Ann Ist Super Sanità 2021 | Vol. 57, No. 2: 151-160
DOI: 10.4415/ANN_21_02_07

Smoking prevalence among healthcare workers in Italy, PASSI surveillance system data, 2014-2018

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Abstract

Introduction. Data on smoking among Italian Health Personnel (HP) from PASSI surveillance system from 2014-2018 were analysed.

Materials and methods. Among 169,678 working-age respondents, smoking prevalence was estimated among 1,253 Medical Doctors (MDs), 4,840 Non-Medical HP (NMHP), 87,749 Non-HP (NHP) and multivariate analysis was conducted.

Results. Current smokers were 23.0% among HP. Smoking prevalence in MDs (16.0%) was significantly lower than those observed in NMHP (25.3%) and NHP (28.6%). A declining trend was detected in all three groups and was more evident among MDs: from 20.8% in 2014 to 11.5% in 2018. Amongst MDs, smoking was significantly associated with male gender (Adjusted Odds Ratio, AdjOR=1.61), younger age (AdjOR=2.00), residing in South (AdjOR=1.71). Among NMHP, smoking prevalence was associated with low economic condition (AdjOR=1.54) and non-university education.

Discussion and conclusions. To further reduce smoking in HP, it is necessary to develop specific training courses in educational curricula.

Key words

- smoking
- health personnel
- health care worker
- smoking cessation training
- educational curricula

INTRODUCTION

In Italy, tobacco smoking is a major threat to health: it has been found to be the third cause of death and the leading cause of years life lost [1]. Healthcare professionals – physicians included – represent a behavioural model to their patients and have an enormous potential to play a key role in battling the tobacco epidemic, both in terms of spreading and tackling this habit [2]. Within their care function in supporting smokers who want to quit, health personnel indicate and/or offer effective treatments [3-7], and abundant literature shows that medical doctors and nurses who currently smoke are less likely to deal with smoking issues and cessation methods than their non-smoking peers [8-12]. Health professionals can also be a powerful support group to tobacco control policies: they have a role clearly known to tobacco companies which, within their marketing strategies, have been looking after the relationship with physicians in a privileged way [13]. According to the Michael Kunze two-phase model, the maturity of the smoking epidemic in a country could be evaluated by the ratio between doctor and general population smoking prevalence: during the ascendant phase of the smoking epidemic, the prevalence of smokers is higher among medical doctors rather than in other social groups, likely due to the better availability of economic resources (phase 1). Conversely, when the smoking epidemic curve starts to decline, probably for the better access to information on health damage provoked by smoking, the medical category seems to anticipate cessation behaviours and abstinence from tobacco (phase 2) [14]. While in some countries this second phase has already been underway for some time, in Italy it may be in its early stages.

Given that there are few recent studies on this highly relevant issue, we analysed data from the Italian Be-

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havioural Risk Factor Surveillance System (Progressi delle Aziende Sanitarie per la Salute in Italia – PASSI), with the aim to estimate cigarette smoking prevalence among healthcare workers in the timeframe 2014-2018. Moreover, we compared these results with those published in scientific literature on smoking prevalence among Italian health professionals.

MATERIALS AND METHODS

PASSI is the surveillance system that monitors the main health-realted behaviors among adult population, aged 18-69, residing in Italy. PASSI study design is cross-sectional with continouos data collection; the units of data collection are the Local Health Units (LHUs), where public health departments' personnel conduct phone interviews using a standardised questionnaire [15]. In the temporal interval 2014-2018, the response rate was 81%; in 2018, 110 out of 121 LHUs from all Regions and Autonomous Provinces except one, participated in the surveillance, covering more than 90% of the adult popultaion living in Italy.

As shown in *Figure 1*, records gathered in the years 2014-2018 on working-age adults (n=169,678) were considered. We selected 107,468 interviews of participants who reported to be working at that time; from this total number we removed 11% of records because of missing information on the "type of work" (employees/in layoffs/with solidarity contract, self-employment, on non-standard employment contracts) or to the question "What is your work?". Aggregating and recoding data from two variables ("work sector" and "type of job"), 7,805 individuals working in the health sector and 87,749 in other sectors have been identified. Among people reporting to work in the health sector, 1,253 were Medical Doctors (MDs), 4,840 Non-Medical Health Personnel (NMHP) and 1,712 did not practice health professions and were not considered in the analysis. An amount of 296 individuals were excluded

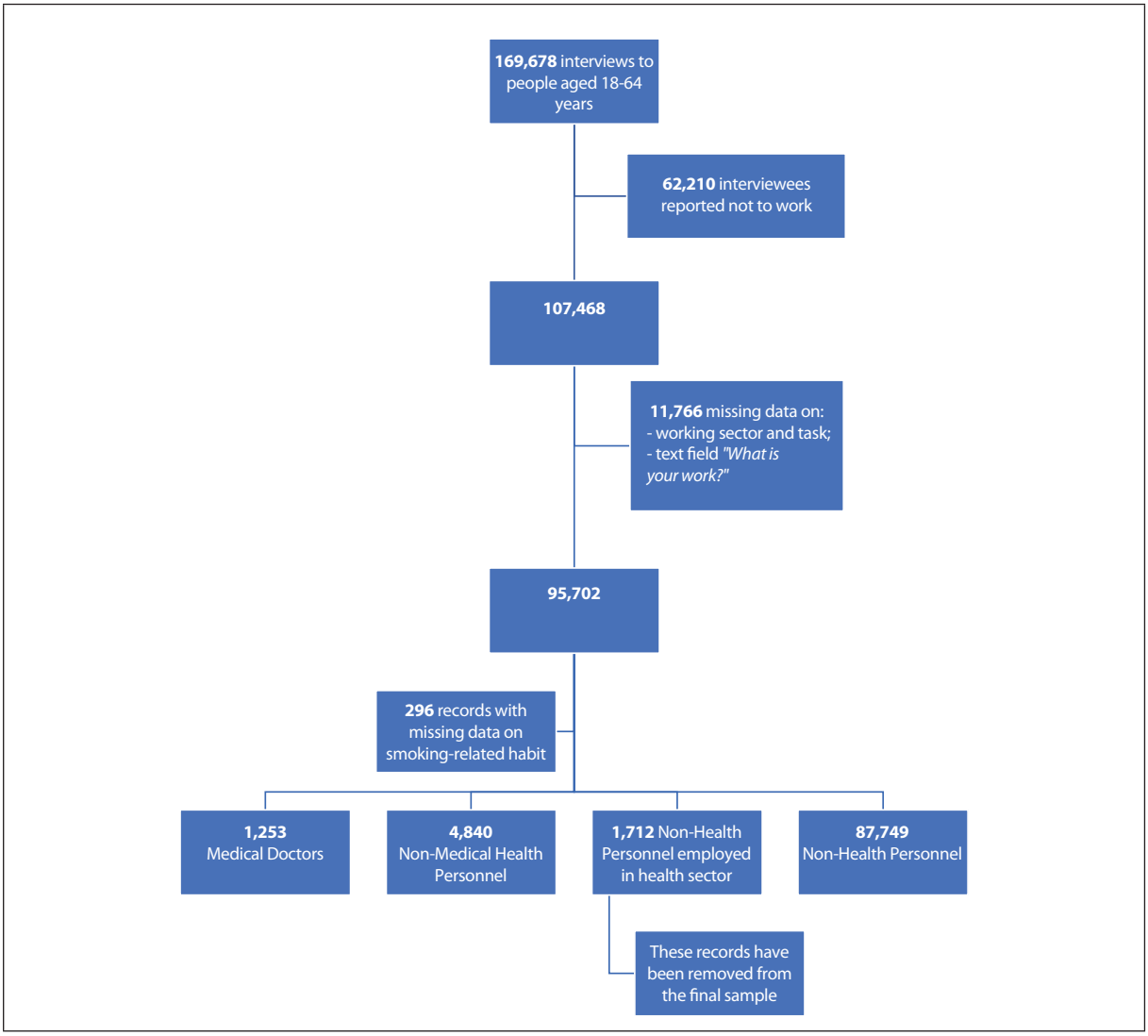

Figure 1
Flow chart describing the selection procedure of individuals belonging to the three professional categories: Medical Doctors (MDs), Non-Medical Health Personnel (NMHP), Non-Health Personnel (NHP) among the working-age respondents to the surveillance system PASSI interview, 2014-2018 (n=169,678).

because additional information on the smoking habit were not available (*Figure 1*). PASSI adopts the definition of current smoker from the World Health Organization, that is "people who declare to have smoked at least 100 cigarettes in their entire life and to be smoking currently or to have quit smoking since less than one year".

Moreover, we conducted a review on articles published from 1985 to 2020 in peer-reviewed journals on smoking prevalence among Italian health care workers.

Statistical analysis

Three categories were considered: MDs, NMHP and workers employed in different sectors from healthcare (Non-Health Personnel; NHP). Prevalence rates with 95% Confidence Intervals (CI 95%) were calculated for these three groups. Prevalences were then stratified by the following socio-demographic variables: age groups, gender, education levels, geographic areas and economic difficulties. This last variable was assessed by asking: "With your monthly household income, how do you manage until the end of the month?" Answers were categorized into two categories: "very easily or easily" = None; "with some/many difficulties" = Some or many economic difficulties. A multivariate logistic regression model was applied to each working category under consideration (MDs, NMHP, NHP) that generated Adjusted Odds Ratio (AdjOR) estimates for interactions and confounding factors. Statistical analysis was performed using Statistical package Stata 16 software (StataCorp LP).

RESULTS

Among NMHP, women were mostly represented (73.6%) than in the other two groups: MDs (44.8%) and NHP (41.9%; *Table 1*). Medical doctors were older, had less economic difficulties and, holding a university degree, had higher education levels than the other two groups. A higher education level was reported among NMHP: 49.2% of them had university degree *vs* 20.0% of NHP (*Table 1*).

In Italy, in the time period 2014-2018, smoking prevalence among healthcare workers (MDs and NMHP) was 23.0%, a percentage which is not statistically lower than that observed among workers employed in other sectors (NHP) (28.6%) (*Table 2*). In MDs, smoking prevalence (16.0%) was significantly lower than that observed among NMHP (25.3%) who, in turn, reached a significantly lower prevalence than that recorded in NHP. From 2014 to 2018, we detected a decrease of smoking prevalence in the three groups, that is even more evident among medical doctors (from 20.8% in 2014 to 11.5% in 2018), with a drop of over 40% in five years, although it does not reach statistical significance due to small sample size. The reduction is less evident but significant in the NHP group (*Figure 2*).

Table 1
Socio-demographic characteristics of the three professional category samples: Medical Doctors (MDs), Non-Medical Health Personnel (NMHP), Non-Health Personnel (NHP). PASSI 2014-2018 (N=93,842)

	Healthcare Personnel (HP)				NHP (n=87,749)	
	MDs (n=1,253)		NMHP (n=4,840)			
	%	*(IC 95%)*	%	*IC 95%*	%	*IC 95%*
Total	1.3	-	5.2	-	93.5	-
Gender						
Men	55.2	(52.5-58.0)	26.4	(25.2-27.7)	58.1	(57.8-58.5)
Women	44.8	(42.0-47.5)	73.6	(72.3-74.8)	41.9	(41.5-42.2)
Age group						
18-34	16.6	(14.6-18.8)	21.3	(20.2-22.5)	23.6	(23.3-23.8)
35-49	29.3	(26.8-31.9)	44.7	(43.3-46.1)	44.3	(43.9-44.6)
50-69	54.1	(51.3-56.9)	34.0	(32.6-35.3)	32.2	(31.9-32.5)
Economic difficulties						
Some or many	10.3	(8.3-12.7)	42.1	(40.3-43.9)	48.7	(48.3-49.1)
None	89.7	(87.3-91.7)	57.9	(56.1-59.7)	51.3	(50.9-51.7)
Educational level						
Up to junior high school	-	(-)	10.0	(9.0-11.1)	28.4	(28.0-28.8)
High school diploma	-	(-)	40.8	(39.0-42.5)	51.6	(51.2-52.1)
University degree	100.0	(-)	49.2	(47.5-51.0)	20.0	(19.6-20.3)
Geografic area						
North	39.0	(35.6-42.4)	43.3	(41.6-45.0)	40.2	(40.0-40.4)
Centre	22.8	(20.3-25.4)	21.7	(20.4-23.0)	25.1	(25.0-25.3)
South and Isles	38.3	(34.6-42.1)	35.0	(33.2-36.9)	34.7	(34.5-34.9)

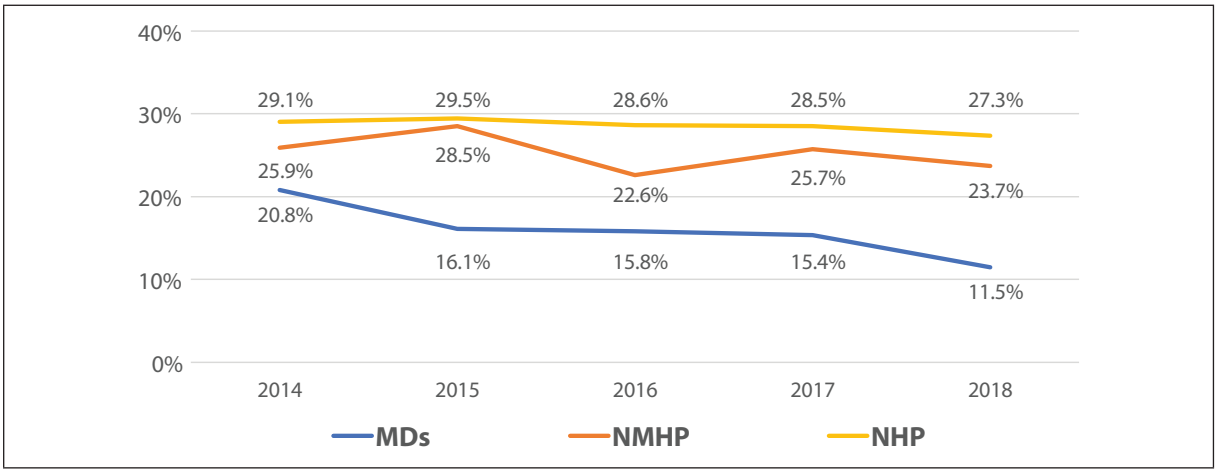

Figure 2
Temporal trend of smoking prevalence among Medical Doctors (MDs), Non-Medical Health Personnel (NMHP), Non-Health Personnel (NHP). PASSI 2014-2018.

Smoking prevalence was lower in women in comparison to men: 13.9% *vs* 18.4% among MDs and 23.7% *vs* 31.9% among NHP, respectively. On the contrary, no differences by gender were found in the NMHP group (*Table 2*). Smoking prevalence was higher among younger MDs, aged 18-34 years (24.4%), that is ten points higher than that recorded in older physicians aged >35 years. In NMHP, there were small and not statistically significant differences by age group. Instead, the older the NHP, the less they tended to smoke, from 35.2% to 24.6%. In all three groups, differences were observed in smoking prevalence according to the perceived economic difficulties (many *vs* none): MDs 22.4% *vs* 15.3%; NMHP 31.0% *vs* 21.0%; NHP 33.4% *vs* 24.1%. Amongst NMHP and NHP, the education gradient was relevant: smoking prevalence was higher among those with lower education levels: 37.4% and 36.4%, respectively. Additionally, we observed a geographic gradient; subjects living in the South reported higher smoking prevalence both among MDs (19.8% South *vs* 12.0% North) and NHP (30.5% South *vs* 26.8% North). This geographical trend was less evident for NMHP (26.4% South *vs* 24.2% North). Smoking prevalence in MDs group was significantly lower, about six percentage points lower than that recorded among graduated NMHP (16.0% *vs* 21.9%). Even though smaller and not statistically significant, a gap in favour of MDs was also found in the comparison with graduated NHP (16.0% *vs* 19.5%).

In the multivariate analysis (*Table 2*), MDs showed a smoking prevalence that was significantly associated with gender (AdjOR=1.61 in men *vs* women), age (AdjOR=2.00 in 18-34 *vs* over 50 years) and geographic area (AdjOR=1.71 Southern *vs* Northern Italy). Amongst NMHP, smoking prevalence was instead associated with economic condition (AdjOR=1.54 in NMHP with some or many difficulties *vs* no difficulties) and education level (AdjOR=1.96 in people with the lowest education level; AdjOR=1.24 in high school graduates *vs* people with university degree). Among NHP, smoking prevalence was associated with male gender, younger age, experiencing economic difficulties, lower education level and living in Central Italy (AdjOR=1.12 compared to North; *Table 2*).

Few and outdated studies on smoking prevalence among health professionals are available (*Table 3*) [16-39]: since 1985, 24 studies have been published, and only eight were carried out in the period 2011-2020 [32-39]. Furthermore, several analyses provided prevalence data referring to few hospitals, and thus were not representative of the Italian health professionals. Another limitation of most of these studies is a response rate lower than 60% of the sample, actually causing a possible bias related to a selection of respondents according to their own smoking habit.

A recent systematic review on prevalence of tobacco use in healthcare workers in each country, reported for Italy a prevalence of 30.6% among men and of 23.7% in women. Anyway, the reference year was outdated (2006; range 2000-2013). Moreover, studies in this review were heterogeneous and mostly of low quality [40]. In order to compare PASSI data here presented with studies carried out on smoking prevalence among healthcare workers in Italy since 1985, we considered papers published after 2000, with a response rate >60% and with a sample size of health professionals coming from at least four hospitals. The following studies were then excluded: four studies since they were published before year 2000 [16-19], six out of 12 referring to the time period 2000-2010 [20-31] because of samples <3 hospitals, and two due to a response rate lower than 60%. Moreover, none of the eight studies carried out in 2011-2020 [32-39] reported a response rate >60% and a greater than three-hospital sample. Considering the remaining studies available for comparison with results from the present study, in 2000, 28% was the smoking prevalence in a sample of General Practitioners (GPs) in Piedmont and Basilicata Regions [24]. In 2000-2002, another sample of GPs in Lombardy Region reported a 22.3% smoking prevalence [25]. Between 2006 and 2008, according to Ficarra *et al.* [32], in seven Italian hospitals located in the three main country areas (North, Centre and South), 33.9% of doctors were

Table 2
Prevalence of smokers and Adjusted Odds Ratio (AdjOR) by socio-demographic characteristics among Medical Doctors (MDs), Non-Medical Health Personnel (NMHP), Non-Health Personnel (NHP). PASSI 2014-2018 (N=93,842)

	Healthcare Personnel (HP)					
	MDs (n=1,253)		NMHP (n=4,840)		NHP (n=87,749)	
	% (IC 95%)	AdjOR (IC 95%)	% (IC 95%)	AdjOR (IC 95%)	% (IC 95%)	AdjOR (IC 95%)
Total	16.0 (13.3-19.1)	-	25.3 (23.7-26.9)	-	28.6 (28.2-29.0)	-
Gender						
Men	18.4 (14.3-23.3)	1.61[a] (1.05-2.46)	24.7 (21.7-28.0)	0.98 (0.80-1.20)	31.9 (31.4-32.5)	1.44[a] (1.38-1.49)
Women	13.9 (9.9-16.7)	1.00[c]	25.5 (23.7-27.3)	1.00[c]	23.7 (23.2-24.3)	1.00[c]
Age group						
18-34	24.4 (14.7-34.2)	2.00[a] (1.10-3.61)	25.3 (22.0-28.5)	1.21 (0.941- 1.56)	35.2 (34.3-36.0)	1.93[a] (1.83-2.03)
35-49	13.7 (9.4-17.9)	1.10 (0.68-1.76)	25.0 (22.6-27.3)	1.02 (0.83-1.25)	27.9 (27.4-28.5)	1.28[a] (1.22-1.46)
50-65	14.7 (11.0-18.4)	1.00[c]	25.6 (22.9-28.4)	1.00[c]	24.6 (24.0-25.3)	1.00[c]
Economic difficulties						
Some or many	22.4 (11.8-33.0)	1.49 (0.81-2.74)	31.0 (28.3-33.7)	1.54[a] (1.28-1.85)	33.4 (32.8-34.0)	1.42[a] (1.36-1.47)
None	15.3 (12.2-18.3)	1.00 [c]	21.0 (19.2-22.9)	1.00[c]	24.1 (23.6-24.6)	1.00[c]
Educational level[b]						
Up to junior high school	-	-	37.4 (32.1-42.8)	1.96[a] (1.47-2.60)	36.4 (35.6-37.1)	2.17[a] (2.04-2.31)
High school diploma	-	-	26.3 (23.8-28.8)	1.24[a] (1.01-1.52)	27.8 (27.3-28.4)	1.46[a] (1.38 – 1.54)
University degree	16.0 (13.3-19.1)	-	21.9 (19.7-24.1)	1.00[c]	19.5 (18.8-20.3)	1.00[c]
Geografic area						
North	12.0 (8.9-15.0)	1.00[c]	24.2 (22.1-26.3)	1.00[c]	26.8 (26.3-27.3)	1.00[c]
Centre	16.4 (12.1-20.7)	1.39 (0.90 - 2.14)	25.5 (22.7-28.3)	1.12 (0.92 - 1.36)	28.9 (28.2-29.6)	1.12[a] (1.07 - 1.17)
South and Isles	19.8 (13.5-26.2)	1.71[a] (1.06 - 2.78)	26.4 (23.1-29.6)	1.06 (0.86 - 1.31)	30.5 (29.7-31.3)	1.05 (1.00 - 1.10)

[a] Significant (p<0.05).
[b] The logistic model for the medical doctors' group does not include the educational level in the covariates.
[c] Reference category.

current smokers, that is much higher than what was documented previously [24, 25]. Such a difference may suppose a greater smoking prevalence among hospital doctors rather than in GPs: even if not ubiquitously, this finding is described elsewhere [41].

DISCUSSION

Among healthcare staff, the lowest smoking prevalence was observed among MDs (16.0%), whereas in NMHP it was 25.3%. Looking at the whole period, even if the trend is not statistically significant, smoking prevalence among physicians has decreased by 45%, from 20.8% in 2014 to 11.5% in 2018. A similar percentage was found by the Italian Federation of General Practitioners (Federazione Italiana Medici di Medicina Generale – FIMMG). Indeed, in 2018, FIMMG conducted a survey on the "Management of smoking in general practice" and interviewing 563 physicians, reported that only 10% were current smokers, whereas 40% declared to have quit and 50% to be never smokers [42].

These findings are encouraging, since smoking status of physicians can impact their professional practice. When physicians smoke themselves, they are in no position to advise or help their patients to stop and they are more likely to believe that they have other priori-

Table 3
Study on smoking prevalence among health care workers in Italy, 1985-2020

Reference	Survey year	Setting/Reference population	Sampling strategy or type of survey	Sample (N)	Type of health care workers (HCWs)	Response rate	Smoking prevalence*
16 Franceschi *et al.*	1985	Pordenone, Friuli Venezia-Giulia	Postal questionnaire	824	Physicians	86%	31%
17 Nardini *et al.*	1995	Attendees at the National Meeting of the Italian National Thoracic Society (AIPO)	Anonymous questionnaire	983	Pneumologists	61.5%	25%
18 Zanetti *et al.*	1996	Three hospitals in Emilia Romagna Region	Anonymous questionnaire	2,453	All	68%	Doctors (31%); nurses (41%); other HCWs (48%)
19 Nardini *et al.*	1996	Sondalo Hospital in Lombardy	Questionnaire sent to all health staff	959	All	57%	Doctors (39%); nursing students or other HCWs (47%)
20 La Vecchia *et al.*	1999	Physicians registered with the Italian Medical Federation (FNOMCeO)	Representative sample by age, gender, and area; phone survey	501	Physicians and dentists	Not reported	Overall (24%); men (24.5%); women (23.1%)
21 Principe	1998	58 Italian Hospitals, involved in the project AIPO – Smoke-free Hospitals	Paper questionnaire	14,348	All including administrative staff	67%	Overall (33.3%); doctors (24.7%); nurses (36.2%); other HCWs (38.4%); administrative staff (32.3%)
22 Invernizzi *et al.*	2000	General Practitioners registered with the Italian GP Society	Questionnaire	428	General Practitioners	100%	24%
23 Muzi *et al.*	2001	One general hospital in Perugia, Umbria	Interviews during occupational health surveillance	2,743	All including administrative hospital crew	100%	Overall (36.5%); doctors (26.3%); %); nurses (38.9%); other HCWs (45.2%)
24 Pizzo *et al.*	2000	General Practitioners in 6 Local Health Authorities: 2 in Turin, Piedmont, 4 in Basilicata	Representative sample; phone interview	729	General Practitioners	72%	28.3%
25 Pretti *et al.*	2000-2002	General Practitioners in Lombardy Region	Anonymous questionnaire	5,348	General Practitioners	67%	Overall (22.3%);
26 Proietti *et al.*	2004	Two general hospitals of Eastern Sicily	Interviews during occupational health surveillance	2,000	Hospital staff	100%	Doctors (27.7%); nurses (36.2%); other HCWs (36.4%)
27 Masia *et al.*	2004	The University Hospital in Sassari, Sardinia	Anonymous questionnaire	1,550	Hospital staff	Not reported	Doctors (21.4%); nurses (35.5%); service staff (40.4%)
28 Negro *et al.*	2007	Trieste Local Health Unit and hospital (Friuli Venezia-Giulia)	Interviews during occupational health surveillance	492	All	100%	37%
29 Copertaro *et al.*	2005	Marche Region	Interviews during occupational health surveillance	262	130 rotating shift nurses and 132 non-shifting nurses	100%	Men (32%); women (23.1%)
30 Incorvaia *et al.*	2008	One public hospital in Milan, Lombardy	Questionnaire	383	All including administrative staff	24%	HCWs (25.8%)
31 Copertaro *et al.*	2008	Marche Region	Interviews during occupational health surveillance	414	193 shift HCWs; 221 non-shifting HCWs	100%	Men (35%); women (23%); shift HCWs (31%); non-shifting HCWs (27%)

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Table 3
Continued

Reference	Survey year	Setting/Reference population	Sampling strategy or type of survey	Sample (N)	Type of health care workers (HCWs)	Response rate	Smoking prevalence*
32 Ficarra *et al.*	2006-08	Seven hospitals in Italy	Questionnaire	1,082	All	98%	Doctors (33,9%); nurses (49.8 %); other HCWs (50.4%)
33 Faggiano *et al.*	2012	Three scientific societies of Italian cardiologists	Web-based survey	5,240	Cardiologists	33.7%	12.4%
34 Frisinghelli *et al.*	2013	Attendees at the 44° National Congress of the Italian Association of Hospital Cardiologists (ANMCO)	Anonymous questionnaire	1,200	Cardiologists	50%	9.5%
35 Nappini *et al.*	2014	Nurses of Pistoia Local Health Unit (Toscana)	Questionnaire	400	Nurses	64%	Men: (33.3%); women (26.3%)
36 Giorgi *et al.*	2015	One hospital in Rome, Lazio	Anonymous questionnaire	320	All	40%	Overall (47%); physicians (42%); nurses (43%); other HCWs and administrative staff (58%)
37 Lina *et al.*	2015	Hospital "National Institute of Cancer", Milan (Lombardy)	Web-based survey	285	Hospitalists	75%	14%
38 Pianori *et al.*	2006, 2011, 2015	Perugia Local Health Unit (Umbria)	Standardised questionnaire	163 (2006), 161 (2011), 151 (2015)	All	100%	33.7% (2006), 36.0% (2011), 33.8% (2015)
39 Provenzano *et al.*	2018	Nursing students at Palermo University, Sicily	Anonymous questionnaire	492	Nursing students	61%	32.9%

* Where not specified, the overall prevalence is reported.

ties than helping patients to quit smoking, given that tobacco and tobacco related diseases are considered as "minor issues" in comparison to other diseases [43]. Doctors should not only have an ethical obligation to act in the best interest of public and patient health but could also play a prominent role in tobacco control as social models, counsellors and the professional category able to lobby for the development of policies [2-12]. Thus, PASSI data provide a more encouraging and updated picture compared to the one outlined by previous studies which reported a higher smoking prevalence in the Italian medical doctors than that recorded in the general population [40, 42].

The present study on the smoking prevalence among healthcare workers in Italy, which is carried out within a population-based survey, is the only one available since 2000 with a large and nationwide sample. The 45% decline in smoking prevalence recorded among MDs in the present study (from 20.8% in 2014 to 11.5% in 2018) seems to belong to a decreasing trend that started earlier, looking at the smoking prevalence of 28% recorded in 2000 among GPs [23] (*Figure 3*). This declining trend is around two times higher than that observed in Italy among the general population in the same period: a 22% decrease from 2001 to 2019 among people aged >14 years, according to ISTAT data; a 16% reduction from 2008 to 2019 among Italian adults aged 18-69 year, according to the PASSI Surveillance System data (about 35,000 people each year) (*Figure 3*).

Consistently with the estimates from the PASSI surveillance system, in the last years in high-income countries, smoking prevalence among health professionals has been declining constantly, with a pooled prevalence, estimated by a meta-analysis of studies carried out in the period 2011-2015, of 19% (CI 95% 15-22%), that is little lower than the percentage of the present study (23%; CI 95%: 22%-29%) [40]. In some countries, smoking prevalence in healthcare workers was significantly much lower, such as in the USA, with 7.2% in 2013 [44], or in Belgium in 2011 reaching 10% in men and 5% in women [40]. Evidence from our study about a lower smoking prevalence among medical doctors compared to other healthcare professionals (16% *vs* 25%) is consistent with other Italian and international studies [18, 19, 40]. In

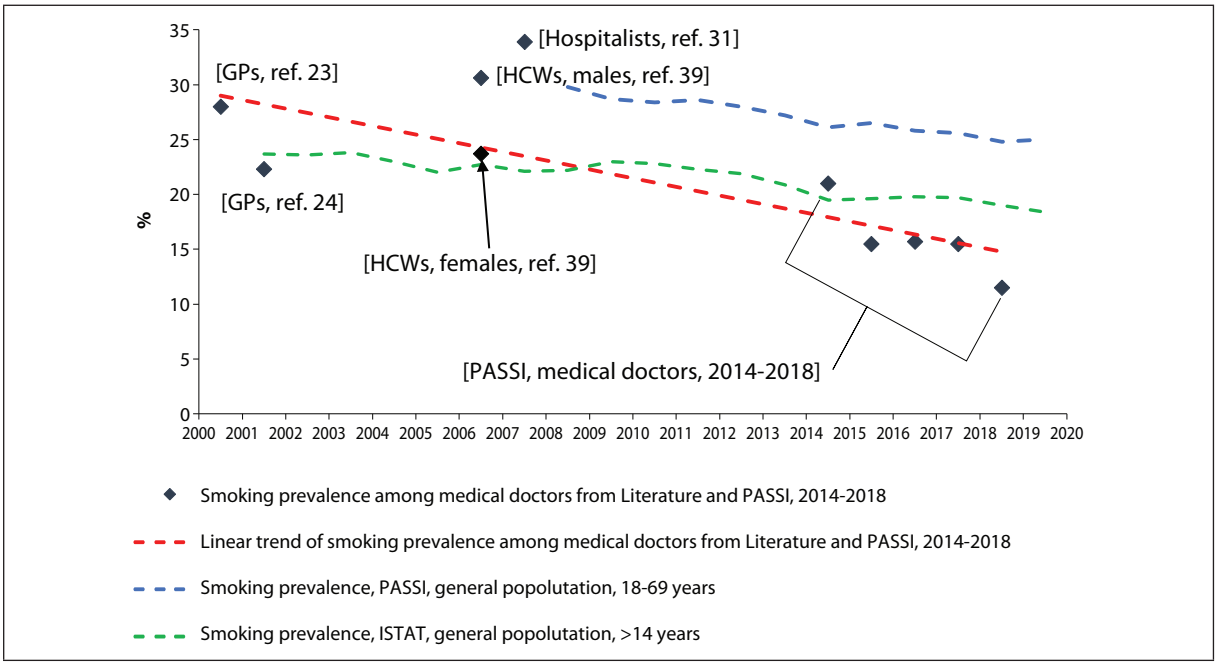

Figure 3
Data from literature, PASSI included, on temporal trend of smoking prevalence among medical doctors in Italy within the last two decades. Sources: ISTAT and PASSI. General Practitioners (GPs), Health care workers (HCWs).

the present analysis, the NMHP group is heterogeneous because it includes nurses, auxiliary personnel, technicians and health assistants, biologists and chemists. For this reason, within this group, important socioeconomic differences occur, both in terms of educational grade and perceived economic difficulties. Additionally, tobacco smoking among doctors is associated with demographic factors (gender, age), whereas in other healthcare workers it is mainly related to socioeconomic level, such as education and economic difficulties. This is likely due to the greater homogeneity of the medical category in socioeconomic characteristics. During the last 20 years, smokers with higher education levels were more likely to quit smoking and thus they recorded lower prevalences [45, 46]. In high-income countries, where tobacco control policies are well developed, medical doctors recorded significantly lower smoking prevalence in comparison to other university graduates [40]. In Italy, this declining trend has just started; as reported in the present study, in 2014-2018 smoking prevalence for MDs was 16%, while in graduated NMHP and NHP it was 21.9% and 19.5%, respectively.

Limitations and strengths

The PASSI surveillance system gathers self-reported data during phone interviews which are based on a standardised questionnaire that is administered by public health professionals to a representative sample of the adult population living in Italy. This kind of information may be affected by bias. In particular, on smoking, social desirability could occur because of the reticence to declare a behaviour that is prone to social disapproval, and healthcare professionals may feel this issue more strongly. However, in the PASSI questionnaire, questions regarding smoking habits are not asked immediately after those regarding socio-demographic and working characteristics, and this could be a strong protective factor from the social desirability bias.

Additionally, the NMHP is quite heterogeneous, since it includes several professional categories, by educational level or type of work.

A limitation to the national representativeness of the data sample is that Lombardy Region did not participate to PASSI Surveillance System, accounting for about 11% of PASSI reference population. However, it is worth to note that in the first years of PASSI Surveillance System, when five LHUs from Lombardy participated in the surveillance, the regional smoking prevalence was similar to those observed in other Northern Italy Regions.

A main strength in the PASSI, is its protocol that achieves a high response rate (81%) due to the standardized procedures of contacts and recall techniques which ensure minimisation of selection bias [40].

CONCLUSION

Smoking behaviour in healthcare workers is important because they represent a model to the general population. Over the last two decades in Italy, a downward trend can be observed in the medical profession, while only a small hint of a reduction has been observed among other health professionals. In order to achieve a further decrease in smoking prevalence among healthcare workers, especially among non-medical health care workers, specific training on the harms of tobacco smoke and on smoking cessation methods should be developed in health professions curricula, both undergraduate and postgraduate.

Acknowledgments

The authors are grateful to all the regional and local coordinators and interviewers of PASSI surveillance, who contributed to the data collection. A special thanks goes to the PASSI coordinating group for their competence and commitment.

Conflict of interest statement

All authors declare that they have no conflict of interest.

This research received no specific grant. PASSI Surveillance is coordinated by the Italian National Institute of Health and it is supported by the Italian Ministry of Health/National Centre for Disease Prevention and Control.

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Authors' contributions

VM, GG, PDA, GC, MM conceptualized and designed the study. VM and RG analysed the data. PDA, VP, VM and GG drafted the manuscript. PDA, BC and MM contributed to the data interpretation and reviewed the manuscript. MSC and GG critically reviewed the manuscript approved the final version.

Received on 29 January 2021.
Accepted on 22 April 2021.

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