.e. for each survey) we would have observed a lower proportion of smokers among the low

educated, thus underestimating the inequality. On the other hand, given the general mortality decline in Italy over the last two decades, the effect of mortality selection might have decreased over time, thus leading to ever less underestimation. This would have resulted in an artificial widening of inequalities in smoking. However, among older men, we observed the reverse trends of decreasing inequalities in smoking.

In conclusion, all these potential biases are not likely to have substantially affected our estimates of trends in smoking inequalities. Other factors need to be considered to explain our findings.

Comparison with other studies

Our results are consistent with those of another study carried out in Italy [6]. Faggiano et al. found that the social gap in the prevalence of current smoking in men widened over the period between 1980 and 1994, with prevalence ratios (PR) of current smoking for the lowest compared to the highest educated increasing from 1.21 to 1.47. A decrease in the “protective” effect which favored less educated women was also reported (PRs from 0.36 to 0.73), a decrease that we found to persist until the year 2000. However, this study did not consider distinct age groups with regard to current smoking. We showed that the socioeconomic inequality in smoking did not increase but reduced among men aged 50–79.

Furthermore, we highlighted the presence of heterogeneity between regions in the magnitude of the social inequality for women. This finding mirrors the results of an international comparative study [7], which reported the presence of

Table 4

Standardized prevalence rates and odds ratios of current smoking among men and women aged 50–79 by educational level (Italian macro-regions, 1983–2000)

Macro-region and educational level	Standardized prevalence rates of current smoking (%)					
	Men			Women		
	1983	1999–2000	Diff.	1983	1999–2000	Diff.
<i>Northwest</i>						
Elementary	43.3	25.1	– 18.2	9.3	11.2	+ 1.9
Lower secondary	41.0	27.0	– 14.0	23.2	17.9	– 5.3
Upper secondary	39.7	24.7	– 15.0	24.4	19.9	– 4.5
Post-secondary	37.5	22.3	– 15.2	14.2	18.7	+ 4.5
OR (95% CI)	1.17 (0.91, 1.49)	1.10 (0.94, 1.29)		0.47 (0.33, 0.67)	0.63 (0.52, 0.77)	
<i>Northeast</i>						
Elementary	39.3	21.2	– 18.1	10.5	11.9	+ 1.4
Lower secondary	41.5	23.1	– 18.4	16.8	19.3	+ 2.5
Upper secondary	31.6	22.9	– 8.7	21.7	19.0	– 2.7
Post-secondary	32.3	23.7	– 8.6	29.3	18.6	– 10.7
OR (95% CI)	1.42 (1.12, 1.80)	0.95 (0.81, 1.12)		0.44 (0.32, 0.61)	0.71 (0.59, 0.87)	
<i>Central</i>						
Elementary	43.3	25.9	– 17.4	7.6	12.7	+ 5.1
Lower secondary	42.4	27.8	– 14.6	18.0	19.3	+ 1.3
Upper secondary	44.2	23.2	– 21.0	24.0	23.0	– 1.0
Post-secondary	34.4	29.4	– 5.0	28.9	24.0	– 4.9
OR (95% CI)	1.21 (1.00, 1.45)	1.05 (0.88, 1.24)		0.29 (0.22, 0.37)	0.56 (0.45, 0.69)	
<i>South</i>						
Elementary	44.3	27.8	– 16.5	2.1	5.4	+ 3.3
Lower secondary	38.5	26.2	– 12.3	15.0	11.8	– 3.2
Upper secondary	37.5	25.7	– 11.8	15.3	16.5	+ 1.2
Post-secondary	34.2	23.2	– 11.0	31.3	19.7	– 11.6
OR (95% CI)	1.31 (1.04, 1.64)	1.14 (1.02, 1.29)		0.14 (0.10, 0.21)	0.34 (0.29, 0.41)	

a North–South gradient in the magnitude of the inequality. Northern countries like Great Britain, Norway and Sweden had larger social differences in smoking than southern countries like Spain, Portugal and Italy. This international pattern was most marked among women of different ages. Our study shows that a similar north–south pattern held in Italy among women over the last two decades.

Comparison with the smoking epidemic model

According to the model described by Lopez et al. [8], as the smoking epidemic proceeds, use of tobacco becomes increasingly more concentrated in the lower socioeconomic groups. Thus, one would expect educational differences to be larger at later stages of the epidemic and among younger generations. Since males take up smoking first, and only later this habit becomes more common among females, larger inequalities would also exist among men during the earlier stages of the epidemic. Most of our findings, namely, the increase in inequality for young men and women over time, as well as the larger inequalities in men and among younger respondents, are consistent with the predictions of the smoking epidemic model. On the basis of this model, Italy is now approaching the end of stage III of the epidemic, in which prevalence rates of

smoking decrease among men and start to decline among women. Northern and central regions are in a more advanced phase of the epidemic compared to southern Italy.

One finding, that is the slightly declining educational gradient in smoking for men aged 50–79, is in contrast with the expectations based on the model. A possible explanation will be described in the following paragraph.

Explanation of the key results

Our study examined period figures, namely, the prevalence of smoking among high and low educated at different points in time. These figures are the results of a complex interplay of inequalities in smoking initiation and cessation rates among different cohorts. Unfortunately, the literature on inequalities in smoking initiation and cessation for different birth cohorts is scarce in Italy. A study carried out in 1986 in Turin found that the likelihood of taking up smoking before the age of 14 was about two times higher among families with a low level of education compared to those with the highest level [25]. With regard to cessation rates, La Vecchia et al. [26] found that quit ratios (i.e. proportion of smokers who quit) were directly related with education in both genders

among participants of the 1983 and 1986 National Health Interview Surveys.

The findings of several studies carried out in Spain, a country with similar sociodemographic correlates of smoking, may shed further light on the trends that we observed in younger age groups in Italy. Widening socioeconomic inequalities in initiation rates were found among men and women from 1950 to 1990 in Spain [27]. Furthermore, differences in cessation rates between high and low educated enlarged from 1987 to 1997 among men and women aged 16–44 [28]. Thus, if similar changes applied in Italy, widening inequalities in initiation rates and, to a lower extent, increasing differences in cessation rates can explain the increase in the inequality in smoking for Italian men and women aged 25–49.

The slight reduction of inequality in smoking for men aged 50–79, which contrasts with model predictions, might be mainly due to a decrease in inequalities in cessation rates between low and high educated. Although the probability of quitting smoking was found to be constantly higher among the highest educated during the 1980s, quit ratios increased over time for all educational groups, thus narrowing the absolute difference between high and low educated [25]. Also in Spain, quit ratios substantially increased between 1987 and 1997 for men and women from all socioeconomic groups [28].

A more general social phenomenon, that is the changing social attitudes towards smoking, underlies the changes in the social distribution of smoking over time. After several reports clarifying the effects of smoking on health were published [29,30], smoking, as a social behavior, has become less acceptable and increasingly stigmatized and regulated. Social norms with respect to smoking and smoking rates first changed in the United States, followed by northern European countries [7]. Higher-educated people were the first to quit smoking [31]. The changes in Italy in the prevalence of smoking during the last two decades may be related to similar factors, namely, a progressively more widespread knowledge of the hazards of smoking and, as a result, an increasing social disapproval of this habit [32].

Other factors may explain why the rates of lower-educated groups did not decrease as those of the higher educated, and these include unfavorable material living conditions and structural barriers to behavioral change [33]. Smoking may act as a mean to cope with stressful living circumstances [34]. The absence of freely available nicotine-replacement therapies in Italy may have also hindered lower social groups from decreasing their smoking rates [35]. It is possible that the differential impact of these factors is larger among younger men, since at older ages the decision to quit smoking may be more determined by the incidence of health problems.

On the other hand, several explanations can account for the North–South gradient in the inequality in smoking observed among women and these mainly relate to both

cultural and material factors. In fact, increasing acceptability of smoking for women has occurred over the last decades [36], with the use of tobacco symbolizing emancipation, independence and freedom [37]. Low-educated women in the south may have been more resistant to adopt a behavior initially acceptable only for men, while women of both upper and lower layers of northern regions may have encountered looser social constraints to their behavior. Low rates of women's participation to the workforce, which exemplify the presence of limitations to their conduct, have first changed in northern regions among higher-educated women [15]. A further explanation to the North–South gradient relates to material circumstances and, particularly, to poverty in the southern regions [12], which may have prevented individuals of lower socioeconomic groups from buying tobacco products in the past.

Conclusion

Our findings suggest that the smoking epidemic is still progressing in Italy, implying widening socioeconomic inequalities in smoking, particularly among younger generations. This progression is occurring with a substantial time lag for central and especially southern regions compared to northern Italy. It is difficult to establish to what extent these trends are susceptible to policy measures, since there was no comprehensive policy against smoking in Italy till recent years [9]. The main challenge to policy-makers remains to reduce smoking rates in the lower socioeconomic groups, and especially to stop a further increase in tobacco use among low-educated women in all regions.

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References

- [1] Jha P, Chaloupka FJ. Curbing the epidemic: governments and the economics of tobacco control. Washington (DC): World Bank, 1999.
- [2] Townsend J. The burden of smoking. In: Whitehead M, editor. Tack-

- ling inequalities in health: an agenda for action. London: King's Fund, 1995. pp. 82–94.
- [3] Townsend J, Roderick P, Cooper J. Cigarette smoking by socioeconomic group, sex, and age: effects of price, income, and health publicity. *BMJ* 1994;309:923–7.
- [4] Mackenbach JP, Gunning-Schepers LJ. How should interventions to reduce inequalities in health be evaluated? *J Epidemiol Community Health* 1997;51:359–64.
- [5] Mackenbach JP, Bakker MJ, Sihto M, Diderichsen F. Strategies to reduce socioeconomic inequalities in health. In: Bakker MJ, editor. *Reducing inequalities in health: a European perspective*. London: Routledge, 2002. pp. 44–5.
- [6] Faggiano F, Versino E, Lemma P. Decennial trends of social differentials in smoking habits in Italy. *Cancer Causes Control* 2001;12:665–71.
- [7] Cavelaars AE, Kunst AE, Geurts JJ, et al. Educational differences in smoking: international comparison. *BMJ* 2000;320:1102–7.
- [8] Lopez AD, Collishaw NE, Piha T. A descriptive model of the cigarette epidemic in developed countries. *Tob Control* 1994;3:242–7.
- [9] Colombo P, Scarpino V, Zuccaro P, Apolone G, Gallus S, La Vecchia C. Smoking in Italian women and men, 2001. *Tumori* 2002;88:10–2.
- [10] Pagano R, La Vecchia C, Decarli A. Smoking in Italy, 1995. *Tumori* 1998;84:456–9.
- [11] Pagano R, La Vecchia C, Decarli A. Smoking in Italy, 1994. *Tumori* 1996;82:309–13.
- [12] Galasso G. The nation and Sicily, modernity and the Mezzogiorno. *Mod Italy* 2002;7:75–84.
- [13] La Vecchia C, Negri E, Pagano R. Recent decline of smoking in younger Italian women. *Int J Epidemiol* 1990;19:221.
- [14] La Vecchia C, Decarli A, Pagano R. Patterns of smoking initiation in Italian males and females from 1955 to 1985. *Prev Med* 1995;24:293–6.
- [15] ISTAT. *Annuario statistico Italiano 2002*. Roma: ISTAT, 2002.
- [16] Mackenbach JP, Kunst AE. Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc Sci Med* 1997;44:757–71.
- [17] StataCorp. *Stata Statistical Software. 7.0 ed.* College Station, TX, 2001.
- [18] La Vecchia C. Smoking in Italy, 1949–1983. *Prev Med* 1986;15:274–81.
- [19] Hatziaendreu EJ, Pierce JP, Fiore MC, Grise V, Novotny TE, Davis RM. The reliability of self-reported cigarette consumption in the United States. *Am J Public Health* 1989;79:1020–3.
- [20] Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. The validity of self-reported smoking: a review and meta-analysis. *Am J Public Health* 1994;84:1086–893.
- [21] Suadicani P, Hein HO, Gyntelberg F. Serum validated tobacco use and social inequalities in risk of ischaemic heart disease. *Int J Epidemiol* 1994;23:293–300.
- [22] Wagenknecht LE, Burke GL, Perkins LL, Haley NJ, Friedman GD. Misclassification of smoking status in the CARDIA study: a comparison of self-report with serum cotinine levels. *Am J Public Health* 1992;82:33–6.
- [23] Lindstrom M, Ostergren PO. Intermittent and daily smokers: two different socioeconomic patterns, and diverging influence of social participation. *Tob Control* 2001;10:258–66.
- [24] Husten CG, McCarty MC, Giovino GA, Chrismon JH, Zhu B. Intermittent smokers: a descriptive analysis of persons who have never smoked daily. *Am J Public Health* 1998;88:86–9.
- [25] Ponti A, Faggiano F. La distribuzione sociale dei fattori di rischio di malattia: il caso del fumo di tabacco. In: Faggiano F, editor. *L'equita' nella salute in Italia*. Milano, Italy: FrancoAngeli, 1994. pp. 187–90.
- [26] La Vecchia C, Negri E, Pagano R, Ferraroni M. Socio-demographic determinants of stopping smoking from Italian population-based surveys. *Soz Praventivmed* 1991;36:154–8.
- [27] Schiaffino A, Fernandez E, Borrell C, Salto E, Garcia M, Borras JM. Gender and educational differences in smoking initiation rates in Spain from 1948 to 1992. *Eur J Public Health* 2003;13:56–60.
- [28] Fernandez E, Schiaffino A, Garcia M, Borras JM. Widening social inequalities in smoking cessation in Spain, 1987–1997. *J Epidemiol Community Health* 2001;55:729–30.
- [29] Physicians RCo JM. *Smoking and health*. London: Pitman Medical, 1962.
- [30] Doll R, Hill AB. The mortality of doctors in relation to their smoking habits: a preliminary report. *BMJ* 1954;1451–5.
- [31] Pierce JP, Fiore MC, Novotny TE, Hatziaendreu EJ, Davis RM. Trends in cigarette smoking in the United States educational differences are increasing. *JAMA* 1989;261:56–60.
- [32] La Vecchia C, Garattini S, Colombo P, Scarpino V. Attitudes towards smoking regulation in Italy. *Lancet* 2001;358:245.
- [33] Stronks K, van de Mheen HD, Looman CW, Mackenbach JP. Cultural, material, and psychosocial correlates of the socioeconomic gradient in smoking behavior among adults. *Prev Med* 1997;26:754–66.
- [34] Graham H. Women's smoking and family health. *Soc Sci Med* 1987;25:47–56.
- [35] Karnath B. Smoking cessation. *Am J Med* 2002;112:399–405.
- [36] Elkind AK. The social definition of women's smoking behaviour. *Soc Sci Med* 1985;20:1269–78.
- [37] Amos A. Women and smoking. *Br Med Bull* 1996;52:74–89.