RESEARCH REPORT

Smoking trends in Italy from 1950 to 2000

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Study objective: To assess how the prevalence of smokers in Italy from 1950 to 2000 has changed, in parallel with law development and the growing attention towards smoking prevention.

Design, setting, and participants: Historical data on smoking trends have been obtained using data collected in 2000 by the National Institute of Statistics. A correction coefficient is proposed to overcome the bias of differential mortality reported in other papers. The sample is made up of 102 261 people aged 15–69 years.

Main results: A general downward trend is seen; there is a more pronounced decrease starting from 1975 to 1980. In both sexes the peak prevalence tends to decrease according to the birth cohort because of the earlier age in which they gave up. A partial exception to the decline of tobacco use in recent years may be made for the 15–19 year-old age group, which has remained stable since 1990.

Conclusions: Although a comprehensive community programme against tobacco was not developed, the different prevention actions implemented in Italy have contributed to a change in attitude and behaviour. The effect of tobacco control strategies implemented in Italy until now is more evident in relation to the breaking of the smoking habit, which happens at an increasingly younger age, although it is not clear how much it is able to prevent people from starting smoking.

A number of studies have analysed the smoking behaviour of men and women in several western European countries highlighting different trends in men and women and in northern and southern Europe.^{1–3}

This article intends to assess how the prevalence of smokers in Italy from 1950 to 2000 has changed, in parallel with law development and the growing attention towards smoking prevention. The analysis of smoking trends gives useful information for assessing future development models related to smoking and its associated diseases, and represents therefore an important tool for planning future “evidence based” actions.⁴

In Europe the first attempts to discourage tobacco use, dating back to the beginning of the 20th century, had little success. During the following decades health education and public health programmes, together with legislative interventions, were planned and carried out in many countries.⁵ Since 1970 the World Health Organisation has officially taken a stand against smoking by adopting various resolutions in favour of tobacco control measures.⁶ The World Health Assembly, according to the resolution of 15 May 1986, recommended member states to implement action strategies capable of reducing the phenomenon, by favouring health education and information programmes for the public, including programmes to help people stop smoking. The active involvement of health professionals and of mass media was also considered to be important.⁷ In 1987 the European Region of the WHO, promulgated the “Charter of Tobacco-Free Europe”, which bound the 32 signatory countries to do all in their power to assure the entire population “to their right to breath fresh, smoke-free air...”.⁸

Italy was one of the first countries to promulgate laws on smoking issues, and incurred many difficulties during enforcement (table 1).

In adopting international and community directives, several restrictive antismoking regulations were issued. Laws aiming at favouring the implementation of health education programmes to spread awareness on health risks attributable to smoking were issued only from 1990. This broad legislative action has not been accompanied by

adequate social and health policies aiming at preventing tobacco use because of the lack of an organic antismoking strategy.^{9–11}

The first Italian national health programme was the 1994–96 NHP. Among the objectives pursued were the prevention of malignant tumours and cardiovascular diseases and the reduction of mortality through health education and primary prevention were foreseen, however, there was no real reference to tobacco prevention as a main risk factor. It was only with the 1998–2000 NHP that the fight against smoking appears among the primary objectives, to be pursued through specific actions including national, regional, and local measures, health education interventions towards students and pregnant women, and the supervision of the correct application of laws in force.

Within this general context, characterised until 2000 by the absence of national prevention resources and of definite smoking monitoring tools, several interventions need to be emphasised: the first campaign at a national level in 1975–1976 that ran with the slogan “whoever smokes is also poisoning you”, various initiatives promoted by the Italian League for the Fight against Cancer and every year since 1987 the celebration of the world “Smoke Free Day”. In Italy a fiscal policy of increasing the price of cigarettes has been in action from the 1970s, contributing to a decrease in smoking.^{1 12}

In this article smoking trends are analysed on the basis of a national survey carried out in 2000. The prevalence of smokers in the years preceding the survey itself is calculated from the data regarding the age at which people started and stopped smoking. A correction coefficient is proposed in the model, which permits the correction of possible deviations because of mortality differences between smokers and non-smokers.

METHODS

Epidemiological survey

The data of the National Institute of Statistics (ISTAT) survey entitled “Health conditions and resort to sanitary services”

Table 1 Main actions against smoking carried out in Italy from 1950 to 2000

Year	Actions against smoking
1962	Law n. 165: forbids advertising campaigns of smoking products
1965	Law n. 584: prohibits smoking in several public places and on public transport
1975–76	First national campaign on mass media with the slogan “whoever smokes is also poisoning you”
1983	Law n. 52: increases economic sanctions
Since 1987	Celebration of the world “Smoke free day”
1990	Law n. 428: regulates the labelling of tobacco products by printing warnings on the amounts of tar or nicotine and the seriously “injures health” messages
1990	DPR n. 309: promotes health education activities and information on damage deriving from smoking in schools, and military schools
1991	DM n. 425: bans all forms of direct and indirect tobacco related advertising and sponsorship
1998–2000	In the national health programme the fight against smoking appears among the primary objectives.

collected from July 1999 to June 2000 were used for this research.

Prospective respondents were identified through a multi-stage sampling representative of the Italian population. Italy was divided into sections identified on the basis of region, and of urban patterns (six urban types according to socio-economic and demographic characteristics). In each section a sample of municipalities was selected with probabilities proportionate to their size. A sample of families was extracted from each selected municipality by random procedure from municipal registers, and all family members were included in the survey. The survey involves a civilian non-institutionalised population. The participants were informed about the aims and methods of the survey through a letter signed by the mayor and by the president of National Institute of Statistics. The survey was conducted by face to face inquiry and by self completed questionnaire; data on smoking habits are self reported.

Data referring to the entire national territory were analysed and a population between 15 and 69 years of age were taken into consideration in this research. The sample is made up of 102 261 people (50 594 men and 51 667 women), weighted to represent a population of 41 860 992 people.

Weighted population was calculated on the basis of a procedure defined by the National Institute of Statistics that assigns a coefficient (weight) to each sample unit. The weights are calculated through a procedure that adjusts the effects of non-response, also taking into account the effect of additional variables available from external sources.¹³

The smoking habit was analysed through the following questions:

- Do you smoke? (yes; no, but I used to smoke; no, I have never smoked)
- How old were you when you started smoking?
- How old were you when you stopped smoking?

In the context of the ISTAT survey smoking includes several forms of smoking (cigarettes, cigars, and pipes). Overall, 86.6% of the sample adhered to the survey.

The prevalence of smokers in 2000 was calculated by dividing the sample into 11 five year birth cohorts (1981–85, 1976–80, 1971–75, 1966–70, 1961–65, 1956–60, 1951–55, 1946–50, 1941–45, 1936–40, 1931–35), corresponding, in 2000, to the following ages 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69.

On the basis of the indications acquired in 2000 regarding the age at which smoking began or was interrupted, the account of the habit was reconstructed for each person and the status of smoker or non-smoker in previous predefined years was determined (1950, 1955, 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995). Prevalence confidence intervals,

although calculated, have not been reported in the text. In fact, because of the large sample size, they are extremely narrow and therefore can be considered non-relevant. Formal statistical tools have not been used in analysing the prevalence trend because of the insufficient number of observed points.

Correction coefficient

The populations of smokers and non-smokers reconstructed for the years preceding 2000 are underestimated because of mortality. If, for example, we consider the 15–19-year old age group, the population of 1995 is based upon “historical data” of people who were 20–24 years old in 2000; the population in 1970 is based upon historical data of people who were 45–49 years old in 2000, and so forth for the other years considered; the more we go back in time, the lower the number of people there are surviving in 2000.

In 1983 research on smoking trends in the USA by Harris proposed a method to overcome the mortality bias based upon the correction of smoking and non-smoking populations, by using survival data of an American epidemiological study.¹⁴

In this work, as distinct survival tables on the smoking habit of the Italian population were not available, US survival tables were referred to, based upon life insurance data and divided according to gender and smoking habits.¹⁵ To avoid any distortion connected to the different life expectations of the two geographical areas, instead of separately calculating the smoking and non-smoking populations as proposed by Harris, a correction coefficient based upon the relation between the survival of smokers and non-smokers is proposed, which may be considered to be reasonably similar in the two geographical areas.

The correction coefficient was calculated for each birth group according to the following formula:

$$\frac{F_x/F_{x+t}}{NF_x/NF_{x+t}} = \text{correction coefficient}$$

where

- F_x = number of smokers at x age
- F_{x+t} = number of smokers at $x+t$ age
- NF_x = number of non-smokers at x age
- NF_{x+t} = number of non-smokers at $x+t$ age

This coefficient represents the excess in the smokers/non-smokers ratio attributable to different mortality.

Consequently, the prevalence of smokers in the years preceding 2000 is calculated as

Table 2 Men: prevalence % of smokers per age group, stratified in years from 1950 to 2000 (vertical), and according to birth cohort (diagonal)

		Prevalence % of male smokers: corrected data (non-corrected data)										
		Age groups (years)										
Birth cohort		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Year	1931-35											
1950	1936-40	33 (27)										
1955	1941-45	26 (23)	64 (57)									
1960	1946-50	28 (26)	58 (53)	70 (63)								
1965	1951-55	29 (27)	62 (59)	64 (60)	70 (64)							
1970	1956-60	29 (29)	61 (59)	65 (63)	64 (60)	68 (62)						
1975	1961-65	29 (28)	62 (61)	64 (63)	64 (61)	62 (58)	64 (58)					
1980	1966-70	27 (27)	57 (56)	63 (62)	61 (60)	60 (58)	56 (52)	59 (53)				
1985	1971-75	25 (24)	51 (51)	56 (56)	58 (57)	56 (55)	54 (51)	51 (47)	49 (43)			
1990	1976-80	21 (21)	48 (48)	50 (49)	50 (50)	51 (51)	47 (46)	46 (44)	41 (38)	38 (35)		
1995	1981-86	20 (20)	43 (43)	47 (47)	45 (45)	46 (46)	45 (45)	42 (41)	38 (37)	33 (32)	30 (28)	
2000		20*	39*	40*	41*	39*	40*	39*	36*	31*	27*	22*

*Data acquired in 2000.

$$\frac{\text{Smokers} \times \text{correction coefficient}}{\text{Smokers} \times \text{correction coefficient} + \text{non-smokers}}$$

Simple mathematical steps show the equivalence of the equation proposed by Harris and the equation for calculating the correction coefficient.

RESULTS

In table 2 the prevalence of smokers among men is reported per age group, stratified in years from 1950 to 2000 (vertical), and according to birth cohort (diagonal); the prevalence seen in 2000 is marked with an asterisk, while the other numbers show the prevalence calculated for the previous years (corrected data per minor survival of smokers—non-corrected data).

The comparison between corrected data and non-corrected data does not show relevant differences. Both data are reported in the tables 2 and 3 for greater detail.

The results point out that in all age groups the prevalence of smokers progressively decreases from the 1931-35 birth cohort to the final 1981-85 cohort.

In the 15 to 19 year old age group the prevalence of smokers presents a slight decline from 1950 (33%) to 1985 (25%), and then settles around 20% in the following years. The older age groups show a stronger decrease in the prevalence of smokers: the initial decline is followed, starting

from 1960-65, by a substantial stability until 1975-80, and then by a constant decrease until 2000. Regarding the 20 to 24 year old age group the prevalence of smokers decreases from 64% in 1955 to 58% in 1960, remains stable until 1980, and then constantly decreases until 2000 (39%).

The prevalence peak tends to decrease according to birth cohort: in the older cohorts (from 1931-35 to 1951-55) the highest prevalence of smokers is in the 25-29 year old age group, while in the younger cohorts (from 1956-60 to 1971-75) the prevalence is brought forward to the 20-24 year old age group. In each year a prevalence peak is seen in the 25-29 and 30-34 age groups; in the following age groups a plateau is seen up to the 40-49 year old age group, followed by a progressive decrease during older age. The plateau becomes steady on lower prevalence values when considering more recent years.

In table 3 the prevalence of smokers among women is reported per age group, stratified in years from 1950 to 2000 (vertical), and according to birth cohort (diagonal); the prevalence seen in 2000 is marked with an asterisk, while the other numbers show the prevalence calculated for the previous years (corrected data per minor survival of smokers—non-corrected data).

The results point out that in all age groups the prevalence of smokers progressively increases from the 1931-35 birth cohort to the 1951-55 and 1956-60 cohorts. In the following cohorts a decreasing trend is seen.

Table 3 Women: prevalence % of smokers per age group, stratified in years from 1950 to 2000 (vertical), and according to birth cohort (diagonal)

		Prevalence % of female smokers: corrected data (non-corrected data)										
		Age groups (years)										
Birth cohort		15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Year	1931-35											
1950	1936-40	3 (3)										
1955	1941-45	3 (3)	11 (10)									
1960	1946-50	4 (4)	12 (11)	14 (13)								
1965	1951-55	7 (7)	17 (17)	17 (16)	16 (15)							
1970	1956-60	11 (11)	26 (25)	22 (21)	20 (19)	17 (16)						
1975	1961-65	17 (17)	33 (32)	31 (30)	25 (24)	21 (20)	18 (16)					
1980	1966-70	17 (17)	39 (39)	36 (35)	32 (31)	25 (24)	22 (21)	17 (16)				
1985	1971-75	15 (15)	38 (38)	39 (39)	35 (35)	30 (30)	24 (23)	21 (20)	15 (14)			
1990	1976-80	12 (12)	32 (32)	36 (36)	35 (35)	32 (32)	27 (27)	22 (21)	17 (17)	13 (12)		
1995	1981-86	13 (13)	24 (24)	30 (30)	32 (32)	32 (32)	29 (29)	25 (25)	20 (19)	16 (16)	12 (11)	
2000		12*	23*	21*	25*	28*	28*	27*	21*	17*	13*	9*

*Data acquired in 2000.

Key points

- An analysis model based upon punctual data from a national survey is presented; this model could be useful in geographical areas where the analysis of trends could be difficult to apply because of the lack of historical data covering a sufficiently long interval of time.
- In recent years our data point out a clear decline of tobacco use in both sexes. A partial exception may be made for the 15–19 age group that has remained stable since 1990.
- The analysis of smoking trends gives useful information for assessing future development models related to the smoking habit and associated illnesses, and represents therefore an important tool for planning future evidence based actions.

In the 15 to 19 year old age group, prevalence increases up to a 17% peak in 1975, which remains stable until 1980; a slight fall is seen until reaching 12% in 1990, followed by a further stabilisation during the following years. In the 20 to 34 year old age groups a regular increase of smokers is seen starting from 1955 with a peak prevalence between 1980–85, followed by a gradual decrease until 2000. For the 35 to 44 year old age groups the peak prevalence is reached in 1990–95, with values equal to 32% and 29% respectively, settling around 28% in 2000.

The older age groups (45–69 years of age), of which only data belonging to most recent years are available, present a constantly rising trend.

As in the case of men, the prevalence peak tends to decrease according to birth cohort: in the older cohorts (from 1931–35 to 1941–45) the highest prevalence is in the 35 to 39 and 40 to 44 year old age group, while in the younger cohorts (from 1956–60 to 1971–75) the age group showing highest prevalence coincides with men (20–24 year old age group). By observing the prevalence during each year, two distinct trends may be seen:

- from 1955 to 1980 the peak prevalence is reached in the 20–24 year old age group, and a decreasing trend is subsequently seen as the age groups grow older;
- from 1985 to 2000 the peaks prevalence are reached at increasingly older ages when considering more recent years.

The different trends of the two sexes explain the different distributions by age of the point prevalences (1950, 1955,..., 2000).

In men the peak prevalence is seen in the 20–24 year old age group, corresponding to the age at which people started smoking, and is followed by a plateau in adult age, and later by a progressive decline in elderly age.

This trend is attributable to the combination of two opposite effects that are nearly equal during adult age:

- the birth cohort effect, as a result of the constant decline of prevalence from the older to the younger birth cohorts;

Policy implications

The analysis of smoking trends gives useful information for assessing future development models related to the smoking habit and associated illnesses, and represents therefore an important tool for planning future evidence based actions.

- the break of the smoking habit effect that makes prevalence decrease as age increases.

In women, the first phase is similar to the men's situation up to 1985, when the peak begins to move towards higher age groups. Unlike men, after reaching the peak, a decline immediately follows. The absence of a plateau is attributable to the fact that overcoming the smoking habit is not counterbalanced, but emphasised, by the birth cohort effect. The intermediate cohorts, which correspond to the current adult age, are those corresponding to the greatest growth of the smoking habit (emancipating increase).

DISCUSSION

In this research historical data on smoking trends have been obtained using data collected in 2000 by the National Institute of Statistics. A correction coefficient that allows us to overcome the bias of differential mortality reported in other papers has been proposed. The application of this analysis model could be useful in geographical areas where, because of the lack of historical data covering a sufficiently long interval of time, the analysis of trends could be difficult to apply.

Using data on smoking from a national survey for the analysis of temporal trends has some potential limitations related to misclassification of short term smokers or light smokers, multiple brief "quits", and age related differences in recall of start and stop times. Short term smokers could not be included in the smokers population; for example, a person who started in 1981 and gave up in 1983 is not included in smokers population, but this does not greatly affect our results, aiming to show a series of point prevalence in selected times. The misclassification in recall of start and stop times, particularly related to the preference for full numbers (last digit 0 or 5), is partially reduced by the length of the age classes, and therefore its effect does not seem relevant for the aims of our analysis. This aspect would become relevant in studies oriented to describe the distribution of start and stop times, and should be corrected through mathematical smoothing tools.

This research on the prevalence of the smoking habit in Italy has shown a general downward trend. In both sexes the peak prevalence tends to decrease according to the birth cohort because of the earlier age in which they gave up.

The smoking trend is different in men and women. In men each birth cohort smokes less than the previous one. Decline therefore is homogenous, although there is a more pronounced decrease starting from 1975 to 1980.

The prevalence is lower among women than among men, but it is necessary to distinguish two temporal phases:

- among women the prevalence of smokers progressively increases up to the 1951–55 and 1956–60 cohorts, in correspondence with the emancipation of women that progressively established itself after the second world war, in particular during the 1960s.¹⁶
- the following generations fall in line with the decreasing trend of men.

These trends fit well with the epidemic model described by Cavelaars *et al.*^{2–3} During the observed period Italy has crossed the stage 3 of the model, with a decreasing trend in men and the peak of women, and moved to stage 4, with a generalised slow decline, parallel for both sexes.^{1–3}

These results suggest that, although a comprehensive community programme against tobacco was not developed, the different prevention actions implemented in our country have contributed to a change in attitude and behaviour, although a cause and effect association can only be supposed.¹⁷ In particular the 1980s represent the turning point of the smoking trend in men. This is at least in part

attributable to providing people with information about tobacco through the mass media that began in the mid-1970s, to the legislation that from this date became more restrictive and limited the environments where people were permitted to smoke, and to the pricing policy that was particularly active from the 1980s.^{1 12 17}

A partial exception to the decline of tobacco use in recent years may be made for the 15–19 age group that has remained stable since 1990. In consideration of this stability, it is reasonable to believe that the decline of smokers in the remaining age groups is attributable mostly to the anticipated breaking of the smoking habit than to the decrease of people who start smoking.

A possible explanation could be found in the aspects of recent prevention advertising campaigns that emphasise the damaging effects of tobacco, including passive smoking. It is reasonable that information of this sort has greater effectiveness on a more mature and responsible adult population, and minor effects on younger populations, naturally less worried about the consequences of their lifestyles.

The effect of tobacco control strategies implemented in our country until now is more evident in relation to the breaking of the smoking habit, which happens at an increasingly younger age, although it is not clear how much it is able to prevent people from starting smoking. It is therefore important to carry out a detailed evaluation of the preventive approach also used in the light of evidence based health promotion.

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