Prevalence of tobacco use in healthcare workers: A systematic review and meta-analysis

Kapka Nilan1*, Tricia M. McKeever1*, Ann McNeill2*, Martin Raw3,4*, Rachael L. Murray1*

1 UK Centre for Tobacco and Alcohol Studies, School of Medicine, Clinical Sciences Building, Nottingham City Hospital, University of Nottingham, Nottingham, United Kingdom, 2 UK Centre for Tobacco and Alcohol Studies, Institute of Psychiatry, Psychology & Neuroscience (IoPPN), King’s College London, London, United Kingdom, 3 NYU College of Global Public Health, New York University, New York, New York, United States of America, 4 NYU Medical School, New York University, New York, New York, United States of America

* These authors contributed equally to this work.

* k.nilan@hotmail.com (KN); rachael.murray@nottingham.ac.uk (RLM)

Abstract

Objectives
To estimate tobacco use prevalence in healthcare workers (HCW) by country income level, occupation and sex, and compare the estimates with the prevalence in the general population.

Methods
We systematically searched five databases; Medline, EMBASE, CINHAL Plus, CAB Abstracts, and LILACS for original studies published between 2000 and March 2016 without language restriction. All primary studies that reported tobacco use in any category of HCW were included. Study extraction and quality assessment were conducted independently by three reviewers, using a standardised data extraction and quality appraisal form. We performed random effect meta-analyses to obtain prevalence estimates by World Bank (WB) country income level, sex, and occupation. Data on prevalence of tobacco use in the general population were obtained from the World Health Organisation (WHO) Global Health Observatory website. The review protocol registration number on PROSPERO is CRD42016041231.

Results
229 studies met our inclusion criteria, representing 457,415 HCW and 63 countries: 29 high-income countries (HIC), 21 upper-middle-income countries (UMIC), and 13 lower-middle- and low-income countries (LMLIC). The overall pooled prevalence of tobacco use in HCW was 21%, 31% in males and 17% in females. Highest estimates were in male doctors in UMIC and LMLIC, 35% and 45%, and female nurses in HIC and UMIC, 21% and 25%. Heterogeneity was high ($I^2 > 90\%$). Country level comparison suggest that in HIC male HCW tend to have lower prevalence compared with males in the general population while in...
females the estimates were similar. Male and female HCW in UMIC and LMLIC tend to have similar or higher prevalence rates relative to their counterparts in the general population.

Conclusions

HCW continue to use tobacco at high rates. Tackling HCW tobacco use requires urgent action as they are at the front line for tackling tobacco use in their patients.

Introduction

As health experts and promoters, healthcare workers (HCW) have an important role to play in curbing the global tobacco epidemic [1]. HCW are well placed to promote smoking cessation and treat tobacco dependence in their patients, following evidence-based tobacco cessation guidelines [2,3]. The WHO Framework Convention on Tobacco Control (FCTC) Article 14 specifically stress the importance of HCW being role models and setting an example by not using tobacco [4]. Currently the prevalence of tobacco use in HCW worldwide is unknown.

Previous reviews of the literature reported historical declines in prevalence of smoking among physicians starting in the 50s and 60s in the US, Australia and New Zealand [5–7], and there is some evidence that prevalence is decreasing in nurses in the US and New Zealand [8–10]. A wider international review of tobacco use in the medical profession found large variation in smoking prevalence in the late 90s, with rates of below 5% in the US and UK physicians, and above 30% in France, Italy, China [11]. A multi-country review of European GPs’ involvement with provision of smoking cessation reported smoking rates of above 40% among GPs in Bulgaria, Greece and Slovakia in the early 2000s [12]. A recent international review of nurses’ attitudes to smoking and smoking cessation (2015) found female nurses’ smoking rates to range from as low as 2% in China to as high as 25.8% in Northern Ireland, and above 30% in Italy, Serbia and Spain [13]. Another international review of physicians’ tobacco use and smoking cessation practices between 1987–2010, reported regional variation in smoking, with rates of 37% in Central and Eastern Europe, 29% in Africa, 25% in Central and South America, and 17.5% in Asia [14].

Tobacco use data on other healthcare professionals were generally lacking and there were no recent estimates of prevalence of tobacco use in HCW across occupation and country level.

We aimed, therefore, to systematically review literature published since 2000 that report tobacco use in any HCW population in any country, and provide estimates by country income level, sex, and occupation. The second aim was to compare smoking prevalence in HCW to the prevalence in the general population at country level.

Methods

Search strategy and selection criteria

We conducted a systematic review and meta-analysis following PRISMA and GATHER guidelines [15,16]. All primary studies from any country and in any language that reported tobacco use in health care populations directly involved in the delivery of health care services to patients (physicians, nurses, dentists, pharmacists, and allied health workers) were eligible for inclusion in the review. First, we searched five electronic databases (MEDLINE, EMBASE, CINHAL Plus, CAB Abstracts, and LILACS) and the WHO Global Health Observatory data repository. A search strategy was developed for each database with a combination of free text
and controlled vocabulary (MeSH terms). Search terms included ‘physician’, ‘general practitioner’, ‘medical doctor’, ‘nurse’, ‘pharmacist’, ‘dentist’, combined with terms for tobacco use and tobacco, such as ‘smoking’, ‘tobacco’, ‘cigar’, ‘shisha’, ‘water pipe’, ‘smokeless tobacco’, adapted for each database. An example of the search strategy used for MEDLINE is available in S2 Appendix. Second, reference lists of publications retrieved in the first step and relevant review papers were screened for relevant studies. The latest search was run on 14 March 2016. Title and abstract screening were performed by two researchers (KN, TM) independently and any conflicts resolved by discussion. If agreement were not reached, a third reviewer was consulted (RM); duplicates and records that did not meet eligibility criteria were excluded at this stage. The full text of potentially eligible abstracts was retrieved, and those that could not be accessed or translated were excluded. Conference abstracts that contained relevant data were included.

Study selection, data extraction and quality assessment
Three researchers (KN, RM, TM) assessed study quality and extracted relevant data independently in pairs, using a standardised data extraction and quality assessment criteria form. Studies were assessed against nine criteria, worth one point each, equally weighted and included selection and representativeness of the study participants, response rate, reporting and measuring tobacco use, research finding and conflict of interest. Data and study scores were reviewed and disagreements resolved by discussion.

We extracted data on number of participants in the study, sex, occupation, and prevalence of tobacco use. We used current, former and never smoker categories; occasional users were allocated to the current smoker category. We used the terms ‘tobacco use’ to cover any tobacco use (cigarettes, water pipe, smokeless tobacco). Studies that reported combined prevalence for more than one occupational category, or unspecified HCW or mixed hospital personnel, were assigned to a ‘mixed’ category. Studies including healthcare professionals who were not medical doctors, dentists, nurses or pharmacists were assigned to an ‘allied’ category. Studies with prevalence data for two or more defined HCW categories, year or country, were extracted multiple times. When there were multiple studies with prevalence data from the same cohort, we included only one study per cohort, selected on the basis of the study sample size and its overall quality. For studies that did not specify the sample size we used the median sample size calculated from all studies (n = 375). Where studies did not specify the year of data collection, we assigned the year before the study was published as the year of data collection. Full text studies that contained prevalence data prior to 2000 were excluded from the meta-analyses.

Data analysis
We grouped the studies by country income level according to the WB income classification for July 2016 fiscal year: high-income countries (HIC), upper-middle income countries (UMIC), lower middle-income countries (LMIC) and low-income countries (LIC). Due to a low number of studies from LMIC and LIC we combined them under lower middle-income and low-income countries (LMLIC) category. We conducted random effect meta-analyses to obtain pooled prevalence estimates by WB income level with 95% Confidence Interval (CI). Heterogeneity between studies was assessed using the $I^2$ statistic. We performed subgroup analyses by HCW occupation and sex, and sensitivity analyses by quality score (grouping studies below and above the mean score) and year of data collection, to explore the effects of heterogeneity. All analyses were conducted in Stata 14.
In the second step of the analyses, we estimated the mean prevalence in male and female HCW by country. WHO Global Health Observatory tobacco use prevalence data in adult males and females for 2015 were used for country level comparison.

**Results**

**Study selection**

We identified 12662 records, 229 of which met our inclusion criteria [17–245]. 55 of the selected studies contained prevalence data on more than one HCW category or year, hence the total number of data records included in the meta-analyses was 296 (171 from 29 HIC, 92 from 21 UMIC and 33 from 13 LMLIC) with prevalence data on 457,415 HCW collected between 2000 and 2014 (Fig 1).

HCW occupation categories included in studies were medical doctors (n = 122), nurses (n = 65), allied (n = 16), dental (n = 14), pharmacy (n = 8), and mixed (n = 71). Most studies reported cigarette smoking (n = 235), three studies reported water pipe smoking [72,117,118] and three smokeless tobacco [42,96,228].

Study sample sizes ranged from 32 to 102,635, with a median sample size of 375. The mean quality score was 4.2 (SD 1.6) out of a possible maximum of 9; quality scores ranged from one to eight and were on average highest in HIC (4.4, SD 1.8) and lowest in UMIC (3.78, SD 1.40). Overall, most studies had a clearly defined study population (87%), stated the study period (77%) and used anonymous survey methods (69%); however, the majority of studies lost points on quality criteria assessing participant selection (only 32% had a representative sample and 40% used a random sampling approach), participant response rate (only 36% had a response rate of 70% or above), and quality of tobacco use data (only 38% clearly defined and measured tobacco use) (S3 Appendix). The studies main characteristics, quality score and reported prevalence of tobacco use are summarised in Tables A—C in S4 Appendix.

**Prevalence of tobacco use in HCW by country income level**

We estimated the pooled prevalence of tobacco use among HCW by grouping studies by WB country income level. The overall pooled prevalence was 21% (95% CI 20–23) and varied by WB income level (p = 0.01). The highest pooled prevalence was in UMIC at 25% (95% CI 22–28) and lowest in LMLIC at 19% (95% CI 15–23) (Table 1).

**Prevalence of tobacco use in HCW by country income level and year of data collection**

We estimated the pooled prevalence of tobacco use among HCW by grouping studies by country income level and year of data collection (Figures A-E in S6 Appendix). Overall, the estimates suggest some decreases in prevalence in HIC and UMIC, while there was no significant change in prevalence in LMLIC. The overall prevalence for 2011–2015 did not vary significantly by country income level (p = 0.94) (Table 2).

**Prevalence of tobacco use in HCW by sex**

We estimated prevalence by sex from 78 studies that reported tobacco use in male HCW and 97 in female HCW (Figures F and G in S6 Appendix). The pooled prevalence was almost twice as high in males than females 31% (95% CI 28–34) vs 17% (95% CI 15–18) and varied by income level (Table 3). Male HCW in UMIC and LMLIC had a higher prevalence compared with their counterparts in HIC, 37% (95% CI 34–40) and 37% (95% CI 21–53) vs 24% (95% CI 21–27) (p<0.01). The pooled prevalence in female HCW was higher in HIC and UMIC.
compared with their counterparts in LMLIC, 19% (95% CI 16–21) and 18% (95% CI 15–20) respectively vs 4% (95% CI 2–6) (p < 0.01).

Prevalence of tobacco use in HCW by occupation

We estimated prevalence by occupation and country income level for medical doctors, nurses, dental, pharmacy, allied, and mixed HCW (Figures H–O in S6 Appendix). Overall, nurses and mixed hospital personnel had the highest pooled prevalence at 24% (95% CI 22–26) and 24%
respectively, while pharmacy HCW had the lowest at 14% (95% CI 8–20). Country income level differences in prevalence were statistically significant in medical, nursing, dental and pharmacy HCW, with the highest estimates in UMIC (p < 0.01) (Table 4).

Prevalence of tobacco use in medical doctors and nurses by sex and country income level

We estimated prevalence of tobacco use by sex for the two occupational categories for which most data were available—medical doctors and nurses (Figures P–S in S6 Appendix). Overall, male medical doctors had a higher pooled prevalence than their female counterparts, 29% (95% CI 25–32) vs. 12% (95% CI 10–13) (Table 5). Male doctors in UMIC and LMLIC had higher estimates compared with their counterparts in HIC, at 35% (95% CI 32–39) and 45% (95% CI 26–64) respectively vs 19% (95% CI 15–22), and the difference was statistically significant (p < 0.01). In female doctors prevalence estimates did not vary by income level (p = 0.82).

Table 1. Pooled prevalence of tobacco use in HCW by WB country income level.

| Year of data collection (2000–2014) | Countries by income level | P-value for difference across income level |
|-----------------------------------|---------------------------|------------------------------------------|
|                                   | All | HIC | UMIC | LMLIC |                                |
| Pooled prevalence, % (95% CI)    | 21 (20–23) | 20 (18–21) | 25 (22–28) | 19 (15–23) | 0.01 |
| Studies (n)                      | 296 | 171 | 92   | 33    |                                |
| Countries (n)                    | 67  | 33  | 21   | 13    |                                |
| I²%                              | 99.5| 99.6| 99.2 | 97.1  | 99.5 |

HCW = healthcare workers; WB = World Bank; HIC = high income countries; UMIC = upper middle income countries LMLIC = lower middle and low income countries.

https://doi.org/10.1371/journal.pone.0220168.t001

(95% CI 21–28) respectively, while pharmacy HCW had the lowest at 14% (95% CI 8–20). Country income level differences in prevalence were statistically significant in medical, nursing, dental and pharmacy HCW, with the highest estimates in UMIC (p < 0.01) (Table 4).

Prevalence of tobacco use in medical doctors and nurses by sex and country income level

We estimated prevalence of tobacco use by sex for the two occupational categories for which most data were available—medical doctors and nurses (Figures P–S in S6 Appendix). Overall, male medical doctors had a higher pooled prevalence than their female counterparts, 29% (95% CI 25–32) vs. 12% (95% CI 10–13) (Table 5). Male doctors in UMIC and LMLIC had higher estimates compared with their counterparts in HIC, at 35% (95% CI 32–39) and 45% (95% CI 26–64) respectively vs 19% (95% CI 15–22), and the difference was statistically significant (p < 0.01). In female doctors prevalence estimates did not vary by income level (p = 0.82).

Table 2. Pooled prevalence of tobacco use in HCW by country income level and year of data collection.

| Years of data collection | Countries by income level | P-value for difference across income level |
|--------------------------|---------------------------|------------------------------------------|
|                          | All | HIC | UMIC | LMLIC |                                |
| 2000–2005                | 23 (21–25) | 22 (20–24) | 27 (22–32) | 14 (8–20) | 0.01 |
| Studies (n)              | 120 | 82  | 31   | 7     |                                |
| Countries (n)            | 40  | 22  | 12   | 6     |                                |
| I²%                      | 99.6| 99.7| 99.2 | 95.9  |                                |
| 2006–2010                | 22 (20–24) | 17 (15–19) | 27 (22–31) | 22 (16–29) | <0.01 |
| Studies (n)              | 104 | 50  | 39   | 15    |                                |
| Countries (n)            | 38  | 16  | 15   | 7     |                                |
| I²%                      | 99.3| 98.9| 99.2 | 97.7  |                                |
| 2011–2015                | 18 (16–21) | 19 (15–22) | 19 (14–23) | 18 (12–23) | 0.94 |
| Studies (n)              | 72  | 39  | 22   | 11    |                                |
| Countries (n)            | 33  | 19  | 8    | 6     |                                |
| I²%                      | 99.3| 99.5| 97.8 | 95.8  |                                |
| P-value for difference across years | 0.04 | 0.01 | 0.01 | 0.22 | 0.94 |
| I²%                      | 99.5| 99.6| 99.2 | 97.1  |                                |

HCW = healthcare workers; WB = World Bank; HIC = high income countries; UMIC = upper middle income countries LMLIC = lower middle and low income countries.

https://doi.org/10.1371/journal.pone.0220168.t002
Similar to doctors, male nurses had a higher pooled prevalence than female nurses, 28% (95% CI 18–37) vs. 18% (95% CI 14–22) and varied by income level (p < 0.01) and were significantly higher in male nurses in UMIC and LMLIC (based on 1 study each), at 47% (95% CI 37–57) and 0% (95% CI 0–66) compared with their counterparts in HIC (p < 0.01). In female nurses the prevalence was significantly higher in UMIC and HIC at 24% (95% CI 18–30) and 21% (95% CI 16–25) respectively compared with their counterparts in LMLIC, at 7% (95% CI 3–13) (based on one study) (p < 0.01).

Overall, female nurses seemed to have higher prevalence estimates compared with female medical doctors (18% vs 12%). This was observed in female nurses in HIC and UMIC (21% vs 12% and 24% vs 13% respectively), while in LMLIC the pattern was reversed (7% vs 10%).

Male nurses in HIC and UMIC also seemed to have higher prevalence estimates than male doctors (29% vs 19% and 47% vs 35% respectively). In LMLIC prevalence estimates were higher in male doctors than male nurses (45% vs 0% respectively), although only one study reported data on male nurses in this group.

### Country level comparison of prevalence of tobacco use in HCW and the general population

**Male HCW compared with males in the general population in HIC.** In most HIC, the mean prevalence in male HCW tend to be lower compared with their counterparts in the general population (between two and 22.5 percentage points) (Table A in S5 Appendix). The exceptions were Australia, Italy and Uruguay, where the prevalence was higher in HCW. The lowest prevalence (<5%) was in the US and Ireland, and the highest (>30%) in Greece, Croatia, Italy and Uruguay. A number of countries (Czech Republic, Denmark, Finland, Germany, Korea, Saudi Arabia, and the UK) were lacking prevalence data on HCW.

**Male HCW compared with males in the general population in UMIC.** The mean prevalence in male HCW in UMIC was above 20%. In Russia, China, Bosnia and Herzegovina, the prevalence in HCW was lower compared with males in the general population (between 0.1 and 26 percentage points), and in Mexico, Turkey, Brazil, Iran, Ecuador the prevalence was higher in HCW (between 2.9 and 21 percentage points). The lowest prevalence (<30%) was in Argentina, Brazil and Mexico and the highest (>40%) in Turkey. Countries lacking prevalence data on male HCW included Colombia, Cuba, Dominican Republic, Jamaica, Jordan, Malaysia, Peru, Romania, Serbia, South Africa, Venezuela.

---

**Table 3. Pooled prevalence of tobacco use in HCW by WB country income level and sex.**

| Countries by income level | All | HIC | UMIC | LMLIC | P-value for difference across income level |
|---------------------------|-----|-----|------|-------|-------------------------------------------|
| Male HCW                  |     |     |      |       |                                           |
| Pooled prevalence, % (95% CI) |     |      |      |       |                                           |
| 31 (28–34)                | 24 (21–27) | 37 (34–40) | 37 (21–53) | <0-01 |
| Studies (n)               | 78  | 40  | 27   | 11    |                                           |
| Countries (n)             | 36  | 21  | 10   | 5     |                                           |
| I²%                       | 99-4| 99  | 99-1 | 98-7  |                                           |
| Female HCW                |     |     |      |       |                                           |
| Pooled prevalence, % (95% CI) |     |      |      |       |                                           |
| 17 (15–18)                | 19 (16–21) | 18 (15–20) | 4 (2–6) | <0-01 |
| Studies (n)               | 97  | 47  | 38   | 12    |                                           |
| Countries (n)             | 46  | 25  | 15   | 6     |                                           |
| I²%                       | 94-3| 99-7| 99-2 | 92-5  |                                           |

HCW = healthcare workers; WB = World Bank; HIC = high income countries; UMIC = upper middle income countries LMLIC = lower middle and low income countries.

https://doi.org/10.1371/journal.pone.0220168.t003
Table 4. Pooled prevalence of tobacco use in HCW by WB country income level and occupation.

| HCW occupation | Countries by income level | P-value for difference across income level |
|----------------|---------------------------|-------------------------------------------|
|                | All | HIC | UMIC | LMLIC |
| Medical        |     |     |      |       |
| Pooled prevalence, % (95% CI) | 20 (19–22) | 16 (14–18) | 25 (22–28) | 21 (16–26) | <0.01 |
| Studies (n)    | 122 | 62  | 44   | 16    |
| Countries (n)  | 48  | 23  | 15   | 10    |
| I² (%)         | 99.1| 99.1| 97.7 | 97.2  |
| Nursing        |     |     |      |       |
| Pooled prevalence, % (95% CI) | 24 (22–26) | 24 (21–26) | 27 (17–37) | 7 (4–13) | <0.01 |
| Studies (n)    | 65  | 49  | 15   | 1     |
| Countries (n)  | 32  | 21  | 10   | 1     |
| I² (%)         | 99.7| 99.7| 99.4 | -     |
| Dental         |     |     |      |       |
| Pooled prevalence, % (95% CI) | 18 (12–23) | 19 (8–29) | 21 (12–30) | 8 (6–10) | <0.01 |
| Studies (n)    | 14  | 7   | 5    | 2     |
| Countries (n)  | 10  | 5   | 4    | 1     |
| I² (%)         | 97.1| 97.9| 96.3 | -     |
| Pharmacy       |     |     |      |       |
| Pooled prevalence, % (95% CI) | 14 (8–20) | 11 (5–17) | 39 (29–49) | -     | <0.01 |
| Studies (n)    | 8   | 7   | 1    | -     |
| Countries (n)  | 5   | 4   | 1    | -     |
| I² (%)         | 97.2| 97.2| 97.2 | -     |
| Allied         |     |     |      |       |
| Pooled prevalence, % (95% CI) | 15 (11–20) | 14 (9–19) | 17 (13–20) | 19 (3–35) | 0.65 |
| Studies (n)    | 16  | 11  | 2    | 3     |
| Countries (n)  | 10  | 6   | 2    | 2     |
| I² (%)         | 97.4| 97.9| 90   | 0     |
| Mixed          |     |     |      |       |
| Pooled prevalence, % (95% CI) | 24 (21–28) | 26 (21–31) | 25 (19–31) | 19 (13–26) | 0.32 |
| Studies (n)    | 71  | 35  | 25   | 11    |
| Countries (n)  | 32  | 15  | 11   | 6     |
| I² (%)         | 99.5| 99.8| 98.5 | 97.8  |

HCW = healthcare workers; WB = World Bank; HIC = high income countries; UMIC = upper middle income countries LMLIC = lower middle and low income countries.

https://doi.org/10.1371/journal.pone.0220168.t004

Male HCW compared with males in the general population in LMLIC. In LMLIC, except Pakistan, the mean prevalence in male HCW was lower than in males in the general population (between 13 and 54 percentage points). The lowest prevalence (<10%) was in India and the highest (>50%) in Pakistan. Countries with prevalence higher than 20% in HCW included Indonesia and Nepal, higher than 30% Armenia and Syria, and above > 50% Pakistan and Tunisia.

Female HCW compared with females in the general population in HIC. In a number of HIC the mean prevalence in female HCW was lower (between 0.7 and 15 percentage points) compared with their counterparts in the general population while in another groups of countries the prevalence was higher in HCW (between 1 and 19 percentage points) (Table B in S5 Appendix). The lowest prevalence was in Korea, Oman and Qatar, less than 5%. HCW prevalence was higher than 20% in Chile, Czech Republic, Denmark, France, Italy, higher than 30%
in Croatia, Spain, Uruguay, and above 40% in Greece. Countries with no prevalence data on female HCW included Germany, Bahrain, Finland, Saudi Arabia and the UK.

**Female HCW compared with females in the general population in UMIC.** In the majority of UMIC (except for Jamaica and Lebanon), the mean prevalence in female HCW was higher than in females in the general population. The lowest prevalence was in Iran and Jamaica, less than 5%. The prevalence in HCW was higher than 20% in Ecuador, Jordan and Turkey, higher than 30% in Cuba and Argentina, and above 40% in Bosnia and Herzegovina.

**Female HCW compared with females in the general population in LMLIC.** Female prevalence data on female HCW from LMLIC were limited. HCW in Armenia and Pakistan had a higher prevalence than female in the general population, by 13 and 7 percentage points, while female HCW in India, Indonesia and Nepal had a lower prevalence. The lowest prevalence was in Indonesia, Nepal and Syria (<5%) and highest in Armenia and Pakistan (<15%).

**Discussion**

This study estimated that between 2000 and 2014 21% of HCW were tobacco users, and there was significant variation in prevalence by sex, occupation and country income level. The income differences in prevalence between countries were present in almost all occupations but were most pronounced in male doctors and female nurses. Male medical doctors in UMIC and LMLIC and female nurses in HIC and UMIC had the highest prevalence estimates. Male and female nurses in HIC and UMIC had higher estimates than their medical doctor counterparts, which suggests socioeconomic differences at play in addition to sex and income differences.
Compared with the smoking prevalence rates in the general population of their countries, male HCW in high income countries tend to have lower prevalence rates while male and female HCW in middle and low income countries tend to have similar or higher prevalence rates relative to their counterparts in the general population.

To our knowledge, this is the first systematic review that attempts to provide estimates of the prevalence of tobacco use worldwide across a variety of different HCW. The high prevalence in male medical doctors in UMIC and LMLIC compared with HIC confirms the findings of previous reviews [11,14]. The sex and income differences in tobacco use among HCW appear to reflect the global pattern of the tobacco epidemic in the general population, which is spreading from high income to low and middle income countries, and is beginning and declining earlier in males than females [246,247]. Overall, the highest prevalence and the largest sex differences in prevalence were observed in middle and low income countries, which are at earlier stages of the tobacco epidemic. By contrast, both male and female medical doctors in HIC, most of which are at the later stages of the epidemic, have the lowest prevalence.

While female nurses had a higher prevalence compared to female doctors in HIC and UMIC, the opposite pattern was found in middle and low income countries where female doctors had a higher prevalence compared to female nurses. A positive association between tobacco use and a higher socioeconomic status was found previously among professional women in LMLIC [248,249]. Tobacco industry’s targeting of women in LMICs who have lower rates of smoking than men particularly in Asia, Sub-Saharan Africa and the Middle East, is similar to the industry’s targeting of women in HIC in the 1920s, linking smoking to women’s social and economic freedoms [250].

High prevalence of smoking among hospital personnel suggests high levels of second-hand smoke exposure in hospitals. Smoking among hospital healthcare workers is a major barrier to implementation of smokefree policy in hospitals. Some hospital studies also reported non-compliance with smoking restrictions on hospital premises [25,181] and smoking in front of patients [25,196]. Second-hand smoke is a health risk and there are no safe levels of exposure [251]. Smokefree workplace can encourage smokers to quit [252]. Although the majority of hospital personnel who smoked wanted to quit, there was little knowledge or cessation support available [85,99,121,192].

Country level comparisons showed that male HCW in HIC were the only group that had a lower prevalence compared with their counterparts in the general population, while in the middle and low income countries prevalence rates in both male and female HCW were similar or higher compared with their counterparts in the general population. Male doctors and female nurses in middle income countries appear to have some of the highest prevalence rates.

Despite some limitations of data (WHO prevalence data were more recent than HCW data), these finding seems to confirm the hypothesis that similarly to high income countries, the smoking epidemic in low and middle income countries starts in more affluent socioeconomic groups, e.g. health professionals, before it spreads to the rest of the population, and begins to decline in males before females in the later stages of the epidemic.

These findings offer cause for concern as many middle and low income countries have fewer tobacco control measures in place [253] and inadequate provision of cessation support [254] There have already been increases in smoking prevalence in males in the general population in some of these countries [253,255], and any further increases are likely to be observed in HCW populations as well.

Despite an increasing number of countries introducing tobacco control legislation as part of the WHO FCTC, progress in implementation of tobacco control measures has been slow particularly in low and middle income countries [254,256], with an overall decrease in
smoking prevalence in the general population globally of 1.1 percentage point between 2010 and 2015 [253]. Offering support to HCW to stop using tobacco is a key recommendation of the FCTC Article 14 guidelines, however according to a recent survey of 142 countries, only 44% of countries offer help to HCW to stop using tobacco [254].

A number of limitations need to be considered. We excluded 51 potentially eligible studies because we were unable to access the full text or translate them. Studies were not evenly distributed across income groups or occupation. More than half of all studies were from HIC, compared to just 12% from LMLIC. Over half of occupations represented were medical doctors, whereas dentists, pharmacists and allied HCW were represented in less than 10% of studies. Further, the majority of studies were of poor quality due to small sample sizes, low response rates and tobacco use being not clearly defined and measured. Despite the large number of studies included in the review, only 33% of studies had nationally representative samples; mainly due to studies reporting on data collected in just one hospital. There are relatively few recent studies, the most recent reporting prevalence data from 2014, and in a number of categories there were a lack of data reported. There was a high heterogeneity (above 90%) in almost all meta-analyses, including sub-group analyses, which suggests high variability in study populations and approaches.

Individual categories of HCW were not homogenous, for example studies included in the medical doctor category included professional groups such as cardiology [73,81,136] and respiratory physicians, [115,116,170] who may reasonably be expected to have a lower tobacco use prevalence than other specialties which have a less clear link with smoking, thus potentially biasing the results.

The overall prevalence estimates in meta-analyses based on mixed female and male populations in countries with large sex difference in prevalence should be interpreted with caution. The occupational differences in smoking prevalence between doctors and nurses in countries with a large proportion of nursing workforce being female are likely to be biased by the gender differences in prevalence, especially in countries like China where smoking prevalence is considerably lower in females compared with males.

HCW data were generally older, and for some countries more than a decade older than the WHO population data. It is possible, therefore, that the prevalence in HCW in low and middle income countries is underestimated as it must have increased since then and be similar to that in the general population.

In all studies tobacco use was self-reported; 66% used self-administered anonymous questionnaires to verify smoking status. While self-reported smoking status was shown to be accurate in most observational studies [257] under-reporting of smoking in female participants due to cultural or social norms in some countries [74] or in countries with a growing popularity in water pipe smoking as this form of tobacco use is not perceived as harmful or addictive [258] is a concern and results should be considered accordingly.

Despite wide variations in prevalence of tobacco use among HCW by country income level, gender and occupation, there are no evidence of significant recent declines in prevalence of tobacco use. In middle and low income countries the prevalence of tobacco use among HCW is no lower than that in the general population and in some professions is very high indeed. This presents a particular challenge for countries where smoking prevalence is already high and/or is projected to increase. This is a cause for concern due to the critical role HCW play in advising tobacco users to stop.

While smoking prevalence in HIC has been associated with social and economic disadvantage, smoking among female HCW in LMLIC may be an indicator of the rise of the tobacco epidemic in these countries, and as such should be addressed by interventions targeting specifically women [249].
The Article 14 Guidelines of the WHO FCTC (4) recommends that HCW record patients' tobacco use and provide at least brief smoking cessation advice. Health professionals who use tobacco maybe less likely to fulfil this obligation or even if they did, their own tobacco dependence would undermine the authority and credibility of cessation advice. All HCW have a duty to provide smoking cessation advice to patients. System changes should be implemented to encourage HCW engagement in smoking cessation regardless of their own smoking status.

Offering support to HCW to stop using tobacco is a priority recommendation of the FCTC Article 14 guidelines. Workplace "smoking breaks" are not statutory right and should be discouraged as a potential disincentive for quitting smoking. Equally, lack of cessation support for HCW who smoke can seriously undermine the success of introducing smokefree policy in healthcare settings [259]. Stopping smoking should be encouraged and staff should be allowed to attend smoking cessation services during working hours. Smokefree work places can encourage changes in smoking behaviour [252]. Studies assessing the impact of implementation of smokefree policy in healthcare settings have shown that smoking bans combined with cessation support are effective in decreasing smoking prevalence in both patients’ and staff [260,261].

Tobacco treatment and preventive measures specifically targeting HCW should be a priority in all countries. Such measures may include workplace interventions, restriction on smoking while at work and provision of cessation support for staff who smoke.

Conclusions
Tobacco use in HCW is a seriously neglected area. HCW are key in reducing tobacco use in the population in their position as role models, and the high levels of tobacco use amongst these groups especially in middle- and low-income countries is concerning and suggests a need for targeted action to address this.

The systematic review also highlighted that the monitoring of HCW tobacco use has been neglected; a number of occupational groups were lacking in data and in many cases data which were available were from older, low quality studies. Global monitoring of tobacco use among HCW is urgently needed.

Supporting information
S1 Appendix. PRISMA checklist 2009.
(DOC)
S2 Appendix. Example search strategy.
(DOC)
S3 Appendix. Summary of quality score.
(DOC)
S4 Appendix. Summary of studies.
(DOC)
S5 Appendix. Country level comparison of prevalence of tobacco use in HCW and the general population.
(DOCX)
S6 Appendix. Meta-analyses.
(DOC)
Author Contributions

Conceptualization: Kapka Nilan, Tricia M. McKeever, Ann McNeill, Martin Raw, Rachael L. Murray.

Data curation: Kapka Nilan, Tricia M. McKeever, Rachael L. Murray.

Formal analysis: Kapka Nilan, Tricia M. McKeever, Rachael L. Murray.

Methodology: Tricia M. McKeever, Rachael L. Murray.

Project administration: Kapka Nilan.

Supervision: Tricia M. McKeever, Ann McNeill, Martin Raw, Rachael L. Murray.

Writing – original draft: Kapka Nilan.

Writing – review & editing: Tricia M. McKeever, Ann McNeill, Martin Raw, Rachael L. Murray.

References

1. WHO. WHO Tobacco Free Initiative. The Role of health professionals in tobacco control: WHO; 2005 [http://www.who.int/tobacco/resources/publications/wntd/2005/bookletfinal_20april.pdf.

2. Raw M, Anderson P, Batra A, Dubois G, Harrington P, Hirsch A, et al. WHO Europe evidence based recommendations on the treatment of tobacco dependence. Tobacco control. 2002; 11(1):44–6. https://doi.org/10.1136/tc.11.1.44 PMID: 11891367

3. A clinical practice guideline for treating tobacco use and dependence: 2008 update. A U.S. Public Health Service report. American journal of preventive medicine. 2008; 35(2):158–76. https://doi.org/10.1016/j.amepre.2008.04.009 PMID: 18617085

4. WHO. Guidelines for implementation of Article 14 of the WHO Framework Convention on Tobacco Control WHO; 2010 [http://www.who.int/fctc/Guidelines.pdf?ua=1.

5. Smith DR. The historical decline of tobacco smoking among United States physicians: 1949–1984. Tobacco induced diseases. 2008; 4:9–17. https://doi.org/10.1186/1617-9625-4-9 PMID: 18822167

6. Smith DR, Leggat PA. The historical decline of tobacco smoking among Australian physicians: 1964–1997. Tobacco induced diseases. 2008; 4:13–21. https://doi.org/10.1186/1617-9625-4-13 PMID: 19114012

7. Smith DR, Leggat PA. Tobacco smoking was dramatically reduced among New Zealand health care workers between 1963 and 1996, but what happened after that?. N Z Med J. 2007; 120:82–4.

8. Sarna L, Bialous SA, Jun HJ, Wewers ME, Cooley ME, Feskanich D. Smoking trends in the nurses’ health study (1976–2003). Nurs Res. 2008; 57.

9. Nelson DE, Giovino GA, Emont SL. Trends in cigarette smoking among US Physicians and nurses. JAMA. 1994;271.

10. Edwards R, Tu D, Stanley J, Martin G, Gifford H, Newcombe R. Smoking prevalence among doctors and nurses-2013 New Zealand census data. N Z Med J. 2018; 131(1471):48–57. PMID: 29518799

11. Smith DR, Leggat PA. An international review of tobacco smoking in the medical profession: 1974–2004. BMC public health. 2007; 7:115–26. https://doi.org/10.1186/1471-2458-7-115 PMID: 17578582

12. Stead M, Angus K, Holme I, Cohen D, Tait G, the PERT. Factors influencing European GPs’ engagement in smoking cessation: a multi-country literature review. The British Journal of General Practice. 2009; 59(566):682–90. https://doi.org/10.3399/bjgp09X454007 PMID: 19674514

13. Chandrakumar S, Adams J. Attitudes to smoking and smoking cessation among nurses. Nurs Stand. 2015; 30(9):36–40. https://doi.org/10.7748/nns.30.9.36.s44 PMID: 26508254

14. Abdullah AS, Stillman FA, Yang L, Luo H, Zhang Z, Samet JM. Tobacco Use and Smoking Cessation Practices among Physicians in Developing Countries: A Literature Review (1987–2010). International journal of environmental research and public health. 2014; 11(1):429–55.

15. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, Clarke M, Devereaux PJ, Kleijnen J, Moher D. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. BMJ (Clinical research ed), 2009; 339.
16. Stevens GA, Alkema L, Black RE, Boerma JT, Collins GS, Ezzati M, et al. Guidelines for Accurate and Transparent Health Estimates Reporting: the GATHER statement. The Lancet. 2016; 388(10062): e19–e23.

17. Abrizah A. Smoking—Identifying status and addressing cessation needs among oral healthcare personnel in Negeri Sembilan: Malaysian Medical Association; 2010 [82]. http://www.e-mjm.org/2010/CRC_2010_supA.pdf (Archived at http://www.webcitation.org/6pB0JPbh on 23 March 2017).

18. Adamek R, Stoczynska J, Maksymiuk T, Zysnarska M, Gromadcka-Sutkiewicz M, Kara I, Kalupa W. Rozpowszechnienie palenia tytoniu w wśród pielęgniarek a świadomość szkodliwości nalogu: [Prevalence of tobacco smoking among nurses and the awareness of harmfulness of smoking habit], Przegl Lek. 2012; 69(10):969–72.

19. Adraneda A. Work schedules and smoking behavior outcomes among physicians in training: A cross sectional study. Chest Journal. 2015; 148(4): https://doi.org/10.1378/chest.2219074

20. Akpanudo SM, Price J. H, Jordan T, Khuder S, Price J. A. Clinical psychologists and smoking cessation: treatment practices and perceptions. J Community Health. 2009; 34(6):461–71. https://doi.org/10.1007/s10900-009-9178-0 PMID: 19701699

21. Akvardar Y D Y.; Ergor G.; Ergor A. Substance use among medical students and physicians in a medical school in Turkey. Soc Psychiatry Psychiatr Epidemiol. 2004; 39(6):502–6. https://doi.org/10.1007/s00127-004-0765-1 PMID: 15205736

22. Al-Arifi MN. Prevalence of smoking and attitude toward smoking cessation among community pharmacists, Saudi Arabia. J Pharm Technol. 2004; 20:329–33.

23. Al-Lawati J, Nooyi SC, Al-Lawati AM. Knowledge attitudes and prevalence of tobacco use among physicians and dentists in Oman. Ann Saudi Med. 2009; 29(2):128–33. https://doi.org/10.4103/0256-4947.51803 PMID: 19318747

24. Amiri Z, Barzigar A, Vahdati M. Risk factors of cardiovascular diseases among physician in Guilan, 2007. Archive of SID. 2010; 28:184–9.

25. Ammar J, Hamzaoui A, Berraies A, Hamzaoui A. Prevalence du tabagisme à l’hôpital A Mami de l’Ariana: Etude prospective à propos de 700 professionnels de la santé; [Smoking prevalence in A Mami hospital of Ariana: prospective study about 700 health professionals]. Tunis Med. 2013; 91(12):705–8.

26. An F, Xiang YT, Yu L, Ding YM, Ungvari GS, Chan SW, Yu DS, Lai KY, Qi YK, Zeng JY, Wu PP, Hou ZJ, Correll CU, Newhouse R, Chiu HF. Prevalence of nurses’ smoking habits in psychiatric and general hospitals in China. Arch Psychiatr Nurs. 2014; 28(2):119–22. https://doi.org/10.1016/j.apnu.2013.11.008 PMID: 24673786

27. Arack R, Blake H, Lee S, Coulson N. An evaluation of the effects of the smoking ban at an acute NHS trust. International Journal of Health Promotion & Education. 2009; 47(4):112–8.

28. Awan K, Hammam MK, Wamakulasuriya S. Knowledge and attitude of tobacco use and cessation among dental professionals. The Saudi Dental Journal. 2015; 27:99–104. https://doi.org/10.1016/j.sdentj.2014.11.004 PMID: 26082577

29. Aydin L, Baltaci D, Alasan F, Tanriverdi MH, Deler H. Smoking cessation practice in male versus female family physicians in Turkey. Eur Respir J. 2013; 42(Suppl 57):P3065.

30. Azzopardi J, Degiovanni S, Farrugia L, Calleja N, Gauci C, Buttigieg A, Montefort S. A survey to assess smoking awareness and attitudes of staff at a local hospital. Eur Respir J. 2012; 40(Suppl 56): P4086.

31. Balbani AM, J C; Carvalho LR. Tabagismo, abandono do fumo e os otorrinolaringologistas do estado de São Paulo. Revista Brasileira de Otorrinolaringologia. 2006; 72:96–103.

32. Baltaci D, Aydin LY, Annakkaya AN, Velioglu U, Alasan F, SarıçTLel F, Ankarali H. Evaluation of smoking frequency and smoking cessation training among Turkish family physicians. Eur Respir J. 2015; 46(Suppl 59):PA5125.

33. Bansal R, Katyal R, Ahmed S, Kumari R. Self-reported health, illness and self-care among doctors of Meerut. Indian Journal of Community Health. 2012; 24(1):23–6.

34. Barbosa L, Machado CJ. Socio-economic and cultural factors associated with smoking prevalence among workers in the National Health System in Belo Horizonte. Rev Bras Epidemiol. 2015; 18(2):385–97. https://doi.org/10.1590/1980-54972015000200008 PMID: 26083510

35. Bazargan M, Makar M, Bazargan-Hejazi S, Ani C, Wolf KE. Preventive, lifestyle, and personal health behaviors among physicians. Academic Psychiatry. 2009; 33:289–95. https://doi.org/10.1176/appi.ap.33.4.289 PMID: 19690108

36. Beaujouan L, Czernichow S, Pourriat JL, Bonnet F. Prévalence et facteurs de risque de l’addiction aux substances psychoactives en milieu anesthésique: résultats de l’enquête nationale [Prevalence and...
risk factors for substance abuse and dependence among anaesthetists: a national survey]. Ann Fr Anesth Reanim. 2005; 24(5):471–9.
37. Beletsioti-Stika P, Scriven A. Smoking among Greek nurses and their readiness to quit. Int Nurs Rev. 2006; 53(2):150–6. https://doi.org/10.1111/j.1466-7657.2006.00483.x PMID: 16650035
38. Bello S, Soto MI, Michalland SH, Salinas JC. Encuesta nacional de tabaquismo en funcionarios de salud [A national survey on smoking habit among health care workers in Chile]. Rev Med Chil. 2004; 132(2):223–32.
39. Beltrán J, Trullén AP, Calvo ER, Jiménez MLC, Labarga IH. Prevalencia del hábito tabáquico en trabajadores de oficinas de farmacia [Prevalence of smoking habit in pharmacy site workers]. Prev tab. 2005; 7(2):54–9.
40. Berkelmans A, Burton D, Page K, Worrall-Carter L. Registered Nurses’ smoking behaviours and their attitudes to personal cessation. Journal of advanced nursing. 2011; 67(7):1580–90. https://doi.org/10.1111/j.1365-2648.2010.05592.x PMID: 21366668
41. Boado M, Bianco E. Tabaquismo en los médicos uruguayos (2011) [Tobacco use in Uruguayan physicians (2011)]. Rev urug cardiol. 2011; 26(3):214–24.
42. Bolinder G, Himmelmann L, Johansson K. Svenska läkare röker minst i världen. Ny studie av tobaksvanor och attityder till tobak [Swedish physicians smoke least in the world. A new study of smoking habits and attitudes to tobacco]. Lakartidningen. 2002; 99(30–31):3111–7.
43. Bolinder G, Boethius G. Svenska läkare och tobak. Vanor, attityder och insatser under fyra decennier [Swedish physicians and tobacco. Habits, attitudes and interventions during four decades]. Lakartidningen. 2010; 107(12):822–6.
44. Bourne P, Glen LV, Laws H, Kerr-Campbell MD. Health, lifestyle and health care utilization among health professionals. Health. 2010; 2:557–65.
45. Burgos Díez P, Del Amo Merina P, Ruiz A, Tomás Q, Burón D, Rescalvo S, Fernández ML, M. Influencia de las variables laborales en la presencia de morbilidad de los trabajadores sanitarios; Occupational influence of variables in the presence of morbidity of health workers. Rev Asoc Esp Espec Med Trab. 2011; 20(2):6–15.
46. Cakir N, Pamuk ON, Dönmez S, Barutcü A, Diril H, Odabas E, Kılıççigel V. Prevalence of Raynaud’s phenomenon in healthy Turkish medical students and hospital personnel. Rheumatol Int. 2008; 29(2):185–8. https://doi.org/10.1007/s00296-008-0666-9 PMID: 18682952
47. Calgan Z, Tahir E, Yegenoglu S, Bilir N. Community pharmacists’ attitude, habits and actual activities regarding smoking and health promotion in the 1. Region of Ankara chamber of pharmacists. Turk J Pharm Sci. 2007; 4(3):125–38.
48. Carel R, Zusman M, Karakis I. Work Ability Index in Israeli Hospital Nurses: Applicability of the Adapted Questionnaire. Experimental Aging Research. 2013; 39(5):579–90 https://doi.org/10.1080/0361073X.2013.839316 PMID: 24151917
49. Ceresa M, McElroy JA, Kuan X, Vila Peter M.; Jorenby Douglas E.; Fiore Michael C.; Du Xueping; Qian Ning; Lu Long; Ren Hongkun. Smoking, barriers to quitting, and smoking-related knowledge, attitudes, and patient practices among male physicians in China. Preven Chronic Disease. 2009; 6(1): A06.
50. Chan S, Sarna L, Wong DCN, Lam TH. Nurses’ tobacco-related knowledge, attitudes, and practice in four major cities in China: Clinical scholarship. Journal of Nursing Scholarship. 2007; 39(1):46–53.
51. Chandrashekar J, Manjunath BC, Unnikrishnan M. Addressing tobacco control in dental practice: a survey of dentists’ knowledge, attitudes and behaviours in India. Oral Health Prev Dent. 2011; 9(3):243–9. PMID: 22068180
52. Chang J, Lee YY, Kuo LN, Hassia PY, Chen HY. Knowledge, Attitudes, and Behavior Toward Smoking Cessation among Hospital Pharmacists in Taiwan. J Exp Clin Med. 2012; 4(4):249–54.
53. Chaudhry M, Chaudhry IA, Ur-Rahman M. Prevalence of smoking among health care providers in tertiary care hospitals. Rawal Medical Journal. 2009; 34(1):40–2.
54. Connolly M, Floyd S, Forrest R, Marshall B. Mental health nurses’ beliefs about smoking by mental health facility inpatients. International journal of mental health nursing. 2013; 22(4):288–93. https://doi.org/10.1111/j.1447-0399.2012.00871.x PMID: 22897708
55. Cookson C, Strang J, Ratschen E, Sutherland G, Finch E, McNeill A. Smoking and its treatment in addiction services: Clients’ and staff behaviour and attitudes. BMC health services research. 2014; 14:304–11. https://doi.org/10.1186/1472-6963-14-304 PMID: 25017205
56. Copertaro A, Bracci M, Barbaresi M, Santarelli L. Importanza della circonferenza vita per la diagnosi di sindrome metabolica e per la valutazione del rischio cardiovascolare nei lavoratori turnisti [Role of waist circumference in the diagnosis of metabolic syndrome and assessment of cardiovascular risk in shift workers]. Med Lav. 2008; 99(6):444–53.
57. Cuesta A, Barbaresi M, Bracci M. Lavoro a turno e rischio cardiometabolico [Shift work and cardiometabolic risk]. Recent Prog Med. 2009; 100(11):502–7.

58. Cuesta A, Kuster F, Lluberas R. Tabaquismo en el personal y usuarios de un hospital universitario: consumo y recomendación de abandono [Smoking in the personnel and users of a university hospital: consumption and recommendation of abandonment]. Rev urug cardiol. 2005; 20(2):77–85.

59. Custodio I, Lima FET, Almeida MI, Silva LF, Monteiro ARM. Perfil sociodemográfico e clínico de uma equipe de enfermagem portadora de Hipertensão Arterial [Sociodemographic and clinical profile of a nursing team with high blood pressure]. Rev Bras Enferm. 2011; 64(1):18–24.

60. De Col P, Baron C, Guillaumin C, Bouquet E, Fanello E. Le tabagisme des médecins généralistes a-t-il une influence sur l’abord du tabac en consultation en 2008? Enquête auprès de 332 médecins généralistes du Maine-et-Loire; [Influence of smoking among family physicians on their practice of giving minimal smoking cessation advice in 2008. A survey of 332 general practitioners in Maine-et-Loire]. Rev Mal Respir. 2010; 27(5):431–40.

61. Demir C, Simsek Z. Physicians’ smoking cessation behavior and related factors. TAF Prev Med Bull. 2013; 12(5):501–10.

62. Demiralay R. The behaviour and attitude of physicians in the Lakes Region towards smoking. Turk J Med Sci. 2003; 33(5):329–34.

63. Demiralay R. Nicotine dependence in medical students and physicians in the Lakes region. Turk J Med Sci. 2003; 33(5):321–7.

64. Díez Piña J, Álvaro Álvarez, Mayoralas Alises S, Rodríguez Bolado P, García Jiménez JD, Gaite Álvaro AE. Consumo de tabaco y actitud ante el inicio del hospital sin humo en el Hospital de Móstoles [Tobacco consumption and attitude towards the onset of the smokeless hospital in the Hospital of Móstoles]. Prev tab. 2006; 8(1):11–7.

65. Donchin M, Baras M. A “smoke-free” hospital in Israel—a possible mission. Preventive medicine. 2004; 39(3):589–95. https://doi.org/10.1016/j.ypmed.2004.02.020 PMID: 15313099

66. Downie L, Barrett C, Keller PR. The personality-related attitudes and behaviors of Australian optometrists: Is there evidence for an evidence-based approach? Nutrition. 2015; 31:669–77. https://doi.org/10.1016/j.nut.2014.10.020 PMID: 25837211

67. Dwyer T, Bradshaw J, Happell B. Comparison of mental health nurses’ attitudes towards smoking and smoking behaviour. Int J Ment Health Nurs. 2009; 18(6):424–33. https://doi.org/10.1111/j.1447-0349.2008.00628.x PMID: 19883414

68. Dziankowska-Zaborszczyk E, Polanska K, Bak-Romaniszyn L, Drygas W, Kaleta D. Rozpowszechnienie palenia tytoniu i biernej ekspozycji na dym tytoniowy wśród pielęgniarek [Polish nurses’ smoking behavior and environmental tobacco smoke exposure]. Przegl Lek. 2009; 66(10):738–40.

69. Echer I, Corrêa APA, Lucena AF, Ferreira SAL, Knorst MM. Prevalência do tabagismo em funcionários de um hospital universitário [Prevalence of smoking among employees of a university hospital]. Rev Lat Am Enfermagem. 2011; 19(1):179–86.

70. Edwards R, Peace J, Stanley J, Atkinson J, Wilson N, Thomson G. Setting a good example? Changes in smoking prevalence among top occupational groups in New Zealand: Evidence from the 1981 and 2006 censuses. Nicotine & Tobacco Research. 2012; 14(3):329–37.

71. Estryn-Behar M, le Nezet O, Bonnet N, Gardeur P. Comportements de santé du personnel soignant: Résultats de l’étude européenne Presst-Next [Health behavior of healthcare personnel: The European Presst-Next Study]. Presse Med. 2006; 35(10 Pt 1):1435–46.

72. Fadhil I. Tobacco education in medical schools: survey among primary care physicians in Bahrain. Eastern Mediterranean Health Journal. 2009; 15(4):969–75. PMID: 20187549

73. Faggianoi P, Temporelli PL, Zito G, Bozeni F, Colivicchi F, Fattori F, Greco C, Mureddu G, Riccio C, Scherillo M, Uguccioni M, Faden G. Profilo di rischio cardiovascolare e stili di vita in una coorte di cardiologi Italiani. risultati della survey SOCRATES [Cardiovascular risk profile and lifestyle habits in a cohort of Italian cardiologists. Results of the SOCRATES survey]. Monaldi Archives Chest Dis. 2013; 80(3):118–25.

74. Fakhfakh R, Klouz A, Lakhal M, Belkahia C, Achour N. Validity of self-reported smoking among women hospital staff in Tunisia. Tobacco control. 2011; 20(1):86. https://doi.org/10.1136/tc.2010.038661 PMID: 20881020

75. Fahallah N, Maurel-Donnarel E, Baumstarck-Barrau K, Lehucher-Michel MP. Three-year follow-up of attitudes and smoking behaviour among hospital nurses following enactment of France’s national smoke-free workplace law. International Journal of Nursing Studies. 2012; 49(7):803–10. https://doi.org/10.1016/j.ijnurstu.2012.01.014 PMID: 22349045

76. Ferraz S. Estudo da prevalência de uso de substâncias psicoativas por enfermeiros; Study of the prevalence of substance abuse by nurses: UFMG; 2010 [updated 26-02-2010. 60-]. http://www.webcitation.org/6pBJDnL5 on 23 March 2017.
77. Fink M, Black B, Butt SL, Fenning SM, Sharkey KM. Health Behaviors of Physical Therapists and Physical Therapist Students in South-central Pennsylvania. HPA Resource. 2014; 14(4):J1–J14

78. Fougere B, Undernor M, Ingrand P, Meurice JC. Tabagisme du personnel du centre hospitalier de Rochefort-sur-Mer [Smoking habits among staff at the Rochefort-sur-Mer Hospital]. Revue des Maladies Respiratoires. 2011; 28(11):1104–10.

79. Freour T, Dessolle L, Jean M, Barriere P. Smoking among French infertility specialists: habits, opinions and patients’ management. Eur J Obstet Gynecol Reprod Biol. 2011; 155(1):44–8. https://doi.org/10.1016/j.ejogrb.2010.10.024 PMID: 21112685

80. Friis K, Ekholm O, Hundrup YA. Comparison of lifestyle and health among Danish nurses and the Danish female population: is it possible to generalize findings from nurses to the general female population? Scand J Caring Sci. 2005; 19(4):361–7. https://doi.org/10.1111/j.1471-6712.2005.00366.x PMID: 16324060

81. Frisinghelli A, Cesana F, Clavario P, Mureddu GF, Temporelli PL, Cherubini A, Mocini D, Fioravanti P, Fattoroli F. Cardiologi italiani e fumo di tabacco. Survey su prevalenza e conoscenza del tabagismo e delle strategie antifumo di una coorte di cardiologi italiani; [Italian cardiologists and tobacco smoking [A survey on the prevalence and knowledge of smoking and strategies for smoking cessation in a cohort of Italian cardiologists]. G Ital Cardiol 2015; 16(7–8):426–32.

82. Garcia de Alberich X, Guerra-Gutiérrez F, Ortega-Martínez R, Sánchez-Villegas A, Martínez-González MA. Consumo de tabaco en titulados universitarios. El Proyecto SUN [Seguimiento Universidad de Navarra] [Smoking among a cohort of Spanish university graduates. The SUN Project]. Gac Sanit. 2004; 18(2):108–17. PMID: 15104971

83. Gazdek D, Kovacic, L. Navike_pusenja.pdf ( Archived at http://www.webcitation.org/6pCWhqCEC on 23 March 2017).

84. Gigliotti E, Ferrero F, Castanos C, Duran P, Moreno L. Consumo de tabaco en médicos residentes de pediatría en la Argentina. Prevalencia actual y tendencia en los últimos diez años [Tobacco smoking among pediatric residents in Argentina. Current prevalence and trend over the past 10 years]. Arch Argent Pediatr. 2013; 111(4):315–21. https://doi.org/10.1590/S0325-00752013000400010 PMID: 23912289

85. Giotakis K, Pachi A, Ilias I, Zafeiropoulos G, Vouraki G, Drylli O, Bratis D, Tselebis A, Douzenis A, Moussas G. Psychological symptoms and habitual smoking in Greek health professionals. Encephalins 2013; 50:82–8.

86. Giavas D R M.; Rumboldt Z. Smoking cessation with nicotine replacement therapy among health care workers: randomized double-blind study. Croat Med J. 2003; 44(2):219–24. PMID: 12698515

87. Gowin E, Dytfeld J, Ignaszak-Szczepaniak M, Dyzmann-Sroka A, Michalak M, Horst-Sikorska W. Do we practice what we teach? Lifestyle of doctors working in Wielkopolska region. Family Medicine and Primary Care Review. 2009; 11(3):316–8.

88. Grempler J, Droste-Arndt H, Flammer E, Steinert T. Wunsch nach A

89. Haé nard J, Droste-Arndt H, Flammer E, Steinert T. Wunsch nach A

90. Haé nard J, Droste-Arndt H, Flammer E, Steinert T. Wunsch nach A

91. Han Q, Li N, Sun PH. Survey on smoking behavior of medical staff in Jilin Province. J of Jilin University. 2013; 39(1):161–4.

92. He G, Li Y, Zhao F, Wang L, Cheng S, Gou H, Klena JD, Fan H, Gao F, Gao F, Han G, Ren L, Song Y, Xiong Y, Geng M, Hou Y, He G, Li J, Guo S, Yang J, Yan D, Wang Y, Gao H, An J, Duan X, Wu C, Duan F, Hu D, Lu K, Zhao Y, Rao CY, Wang Y. The prevalence and incidence of latent tuberculosis infection and its associated factors among village doctors in China. PloS one. 2015; 10(5):e0124097. https://doi.org/10.1371/journal.pone.0124097 PMID: 25996960

93. Hernández M, Pérez FJ. Hábito y actitud respecto al tabaco en enfermería de atención primaria de Bilbao [Smoking and attitudes to smoking among primary care nurses in Bilbao, Spain]. Enferm clín 2005; 15(3):156–62.

94. Hidalgo C, Casas GMV, Monsalve AS. Drugs of abuse consumption in health professionals (physicians and nurses) from two outpatient services of first level attention in Bogota. Rev Cien Salud. 2012; 10:87–100.
95. Hilleshein E, de Souza LM, Lautert L, Paz AA, Catalan VM, Teixeira MG, Mello DB. Capacidade para o trabalho de enfermeiros de um hospital universitario [Work capacity of nurses in a university hospital]. Rev Gaucha Enferm. 2011; 32(3):509–15. PMID: 22165397

96. Hjalmarson A, Saloojee Y. Psychologists and tobacco: attitudes to cessation counseling and patterns of use. Preventive medicine. 2005; 41(1):291–4. https://doi.org/10.1016/j.ypmed.2004.11.012 PMID: 15917024

97. Hodgetts G, Broers T, Marshall G. Smoking behaviour, knowledge and attitudes among Family Medicine physicians and nurses in Bosnia and Herzegovina. BMC Family Practice. 2004; 5(1):12.

98. Hung O, Keenan NL, Fang J. Physicians’ health habits are associated with lifestyle counseling for hypertensive patients. American Journal of Hypertension. 2013; 26(2):201–8. https://doi.org/10.1093/ajh/hps022 PMID: 23382404

99. Incorvaia C, Pravettoni C, Dugnani N, Riario-Sforza GG. Indagini sull’atteggiamento attuale verso il fumo di sigaretta degli operatori sanitari in Italia [A survey on current attitudes to smoking in health care workers in Italy]. Med Lav. 2008; 99(3):212–5. PMID: 18689093

100. Jardim T, Jardim PCBV, Araújo WEC, Jardim LMSSV, Salgado CM. Factores de riesgo cardiovasculares en cohorte de profesionales del área médica: 15 años de evolución [Cardiovascular risk factors in a cohort of healthcare professionals: 15 years of evolution]. Arq Bras Cardiol. 2010; 95(3):332–8. https://doi.org/10.1590/s0066-782x2010005000084 PMID: 20602007

101. Jardim T, Sousa ALL, Povoa TR, Barroso WS, Chinem B, Jardim PCV. Comparação entre Fatores de Risco Cardiovascular em Diferentes Áreas da Saúde num Intervalo de Vinte Anos [Comparison of Cardiovascular Risk Factors in Different Areas of Health Care Over a 20-Year Period]. Arq Bras Cardiol. 2014; 103(6):493–501.

102. Jiang YL, XinHua; Xi W. U. Smoking behavior of Chinese physician. Chinese J of Prev and Control of Chron Disease. 2009; 17(3):224–7.

103. Jimenez-Ruiz C, Miranda JAR, Pinedo AR, Martinez EDH, Marquez FL, Cobos LP, Reina SS, Orive JIDG, Ramos P. Prevalence of and attitudes towards smoking among Spanish health professionals. Respiration. 2015; 90(6):474–80. https://doi.org/10.1159/000441306 PMID: 26484660

104. Kaiser P, Noack A, Donner-Banzhoff N, Keller S, Baum E. Comparing physicians’ and lawyers’ health behaviour. Z Allg Med. 2005; 81(10):419–22.

105. Kaneita Y, Ohida T, Imamura S, Ikeda M, Itani O. Prevalence and correlates of smoking among Japanese physicians: Result from the 2012 survey on the smoking activities of Japan Medical Association members. JMAJ. 2013; 56(4):253–66.

106. Karahan A, Kav S, Abbasoglu A, Dogan N. Low back pain: prevalence and associated risk factors among hospital staff. J of Advanced Nursing. 2009; 65(3):516–24.

107. Kara-Perz H, Perz S, Popow M, Kosicka T. Czynne i bierne narazenie na dym tytoniowy czlonków zespółów ratownictwa medycznego [Smoking and passive exposure to tobacco smoke among members of medical rescue teams]. Przegl Lek. 2008; 65(10):600–1.

108. Kazmi S, Patel S, Watkins L, Tack G, Stead R J, Babores M. Smoking habits of health care professionals in a district general hospital (DGH) two years after smoking ban. Am J Respir Crit Care Med. 2010; 181:A2650.

109. Kenfield S, Wei EK, Rosner BA, Glynn RJ, Stampfer MJ, Colditz GA. Burden of smoking on cause-specific mortality: application to the Nurses’ Health Study. Tob Control. 2010; 19(3):248–54. https://doi.org/10.1136/tc.2009.032839 PMID: 20501499

110. Ketkar A, Veluswamy SK, Prabhu N, Maiya AG. Screening for noncommunicable disease risk factors at a workplace in India: A physiotherapy initiative in a healthcare setting. Hong Kong Physiotherapy Journal. 2015; 33(1):3–9.

111. Khawaja O, Petrone AB, Aleem S, Manzoor K, Gaziano JM, Djourus L. Sleep duration and risk of lung cancer in the physicians’ health study. Chin J Lung Cancer. 2014; 17(9):649–55.

112. Kheradmand A, Hoseinrezae H, Khodabandeh S, Pilevarzadeh M. Frequency of smoking and specialized awareness among doctors and nurses of hospitals in Kerman, Iran. Addict Health. 2013; 5(1):51–6.

113. Kim M, Son KH, Park HY, Choi DJ, Yoon CH, Lee HY, Cho EY, Cho MC. Association between shift work and obesity among female nurses: Korean Nurses’ Survey. BMC public health. 2013; 13: https://doi.org/10.1186/471-2458-13-1204

114. Klopepe P, Brotons C, Anton JJ, Ciurana R, Iglesiass M, Pineiro R, Fornasini M. Prevencion y promocion de la salud en atencion primaria: comparacion entre la vision de los medicos espanoles y los medicos europeos [Preventive care and health promotion in primary care: comparison between the views of Spanish and European doctors]. Atien Primaria. 2005; 36(3):144–51. PMID: 16029744
115. Kobayashi J, Shigenaga T, Kitamura S. Repeated questionnaire about smoking at the annual meetings of the Japanese Respiratory Society held in 1996, 1999, 2001, 2003, 2005, 2007, 2010, and 2012. Eur Respir J. 2012; 40(Suppl 56):P1069.

116. Korzybski D, Bliska A, Skrzypczynska E, Gorecka D. Rozpowszechnienie nalogu palenia tytoniu w rodzin na [Smoking habits among Polish respiratory physicians]. Pneumonol Alergol Pol. 2008; 76(3):142–7. PMID: 18843928

117. Kumar A, Ghazali S, Ismail S, Idruees N, Rizvi N. Knowledge attitude and practice of shisha (water pipe) use in doctors. Eur Respir J Suppl. 2012; 40(56):P4067.

118. Kumar A, Notani S, Mahat R, Hussain N, Rizvi N. Comparison of knowledge attitude and practice of cigarette smoking and water pipe use among physicians and surgeons of Pakistan. Eur Respir J Suppl. 2015; 46(59):PA1426.

119. Kumbria S, Milakovic SB, Jelinic JD, Matanic D, Markovic BB, Simunovic R. Zdravstveni radnici—odnos prema vlastitom zdravlju [Health care professionals—attitudes towards their own health]. Acta Med Croatica. 2007; 61(1):105–10. PMID: 17593650

120. Kuo H, Chou SY, Kuo HH, Lin LM, Lin AY, Liaw LJ. The prevalence of cigarette smoking among physicians and dentists in a county in Taiwan. Mid-Taiwan Journal of Medicine. 2007; 12(1):37–43.

121. Lazovic N, Majstorovic S, Antonovic J, Pesic I, Suluburic D. Research of smoking in health workers in Hospital Cacak-Serbia. Eur Respir J Suppl. 2011; 38(55):1093–4.

122. Li H, Sun HS, Liu ZQ, Zhang Y, Cheng QC. Cigarette smoking and anti-smoking counselling: dilemmas of Chinese physicians. Health Education. 2007; 107(2):192–207.

123. Li X, Yuan YY, Gao HY. Investigation of smoking-related behaviors among the doctors in Tianjin. Chinese J of Prev and Control of Chron Disease. 2010; 18(1):31–2.

124. Li X, Cheng MN, Miao S, Zhang H, Ke T, Chen YS. Study on epidemic status of current smoking and related factors among staffs in Shanghai hospitals. Modern Preventive Medicine. 2013; 40(12):2189–91.

125. Lina M, Pozzi P, Brunelli C, Pierotti MA, Boffi R. Physicians’ smoking habit, training and attitude toward cancer patient smoking cessation: The Istituto Nazionale dei Tumori experience. Eur Respir J Suppl. 2012; 40(56):P4047.

126. Lindo J, LaGrenade J, McCaw-Binns A, Eldemire-Shear D. Health status and health maintenance practices among doctors and nurses at two hospitals in Jamaica. West Indian Med J. 2010; 58(6):539–45. PMID: 20583679

127. Lisanti R, Gatica D, Abal J, Delaballe E, Grañana M, Gonzalez L, Moreno G, Di Giorgi L. Comparación del tabaquismo en Argentina entre el personal de salud y población general (periodo 1997 a 2012). Prev tab. 2014; 16(1):21–7.

128. Lopez-Maya L, Lina-Manjarrez F, Navarro-Henze S, Lopez LML. Adicciones en anestesiologos. ¿Por que se han incrementado? ¿Debemos preocuparnos? [Addiction in anesthesiologists. Why have increased? Should we be concerned?]. Revista Mexicana de Anestesiologia. 2012; 35(2):95–106.

129. Maksimovic L, Patkovic S, Daniel M, Stewart H, Chong A, Lekkas P, Cargo M. Characterising the smoking status and quit smoking behaviour of aboriginal health workers in South Australia. International journal of environmental research and public health. 2013; 10(12):7193–206. https://doi.org/10.3390/ijerph10127193 PMID: 24351741

130. Malik AK C A.; Karamat A.; Arif N.; Cheema M. A.; Rauf A. Cigarette smoking and health care professionals at Mayo Hospital, Lahore, Pakistan. J Pak Med Assoc. 2010; 60(6):509–12. PMID: 20527661

131. Malinauskienė V, Leisyte P, Romualdas M, Kirtiklyte K. Associations between self-rated health and psychosocial conditions, lifestyle factors and health resources among hospital nurses in Lithuania. J of Advanced Nursing. 2011; 67(11):2383–93.

132. Man M, Bondor C, Pop M. Râjnoaveanu R, Alexandrescu D, Rusu G. De ce fumeaza doctorii? [Why do doctors smoke?]. Pneumologia. 2009; 58(3):195–200. PMID: 19817319

133. Mansour A, Shoughati AT, Ghazi NG, Mokdad F, Ghosn M. Health status of Lebanese ophthalmologists. Clinical and Experimental ophthalmology. 2002; 30(1):60–1. PMID: 151027193 PMID: 24351741

134. Mansoura F, Abdulmalik MA, Salama RE. Profile of smoking among primary healthcare professionals at Mayo Hospital, Lahore, Pakistan. J Pak Med Assoc. 2010; 60(6):509–12. PMID: 20527661

135. Marin G, Silberman M, Ferrero S, Sanguinetti C. Tabaquismo en instituciones de salud en Buenos Aires, Argentina [Smoking in health institutions in Buenos Aires, Argentina]. Rev Inst Naval Resp Mex. 2008; 21(2):67–91.

136. Marochi L, Campos CW, Marcanti FP, Moreira DM. Comparação de fatores de risco cardiovascular entre médicos cardiólogos e não cardiologistas [Comparison of cardiovascular risk factors between cardiologists and non-cardiologists]. Rev bras cardiol (Impr). 2013; 26(4):248–52.
137. Martínez C, García M. Evaluación del grado de implantación de las intervenciones para el control del tabaquismo en la Red Catalana de Hospitales sin Humo [Evaluation of the degree of implementation of tobacco control interventions in the Catalan Network of Smoke-Free Hospitals]. Enferm clín (Ed impr). 2007; 17(4):177–85.

138. Maryana M, Jaafar N, Mohd YZY. Knowledge and attitude of dental health care workers towards smoking. Med J Malaysia. 2010; 65(Suppl A):PH802.

139. Memon A, Mustufa MA, Muhammad A. Frequency of smoking among employees at a tertiary care children hospital, Karachi. J of the Dow University of Health Sciences. 2010; 4(1):43–6.

140. Merrill R, Madanat H, Kelley AT, Layton JB. Nurse and physician patient counseling about tobacco smoking in Jordan. Promotion & Education. 2008; 15(3):9–14.

141. Michalsen A, Richarz B, Reichard H, Spahn G, Konietzko N, Dobos GJ, Reichart H. Raucherentwöhnung bei Krankenhausbeteiligten—Eine kontrollierte Interventionsstudie [Smoking cessation for hospital staff. A controlled intervention study]. Dtsch Med Wochenschr. 2002; 127(34–35):1742–7. https://doi.org/10.1055/s-2002-33544 PMID: 12192632

142. Mihalopoulos N, Berenson GS. Cardiovascular risk factors among internal medicine residents. Preventive cardiology. 2008; 11:76–75. PMID: 11529979

143. Mitra D, Pawar SD, Anahita M, Shah RA, Rodrigues SV, Desai AB, Patthare PN, Shingnapurkar SH, Vijayakar HN. Attitudes of dental professionals toward tobacco use. J Indian Soc Periodontol. 2015; 19(3):317–21. https://doi.org/10.4103/0972-124X.153488 PMID: 26229275

144. Miyazaki Y, Hayashi K, Mizunuma H, Lee JS, Katanoda K, Imazeki S, Suzuki S. Smoking habits in young adults: their reasons for smoking and desire to quit. Journal of advanced nursing. 2001; 35(5):769–75. PMID: 11529979

145. Movsisiyan V, Varduni P.; Arusyak H.; Diana P.; Armen M.; Frances S. A. Smoking behavior, attitudes, and cessation counseling among healthcare professionals in Armenia. BMC public health. 2012; 12:1028. https://doi.org/10.1186/1471-2458-12-1028 PMID: 23176746

146. Moxham L, Dwyer T, Reid-Seal K. Graduate nurses and nursing student's behaviour: knowledge and attitudes toward smoking cessation. Nurse Educ Today. 2013; 33(10):1143–7. https://doi.org/10.1016/j.nedt.2012.11.024 PMID: 23273686

147. Nappini V, Fedi M, Millarini V, Fabbri S. Indagine sullo stile di vita di infermieri, studenti infermieri e giovani adolescenti [Survey on the lifestyle of nurses, nursing students and young adolescents]. Professioni infermieristiche. 2015; 68(2):148–54. https://doi.org/10.7429/pi.2015.680214PMID: 26402235

148. Nawaz A, Naqvi SAA. Attitudes, perceptions, habits of smoker, non-smoker general practitioners and why they fail to motivate patients to quit smoking. Pak J Med Sci. 2008; 24(1):152–6.

149. Negro C, De Michieli P, Peresson M, Tominz R, Poropat C, Vegliach A, Generoso G, Cosmini S, Bovenzi M. Operatori della sanità liberi dal fumo. Attivazione di un progetto in Provincia di Trieste [Freedom from smoking for health care workers. A project from Trieste]. G Ital Med Lav Ergon. 2007; 29(3 Suppl):246–8. PMID: 18409668

150. Nekhoroshev A, Fedorova TG, Kotova GN. Sotsioligcheskoe issledovanie osobennostei trudovoi deiatelnosti vrachei Severo-Zapadnogo regiona Rossii [A sociological study of labor peculiarities of doctors in the North West of Russia]. Gig Sanit. 2003(3):24–7. PMID: 12852034
156. Ng N, Prabandari YS, Padmawati RS, Okah F, Haddock CK, Nichter M, Nichter M, Muramoto M, Poston WSC, Pyle SA, Mahard inata N, Lando HA. Physician assessment of patient smoking in Indonesia: a public health priority. Tobacco control. 2007; 16(3):190–6. https://doi.org/10.1136/tc.2006.018895 PMID: 17565139

157. Ngalante B, Lumia H, Ndiiye M, Njankouo YM, Mbahe S, Wandji A, Temfack E, Sone AM, Dautzenberg B. Prevalence du tabagisme chez le personnel de l’Hôpital General de Douala, Cameroun [Prevalence of smoking among staff of the General Hospital of Douala, Cameroon]. Pan Afr Med J. 2012; 11(25):1–7.

158. Nollen N, Adewale S, Okuyemi KS, Parakoyi A. Workplace tobacco policies and smoking cessation practices of physicians. J Natl Med Assoc. 2004; 96(6):838–42. PMID: 15233495

159. Ocampo-Ocampo M, Cuevas-Aguirre E, Borjas-Rivera I, Ramirez-Casanova ME, Cicero-Sabido R. Quienes fuman en un hospital general? Comentario clinico [Who smoke at a general hospital? Clinical comment]. Gac Med Mex. 2001; 137(6):615–20. PMID: 11766469

160. Okeke P, Ross AJ, Esterhuizen T, Wyk JMV. Tobacco and alcohol use among healthcare workers in three public hospitals in KwaZulu-Natal, South Africa. S Afr Fam Pract. 2012; 54(1):61–7.

161. Oliveira S, Honner MR, Paniago AMM, Aguiar ESA, Cunha RV. Prevalência da infecção tuberculosa entre profissionais de um hospital universitário; Existência da infecção tuberculose entre profissionais de um hospital universitário em Mato Grosso do Sul, 2004 [Prevalence of mycobacterium tuberculosis among professionals in a university hospital, Mato Grosso do Sul, 2004]. Rev Lat Am Enfermagem. 2007; 15(6):1120–4. https://doi.org/10.1590/s0104-11692007000600010 PMID: 18235953

162. O’Mahony E, Rahmani F. Staff attitudes to smoking in an Irish mental health service. BJPsych. 2004; 28(11):425.

163. Osorio X, Rivas E, Jara J. Prevalencia de tabaquismo en enfermeras de la IX región, Chile [Prevalence of smoking among nurses in the Ninth region of Chile]. Rev Med Chile. 2003; 131(3):269–74. PMID: 12790075

164. Ozturk O, Ozturk G, Yazicioglu B, Yalcin BM, Unal M. Smoking frequency, cessation knowledge; Attitudes and beliefs among internal and surgery residents. J Exp and Clin Med. 2015; 32(4):171–5.

165. Packer H, Jawad M. Junior doctors and waterpipe tobacco smoking. British Journal of General Practice. 2014; 64:617–8.

166. Parkins G, O'Rourke N. Smoking attitudes among cancer centre staff. Lung Cancer. 2012; 75(Suppl 1):S44.

167. Parma K, Rahu K, Rahu M. Smoking habits and attitudes towards smoking among Estonian physicians. Public Health. 2005; 119(5):390–9. https://doi.org/10.1016/j.puhe.2004.07.005 PMID: 15780327

168. Pati S, Patnaik S, Swain S. 5A tobacco cessation strategy and physician’s practice in Odisha, India: A cross-sectional study. Int J Prev Med. 2014; 5(3):325–32. PMID: 24829717

169. Paudel B, Paudel K, Timilsina D. Reaction s of Nepali adults to warning labels on cigarette packages: A survey with employee and medical students of a tertiary care medical college of western region of Nepal. Journal of Clinical and Diagnostic Research. 2013; 7(10):2216–22. https://doi.org/10.7860/JCDR/2013/5588.3475 PMID: 24298480

170. Peng D, Zhou JH, Chen H, Li R, Li C, Zhou HY, Wang DX, Wang CZ. Respiratory physicians’ knowledge, attitude and practice of tobacco control and their smoking status in the city of Chongqing. Chin J Tuberc Respir Dis. 2013; 36(4):283–7.

171. Pérez BB A C, Ramón MJ, de FO, Martínez L, Aranda C, V A Vila DS. Prevalence of IgG antibodies to toxin tetanus in health workers. Med segur trab. 2014; 60(236):480–8.

172. Pericás J, Ayensa JA, Milán J, Contreras P, Serra F, Sureda AM. El hábito tabáquico en el colectivo de colegiados en enfermería de la Comunidad de las Islas Baleares [The smoking habits of registered nurses in the community of the Balearic Islands]. Index enferm. 2007; 16(58):26–30.

173. Perrin P, Merrill RM, Lindsay GB. Patterns of smoking behavior among physicians in Yerevan, Armenia. BMC public health. 2006; 6: https://doi.org/10.1186/1471-2458-6-139

174. Perry L, Lamont S, Brunero S, Gallagher R, Duffield C. The mental health of nurses in acute teaching hospital settings: a cross-sectional survey. BMC Nursing. 2015; 14(1): https://doi.org/10.1186/s12912-015-0068-8 PMID: 25904820

175. Pokhrel B, Thankappan KR, Mini GK, Sarma PS. Tobacco use among health professionals and their role in tobacco cessation in Nepal. Prevention and Control. 2006; 2:117–25.

176. Poulsen K, Cleal B, Clausen T, Andersen LL. Work, diabetes and obesity: a seven year follow-up study among Danish health care workers. PloS one. 2014; 9 (https://doi.org/10.1371/journal.pone.0103425):e103425. PMID: 25068830
177. Pourmahabadian M, Azam K, Ghasemkhani M. Pulmonary function study between formaldehyde exposed and non-exposed staffs at some of the Tehran Educational Hospitals. J of Med Sci. 2006; 6 (4):621–5.

178. Pretto G, Roncarolo F, Bonfanti M, Bettinelli E, Invernizzi G, Ceccarelli M, Carreri V, Tenconi MT. Indagine conoscitiva sulle abitudini al fumo, le opinioni e l’attività di prevenzione del tabagismo tra i medici di medicina generale della Lombardia [Survey among GP’s about their smoking habits, opinions and behaviours in smoking prevention in Lombardy (Northern Italy)]. EP. 2006; 30(6):343–7.

179. Pretto A, Pastore CA, Assunção MCF. Comportamentos relacionados à saúde entre profissionais de ambulatórios do Sistema Único de Saúde no município de Pelotas-RS [Healthcare professionals health-related behaviors in National Health System clinics in the city of Pelotas-RS, Brazil]. Epidemiol serv saúde. 2014; 23(4):635–44.

180. Principe R. [Smoking habits of Italian health professionals]. Italian Heart Journal. 2001; 2 (Suppl 1):110–2.

181. Proietti L, Bonanno G, Di Maria A, Palermo F, Polosa R, Lupo L. Abitudine al fumo di tabacco in operatori sanitari: esperienza in Aziende Ospedaliere della Sicilia Orientale [Smoking habits in health care workers: experience in two general hospitals of Eastern Sicily]. Clin Ter. 2006; 157(5):407–12. PMID: 17147047

182. Prucha M, Fisher SG, McIntosh S, Grable JC, Holdeness H, Thevenet-Morrison K, Monegro ZQ, Sanchez JJ, Bautista A, Diaz S, Ossip DJ. Health care workers’ knowledge, attitudes and practices on tobacco use in economically disadvantaged Dominican Republic communities. International journal of environmental research and public health. 2015; 12(4):4060–75. https://doi.org/10.3390/ijerph12044060 PMID: 25872018

183. Pumpe K, Schildge J, Walter B. Smoking habits of staff in a hospital specializing in pneumology. Atemw-Lungenkth. 2003; 29(2):49–58.

184. Rahman M, Wilson AM, Sanders R, Castle D, Daws K, Thompson DR, Ski CF, Matthews S, Wright C, Retief F, Prinsloo E, Calitz J, Barnes JM. Smoking among nursing staff at Tygerberg Hospital, Cape Town. South African Medical Journal. 2003; 93(9):661–3. PMID: 14635551

185. Rius M, Mesa P, Garcia M, Rius F, De La Vega MG, Lupianez A. Smoking tendencies in physicians and surgeons from Andalusia. Eur Respir J. 2012; 40(Suppl 56):P1979.

186. Rodriguez G, Galvão V, Viegas CA. Prevalence of smoking among dentists in the Federal District of Brasilia, Brazil. J Bras Pneumol. 2008; 34(5):288–93. https://doi.org/10.1590/s1806-37132008000500007 PMID: 18545824

187. Rodriguez G, Valderrey BJ, Secades VR, Vallejo SG, Fernández HJR, Jiménez GJM, Díaz GT, García RO. Consumo y actitudes sobre el tabaco entre el personal sanitario del Principado de Asturias (España) [Smoking and attitudes to smoking among health personnel in the Principado of Asturias, Spain]. Trastadorict. 2004; 6(4):234–9.

188. Saavedra V, Ferreira PS, Pillon SC. Tabaquismo en las enfermeras de un hospital nacional de Lima, Perú [Smoking among nurses of the national hospital in Lima, Peru]. Rev Latino-Am Enfermagem. 2010; 18 Spec No:550–6.

189. Saika K, Sobue T, Katanoeda K, Tajima K, Nakamura M, Hamajima N, Oshima A, Kato H, Tago C. Smoking behavior and attitudes toward smoking cessation among members of the Japanese Cancer Association in 2004 and 2006. Cancer Sci. 2008; 99(4):824–7. https://doi.org/10.1111/j.1349-7006.2008.00736.x PMID: 18307540

190. Sainz M, Sánchez E, Guillén M, González A, Calvo R, García-Arenzana N, Federes J. El profesional sanitario frente al consumo de tabaco: la experiencia de un hospital de la Comunidad de Madrid. Med prev. 2007; 13(3):19–26.

191. Salah S, Rhil H, Elguesmi O, Abdarrahmen AB, Hayouni A, Mrizak N, Benzarti M. Connaissances, attitudes et comportements du personnel hospitalier vis-à-vis du tabagisme et de la réglementation anti-
Prevalence of tobacco use in healthcare workers

197. San Pedro E, Roales-Nieto JG, Coronado JLB. Hábitos y creencias de salud en médicos y estudiantes de Medicina [Health habits, and health beliefs among physicians and medical students]. Int j psychol psychoter (Ed impr). 2006; 6(1):99–110.

198. Sánchez P, Lisanti N. Prevalencia de tabaquismo y actitud hacia el tabaco entre médicos del Azuay, Ecuador. Rev Pan Am Salud Publica/Pan Am J Public Health. 2003; 14(1).

199. Santa-Maria A, Sainz M, Cano S, Fereres J. Consumo y actitudes hacia el tabaco de los profesionales de la medicina y enfermería del Hospital Clínico San Carlos de Madrid. Medicina Preventiva. 2005; 11(4):16–23.

200. Santander R S, Sánchez C, Zapata P, Sánchez L, S S. La salud de los médicos de la región metropolitana y algunos de sus determinantes [Health status of physicians and some of its determinants: metropolitan region, Chile]. Cuad Méd Soc. 2010; 50(3):220–34.

201. Santos F, Gouveia CHBC, Andrade PM, Guimarães AABP, Machado RIL. Prevalence of smoking among medical professionals of a public hospital. Journal of Thoracic Oncology. Suppl2 2012; 7(7):S116–S7.

202. Sarra L, Bialous SA, Kralikova E, Kmetova A, Felbrova V, Kulovana S, Mala K, Roubickova E, Wells MJ, Brook JK. Tobacco cessation practices and attitudes among nurses in the Czech Republic. Cancer Nursing. 2015; 38(6):E22–E9. https://doi.org/10.1097/NCC.0000000000000222 PMID: 25730594

203. Sarra L B S, Nandy K, Yang Q. Are quit attempts among U.S. female nurses who smoke different from female smokers in the general population? An analysis of the 2006/2007 tobacco use supplement to the current population survey. BMC women’s health. 2012; 12(1):4.

204. Schulz M, Töpper M, Behrens J. Rauchverhalten von Mitarbeitern und Patienten der psychiatrischen Abteilung eines Allgemeinkrankenhauses; [Smoking habits of employees and patients in the psychiatric department of a general hospital]. Gesundheitswesen (Bundesverband der Ärzte des Öffentlichen Gesundheitsdienstes (Germany)). 2004; 66(2):107–13.

205. Shelley D T T, Pham H, Nguyen L, Keithly S, Stillman F, Nguyen N. Factors influencing tobacco use treatment patterns among Vietnamese health care providers working in community health centers. BMC public health. 2014; 14:68. https://doi.org/10.1186/1471-2458-14-68 PMID: 24450865

206. Shi Y C, Luo A, Huang Y, Warner DO. Perioperative tobacco interventions by Chinese anesthesiologists: practices and attitudes. Anesthesiology. 2010; 112(2):338–46. https://doi.org/10.1097/ALN.0b013e3181c91ee7 PMID: 20998136

207. Shkedy Y, Feinmessner RM, Mizrachi A. Smoking habits among Israeli hospital doctors: a survey and historical review. Isr Med Assoc J. 2013; 15(7):339–41. PMID: 23943976

208. Simonetti S, Kobayashi RM, Bianchi ERF. Identificacao dos agravos a saude do trabalhador de enfermagem em hospital cardiológico [Identification of damages to the health of nursing workers in a cardiology hospital]. Saúde Coletiva. 2010; 7(41):135–9.

209. Siqués P, Brito J, Muñoz C, Pasten P, Zavala P, Vergara J. Prevalence and characteristics of smoking in primary healthcare workers in Iquique, Chile. Public Health. 2006; 120:618–23. https://doi.org/10.1016/j.puhe.2006.01.008 PMID: 16730761

210. Slater P, McElwee G, Fleming P, McKenna H. Nurses’ smoking behaviour related to cessation practice. Nursing Times. 2006; 102(19):32–7. PMID: 16711288

211. Smith D, Zhang X, Zheng Y, Wang RS. Tobacco use among public health professionals in Beijing: The relationship between smoking and education level. Australian and New Zealand J of Public Health. 2005; 29(5):488–9.

212. Smith D, Zhao I, Wang L. Tobacco smoking among doctors in mainland China: a study from Shandong province and review of the literature. Tobacco induced diseases. 2012; 10(1)

213. Sonmez C, Aydi LY, Turke Y, Baltac D, Dikic S, Sarıgüze YC, Alasa F, Deler MH, Karacan MS, Demir M. Comparison of smoking habits, knowledge, attitudes and tobacco control interventions between primary care physicians and nurses. Tobacco induced diseases. 2015; 13(37): https://doi.org/10.1186/s12971-015-0062-7 PMID: 26568385

214. Sousa R, Sobral DP, Pa SMRS, Martin MCC. Prevalência de sobre peso e obesidade entre funcionários plantonistas de unidades de saúde de Teresina, Piauí [Overweight and obesity prevalence in employees of healthcare units in Teresina, Piauí, Brazil]. Rev nutr. 2007; 20(5):473–82.

215. Souza N, Cunha LS, Pires AS, Gonçalves FGA, Ribeiro LV, Silva SSLF. Socio-economic and health profile of the nursing staff of the piquet carreiro polyclinic. Revista Mineira de Enfermagem. 2012; 16(2):232–40
216. Stubbs J, Haw C, Garner L. Survey of staff attitudes to smoking in a large psychiatric hospital. Psychiatric Bulletin 2004; 28:204–7.

217. Suárez N, Hernandez MC, Hechavaria SN. El tabaquismo en los profesionales de la salud en el municipio Habana Vieja [Smoking in health professionals working in Habana Vieja municipality]. Cuban Public Health Rev 2008; 34(4):ISSN 0864-3466.

218. Sun J, Wu XL, Zhang F. Study on smoking-related health knowledge and attitudes and behaviors among doctors in Hebei province. Chinese J of Prev and Control of Chron Disease. 2009; 17(3):240–3.

219. Tong EK, Strouse R, Hall J, Kovac M, Schroeder SA. National survey of U.S. health professionals' smoking prevalence, cessation practices, and beliefs. Nicotine & tobacco research: official journal of the Society for Research on Nicotine and Tobacco. 2010; 12(7):724–33.

220. Torres A, Ruiz T, Müller SS, Lima MCP. Qualidade de vida e saúde física e mental de médicos: uma autoavaliação por egressos da Faculdade de Medicina de Botucatu—UNESP [Quality of life, physical and mental health of physicians: a self-evaluation by graduates from the Botucatu Medical School—UNESP]. Rev Bras Epidemiol. 2011; 14(2):264–75. PMID: 21659693

221. Tountas Y, Manios Y, Dimitrakaki C, Tzavara C. Relationship between basic protective health behaviours and health related quality of life in Greek urban hospital employees. International Journal of Public Health. 2007; 52(6):341–7. PMID: 18368997

222. Touré N, Dia Kane Y, Diatta A, Ndiaye EHM, Niang A, Thiam K, Diatta A, Dia Kane Y, Ndiaye EM, Cisse MF, Mbaye FBR, Hane AA. Le tabagisme chez le personnel médical et paramédical dans quatre grands hopitaux de Dakar [Smoking among health workers at four large hospitals in Dakar, Senegal]. Rev Mal Respir. 2011; 28:1095–103. https://doi.org/10.1016/j.rmr.2011.03.017 PMID: 22123135

223. Tselebis A PA, Theotoka I, Ilias I. Nursing staff anxiety versus smoking habits. Int J Nurs Pract. 2001; 7(3):221–3. PMID: 11811818

224. Uallachain G. Attitudes towards self-health care: A survey of GP trainees. Irish Med J. 2007; 100 (6):489–91.

225. Underner M, Laforgue AV, Chabaud F, Meurice JC. Influence du tabagisme des medecins sur la pratique du "conseil minimal". Enquete aupres de 369 medecins generalistes de la Vienne [Influence of doctors’ smoking habits on minimal advice for smoking cessation. A survey of 369 general practitioners in the department of Vienne, France]. Presse Med. 2004; 33:927–9. PMID: 15509045

226. Uruena J, Pust AB, Serra MS, Pujadas CD, Guila FM. Evolucion del consumo de tabaco en trabajadores de un hospital de Cataluna [Temporal evolution of tobacco consumption among health care workers in a Catalanian hospital, Spain]. Rev Esp Salud Publica. 2013; 87:407–17.

227. Valliani A, Ahmed B. Use of smoke less tobacco amongst the staff of tertiary care hospitals in the largest city of Pakistan. Eur J Med Res. 2011; 16:87–8.

228. Valverde B, Perez AM, Moreno AC. Consumo de drogas entre los Especialistas Internos Residentes de Jaen (Espana) y su relacion con el consejo clinico [Drugs consumption among Intern Specialists in Jaen (Spain) and their relationship to clinical counseling]. Addiciones. 2013; 25(3):243–52.

229. Velasco-Contreras M. Perfil de salud de los trabajadores del Instituto Mexicano del Seguro Social [Health profile of Instituto Mexicano del Seguro Social workers]. Rev Med Inst Mex Seguro Soc. 2013; 51(1):12–25. PMID: 23550404

230. Viegas C, Andrade APA, Silvestre RS. Características do tabagismo na categoria médica do Distrito Federal; Characteristics of smoking among physicians in the Federal District of Brazil. J Bras Pneumol. 2007; 33(1):76–80.

231. Villarreal D, Bascones-Martinez A, Perez Gonzalez E, Lauritano D. Conocimiento y actitud del odontólogo frente al manejo del tabaquismo: estudio comparativo entre España, Italia y Venezuela [The participation of dentists in smoking cessation: comparative study of Venezuelan, Spanish and Italian dentists]. Avances Odontostomatol. 2009; 25(4):209–13.

232. Virtanen M, Vahtera J, Battty DG, Tuisku K, Oksanen T, Elowainio M, Ahola K, Pentti J, Salo P, Vartti AM, Kivimaki M. Health risk behaviors and morbidity among hospital staff—comparison across hospital ward medical specialties in a study of 21 Finnish hospitals. Scand J Work Environ Health. 2012; 38:228–37. https://doi.org/10.5271/sjweh.3264 PMID: 22173213

PLOS ONE | https://doi.org/10.1371/journal.pone.0220168 July 25, 2019 24 / 26
235. Vitzthum K, Koch F, Koßmehl-Zorn S, Goldhahn LM, Kusma B, Mache S, Groneberg DA, Pankow W. Gesundheitsförderung im Gesundheitswesen—Analyse der Rauchgewohnheiten der Mitarbeiter, Konsequenzen für die Patientenbehandlung und Ressourcen für zukünftige Tabakentwöhnungsinitiativen [Health promotion within health care—analysis of employees’ smoking habits, consequences for patient care and resources for future smoking cessation initiatives]. Gesundheitswesen (Bundesverband der Ärzte des Öffentlichen Gesundheitsdienstes (Germany)). 2013; 75:35–42.

236. Yan J X S, Ouyang D, Jiang D, He C, Yi S. Smoking behavior, knowledge, attitudes and practice among health care providers in Changsha city, China. Nicotine & tobacco research: official journal of the Society for Research on Nicotine and Tobacco. 2008; 10(4):737–44.

237. Zafar M. Prevalence of smoking and associated risk factors among medical professionals in hospitals of Karachi, Pakistan. Int J Preventive Medicine. 2014; 5(4):457–62.

238. Zakaria W, Khoury A. Influence of smoking among residents doctors in a tertiary teaching hospital and their attitude of giving smoking cessation advice. Eur Respir J. 2012; 40(Suppl 56):P1977.

239. Zapka J, Lemon SC, Magner RP, Hale J. Lifestyle behaviors and weight among hospital-based nurses. Journal of Nursing Management. 2009; 17(7):853–60 https://doi.org/10.1111/j.1365-2834.2008.00923.x PMID: 19793242

240. Zhou J, Abdullah AS, Pun VC, Huang D, Lu S, Luo S. Smoking status and cessation counseling practices among physicians, Guangxi, China. 2007. Preventing chronic disease. 2010; 7(1):http://www.cdc.gov/pcd/issues/2010/jan/09_0006.htm. Accessed on 17 June 2017.

241. Zylbersztejn H, Cragnolino R, Francesia AN, Tambussi A, Mezzalira VJ, Levin RL, Michref A, Mulassi A, Picarel A, Roblottet A, Puleio PA, Rossi E, Escobar C, J G, Salvati AM, Ciruzzi M. Estudio epidemiológico del tabaquismo en médicos; Epidemiological study of smoking in physicians. Rev Argent Cardiol. 2003; 71(3):178–84.

242. Zylbersztejn H, Cardone A, Vainstein N, Mulassi A, Calderón JG, Blanco P, Pautasso E, Picarel A, Cragnolino R, Fernández S, Andina A, Saravia Toledo S, Torchio I, Belziti CA. Tabaquismo en médicos de la República Argentina. Estudio TAMARA; Smoking among physicians in Argentina. The TAMARA trial. Rev Argent Cardiol. 2007; 75:109–16.

243. Zysnarska M, Bernad D, Adamek R, Maksymiuk T. Palenie papierosow wsrod pielegniarek —brak wiedzy, czy efekt przeciazen ia praca? [Tobacco smoking among nurses—a lack of knowledge or effect of work overload?]. Przegl Lek. 2008; 65(10):602–4. PMID: 19189559

244. Sarna L, Bialous SA, Sinha K, Yang Q, Wewers ME. Are health care providers still smoking? Data from the 2003 and 2006/2007 Tobacco Use Supplement-Current Population Surveys. Nicotine & tobacco research: official journal of the Society for Research on Nicotine and Tobacco. 2010; 12 (11):1167–71.

245. Peters SAE, Huxley RR, Woodward M. Do smoking habits differ between women and men in contemporary Western populations? Evidence from half a million people in the UK Biobank study. BMJ Open. 2014; 4(12).

246. Islami F, Stoklosa M, Drope J, Jemal A. Global and Regional Patterns of Tobacco Smoking and Tobacco Control Policies. European Urology Focus. 2015; 1(1):3–16. https://doi.org/10.1016/j.euf.2014.10.001 PMID: 28723352

247. Bosdriesz JR, Mehmedovic S, Witvliet MI, Kunst AE. Socioeconomic inequalities in smoking in low and mid income countries: positive gradients among women? International Journal for Equity in Health. 2014; 13:14-. https://doi.org/10.1186/1475-9276-13-14 PMID: 24502335

248. Amos A, Greaves L, Richter M, Bloch M. Women and tobacco: a call for including gender in tobacco control research, policy and practice. Tobacco control. 2012; 21(2):236–43. https://doi.org/10.1136/tobaccocontrol-2011-050280 PMID: 22166266

249. Anderson CL, Becher H, Winkler V. Tobacco Control Progress in Low and Middle Income Countries in Comparison to High Income Countries. International journal of environmental research and public health. 2016; 13(10):1039.
254. Nilan K, Raw M, McKeever TM, Murray RL, McNeill A. Progress in implementation of WHO FCTC Article 14 and its guidelines: a survey of tobacco dependence treatment provision in 142 countries. Addiction (Abingdon, England). 2017; 112(11):2023–31.

255. Bilano V, Gilmour S, Moffiet T, d’Espaignet ET, Stevens GA, Commar A, et al. Global trends and projections for tobacco use, 1990–2025: an analysis of smoking indicators from the WHO Comprehensive Information Systems for Tobacco Control. The Lancet. 2015; 385(9972):966–76.

256. Nilan K, McNeill A, Murray RL, McKeever TM, Raw M. A survey of tobacco dependence treatment guidelines content in 61 countries. Addiction (Abingdon, England). 2018.

257. Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. The validity of self-reported smoking: a review and meta-analysis. American Journal of Public Health. 1994; 84(7):1086–93.

258. Maziak W, Nakkash R, Bahelah R, Husseini A, Fanous N, Eissenberg T. Tobacco in the Arab world: old and new epidemics amidst policy paralysis. Health policy and planning. 2014; 29(6):784–94. https://doi.org/10.1093/heapol/czt055 PMID: 23958628

259. Bloor RN, Meeson L, Crome IB. The effects of a non-smoking policy on nursing staff smoking behaviour and attitudes in a psychiatric hospital. J Psychiatr Ment Health Nurs. 2006; 13.

260. Martinez C, Fu M, Martinez-Sanchez JM, Anton L, Fernandez P, Ballbe M, et al. Impact of a long-term tobacco-free policy at a comprehensive cancer center: a series of cross-sectional surveys. BMC public health. 2014; 14:1228. https://doi.org/10.1186/1471-2458-14-1228 PMID: 25427959

261. Gadomski AM, Stayton M, Krupa N, Jenkins P. Implementing a smoke-free medical campus: Impact on inpatient and employee outcomes. Journal of Hospital Medicine. 2010; 5(1):51–4. https://doi.org/10.1002/jhm.473 PMID: 20063401