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# Inequalities in Smoking Prevalence: A Missed Opportunity for Tobacco Control in Pakistan

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## Abstract

### **Background**

Pakistan is one of the highest tobacco consuming countries in South Asia and consumption is increasing. To implement equity orientated tobacco control policies, the most vulnerable groups must be identified. We aimed to identify these groups using the Pakistan Demographic and Health Survey (PDHS) 2012-13.

### **Methods**

Descriptive statistics, univariate and multivariate analyses were used to explore household and participant characteristics associated with smoking inside the home or tobacco smoking, respectively. Survey weights were used to give nationally representative findings.

### **Results**

Data for 12,931 households, 3,132 men and 13,538 women were examined. 58.3% of surveyed households were smoke-free, 39.1% were exposed to indoor tobacco smoke every day, 2.6% less frequently. Significantly more rural households were exposed to indoor tobacco smoke than urban households (45.2% vs 34.9%). Of men, 28.3% reported smoking compared with 1.3% of women. Smoking prevalence was higher in older age groups. Increasing wealth was associated with lower smoking prevalence and indoor smoking. For men, but not women, increasing education was associated with reduced smoking.

### **Conclusions**

Inequalities in smoking behaviour impose harm to those who can least afford the financial and health costs. Future tobacco control policies in Pakistan must be sensitive to gender, geography and socio-economic status.

## Introduction

Pakistan is one of the highest tobacco consuming countries in South Asia with 23.9 million users consuming 90,000 tons of tobacco annually (1,2). The prevalence of tobacco smoking was 3.6% for women and 40.6% for men in 2012 (3). Higher taxes and strict law enforcement in high income countries have resulted in a shift of the tobacco industry's efforts to low and middle income countries (4). Almost all low and middle income countries have experienced a growth in tobacco use in contrast to high income countries where prevalence has markedly declined (5). This prevalence in smoking trends is reflected in tobacco related mortality. The majority of tobacco related deaths occur in low and middle income countries, like Pakistan. It is expected that 80% of tobacco related deaths will occur in low and middle income countries by 2030 (6).

Tobacco related inequalities not only exist between countries but also within countries. People from low socioeconomic groups and those who are less educated are the most vulnerable to taking up cigarette smoking (7-12). In some countries, the working classes and youth are the main targets of tobacco industry (13). Tobacco industry internal documents show how opportunity to attract these potential users with targeted marketing are exploited (13). Multiple observational studies have shown that the rate of tobacco cessation is also not uniform within countries, more deprived socioeconomic groups show almost half the rate of decline as compared with the less deprived groups (7-12). This underscores that tobacco control efforts need to be targeted to these most vulnerable groups. Many high-income countries have realised this issue and have embarked on tobacco control through equity oriented policies. For example: in the UK where smoking is increasingly confined to the lowest socioeconomic groups, the 2015 "Cancer Plan" included a specific target relating to reducing smoking in manual groups (14); in Australia, increasing the price of tobacco has contributed to a decline in tobacco related inequalities in some areas (15).

In order to implement equity-oriented policy, national tobacco control programmes need to be vigilant in identifying vulnerable groups, as well as those who are not effectively covered by existing policies. Pakistan, is a signatory to the WHO Framework Convention on Tobacco Control with legislation in place to reduce tobacco smoking, such as the "Prohibition of Smoking in Enclosed Places and Protection of Non-smokers", although implementation of these laws has been questions (16). Moreover, like many other low and middle income countries, Pakistan has approached tobacco control with a population based approach. For example, to date, three large population based surveys have monitored smoking prevalence in Pakistan without highlighting the extent of inequalities in tobacco use. We have analyzed a large set of population based data to quantify the inequalities in tobacco use in Pakistan.

## Methods

### Data

We used data from the Pakistan Demographic and Health Survey (PDHS), 2012-13 (17). This survey was carried out under the global Demographic and Health Survey (DHS) programme in Pakistan funded by the United States Agency for International Development (USAID). The primary purpose of the survey is to provide nationally representative data about demographic and maternal and child health indicators for national and international policy-makers (e.g.: 3). The sample was determined using stratified random sampling based on the 1998 census. Data was collected from 12,943 households, 13,558 women and 3,134 men, and covering all four provinces of the country and Gilgit

Baltistan areas. Some parts of some provinces were excluded due to adverse law and order situations. The survey used four types of questionnaires targeted separately at 1. Households; 2. Ever-married women and 3. Ever-married men aged 15-49 resident in those households; and 4. The community. Questionnaires were translated into Urdu and Sindi. Data was collected in-person by 20 field worker teams, including at least one male interviewer and three female interviewers. The household response rate was 96%; the women's response rate was 93% and the men's response rate was 79%. For the purpose of this study we used data from the first three questionnaires (household, women and men).

## Measures

We examined smoking behaviour using answers to two questions. The first was used to examine whether smoking occurred in the house. This is from the household questionnaire. It asks: "How often does anyone smoke cigarettes/huqa (hookah/huqqa)/biryani (biri) or pipe inside your house? Would you say daily, weekly, monthly, less than monthly or never?". We categorised the answer to this question into a binary variable for the logistic regression, classifying those answering "never" as "smoke-free households" and those who gave any other answer as "households exposed to indoor tobacco smoke".

The second question we examined is from the individual questionnaire (included on both ever-married women and the ever-married men questionnaires) and reads: "Do you presently smoke cigarettes?" to which the answer was "yes" or "no". We used the answer to this question as our binary variable for the logistic regression. If the respondent indicated that they do smoke cigarettes they are asked "In the last 24 hours, how many cigarettes did you smoke?" and allowed to give any number in reply. We categorised the respondents into three groups depending on how many cigarettes they reported smoking in the previous 24 hours (<10 cigarettes, 10-19, and 20+ cigarettes per day). Note that, unlike the question on the household questionnaire- the question on the individual questionnaire asks about cigarette smoking specifically (excluding other forms of tobacco smoking).

Other measures used were household wealth quintile and household geography (urban vs rural), included in both the household and individual analyses; and age (15-29; 30-39; 40-49), education (primary, secondary or higher) included in the individual analyses.

## Analysis

We used descriptive statistics to examine the household characteristics according to whether smoking occurred in the house, and participant characteristics according to whether or not the participant smokes cigarettes. These were adjusted for survey design using survey weights supplied with the PDHS data, in order to give nationally representative findings, as described in table legends.

We examined the association between household characteristics and smoke-free households and between individual characteristics and smoking behaviour respectively, using multivariate logistic regression adjusted for survey design. Individual analyses were performed separately for men and women. Statistical significance is reported at the 5% level ( $p < 0.05$ ). All analyses were performed using STATA SE 13.

## Results

### Household level analysis

We excluded all observations without a valid answer to the question “How often does anyone smoke cigarettes/huqa/berry or pipe inside your house? Would you say daily, weekly, monthly, less than monthly or never?”. This resulted in exclusion of 12 records, leaving 12,931 households in the dataset for further analyses. Table 1 shows the characteristics of the included households, we present both the unadjusted and survey adjusted figures [Table 1]. The survey adjusted figures show that in a nationally representative sample, 58.3% of households are smoke-free. 39.1% of households are exposed to indoor tobacco smoke every day while 2.6% of households are exposed less frequently. As expected the wealth quintiles are equally represented in the adjusted data, and 33.9% of the adjusted sample are urban.

*-Insert Table 1: Characteristics of included households-*

Of urban households, 34.9% are exposed to indoor tobacco smoke compared with 45.2% of rural households. This difference was significant in multivariate analyses. Each increasing wealth quintile had reduced exposure to indoor tobacco smoke than the previous quintile, with 46.4% of the poorest quintile exposed to indoor tobacco smoke, compared with 31.1% of the richest quintile [Table 2]. In the multivariate analysis, the richest households were significantly less likely to be exposed to indoor tobacco smoke than households from the middle wealth quintile and there were no other significant differences by wealth.

*-Insert Table 2: Association between household characteristics and smoking in the house. Results from multivariate analysis adjusting for survey design-*

### Individual level analysis

We excluded all observations without a valid answer to “Do you presently smoke cigarettes?”. This resulted in excluding 2 men and 20 women from the analysis leaving 3,132 men and 13,538 women.

Of men, 28.3% reported smoking cigarettes, a much higher percentage than in women, at just 1.3% [Table 3]. While 10.6% of men smoked more than 20 cigarettes a day, just 0.3% of women did so [Table 3]. Further characteristics of the study participants are included in Table 3.

*-Insert Table 3: Characteristics of included men and women-*

In both men and women, there was a higher prevalence of cigarette smoking in older age groups (18.9% and 0.4% in the 15-29 year age group respectively and 34.2% and 2.3% in the 40-49 year age group respectively) [Table 4]. In multivariate analysis for both sexes, being in one of the two older age groups (30-39, 40-49) increased odds of cigarette smoking compared with the youngest age group (15-29). Twice as many rural women smoked cigarettes compared with urban women (1.6% compared with 0.8%), however in multivariate analyses, geography was not significantly associated with cigarette smoking in either sex [Table 4].

In both men and women reduced prevalence of cigarette smoking were seen in groups with higher levels of education and increasing levels of wealth, although smoking was less prevalent in the poorest quintile of men than in all but the richest quintile [Table 4]. In multivariate analysis for men, having a higher level of education was associated with reduced odds of cigarette smoking and being in the richest wealth quintile was associated with reduced odds of cigarette smoking compared with the middle wealth quintile [Table 4]. For women, the same pattern was seen with regard to wealth

quintile, although level of education was not significantly associated with cigarette smoking [Table 4].

*-Table 4: Association between participant characteristics and cigarette smoking status. Results from multivariate analysis adjusting for survey design -*

## Discussion

### Main finding of this study

Inequalities exist in smoking prevalence in Pakistan. These differences manifest as urban/rural, Socio-Economic Status (SES), education and gender disparities. Exposure to indoor tobacco smoke was found to be higher among low SES households in Pakistan with 46.4% of households having at least one person who smokes inside house in the poorest wealth quintile as compared to only 31.1% households in the richest quintile. A similar pattern was observed for individual tobacco use among women, with more smokers in poor income groups as compared with richer groups, although the poorest men were less likely to smoke than men in any other wealth category. Further, our study shows that rural residents of Pakistan are highly exposed to second hand smoke, with 45% of houses having someone who smokes indoors- this is despite individual cigarette smoking prevalence not being significantly greater for the rural population. In addition, education level was found to be an important predictor of cigarette smoking among Pakistani males. The prevalence decreased with increased education level. However, such differences were not there for women smokers.

### What is already known on this topic

Inequalities in smoking prevalence have been observed all over the world in terms of the latest phase in the smoking epidemic model (18, 19). The developed world has recognized such inequalities and national governments have started using equity oriented tobacco control policies instead of general population based approach (14,15,20).

Low SES groups are more vulnerable to the tobacco epidemic even in high income countries (7-12). The common reported reasons are high stress, low literacy and poor social capital among these individuals (7-12). In Pakistan, the main contributing factor for high prevalence in low income groups might be the design of pro-poor tobacco pricing policies. The tiered tax system in the country keeps tax rates low on low priced cigarettes, keeping them affordable for the poor. Pakistan is reported to have the lowest average consumer price (\$1.20) in the world (21). Although, we note that the poorest men in our study were the least likely to smoke, which may be because they have too little disposable income to spend even on the low priced cigarettes. In line with our findings, a similar gradient for tobacco use with education is reported in India with the major burden on less educated individuals (22,23). Educational disparities in smoking may reflect the lack of resources among the less literate groups (23,24). A possible clue may also lie in the occupation-based norms. In-depth explanatory studies are required that assess the role of education along with the occupational factors such as peer pressure, smoking culture and psychosocial stress. If tobacco control policies remain at the current pace and focus, the poor and marginalized are likely to continue to smoke in Pakistan. This in turn will entrap them in vicious cycles of poverty due to high risk of tobacco related morbidities.

A recent tobacco use survey has also reported higher smoking rates in rural areas of Pakistan (2). However, the trend was opposite a decade ago when the prevalence of smoking was reported more in urban areas (15.2% as compared to 13.7%) in a national survey (25). Similar trends have been seen in China, Ghana and India (26). The design of tobacco control policies in Pakistan may be a major contributing factor for causing this shift of smoking burden to rural areas. The smoke free places regulation is very relevant to urban and structured cities and town. However, in the rural areas of

Pakistan, people do independent labour work, small scale agriculture and business. Houses, markets and road sides are, therefore, not declared as smoke free in the country. Further, the government of Pakistan has not examined rural areas in monitoring its efforts to implement the Framework Convention on Tobacco Control. To date only one formal monitoring has been carried out which was limited to major cities only (27). The tobacco industry may take advantage of such loopholes in the system and market its products aggressively in rural areas. Tobacco control policies in the country need to address these inequities with concentrated efforts in rural areas. Regular monitoring of smoking related laws should cover both urban and rural areas.

The findings of higher smoking in men than women by our study are supported by a recent nationwide survey in Pakistan (Global Adult Tobacco Survey 2014) which found that 22.2% of men and 2.1% of women over 15 smoke cigarettes (2). This is very typical position in smoking epidemic where male smokers are higher in number as compared to females. Data from other low and middle income countries have also shown that male smoking is more common and it is a culturally accepted behaviour (28). Smoking among men may be considered by some as a sign of being masculine, being grown up and being superior (29). Male dominant smoking in society may contribute to disparities in health status between the sexes. Male life expectancy (64.6 years) in Pakistan is less than females (66.7 years) (30). This is despite a high maternal mortality rate. Lung cancer is the most prevalent cancer among Pakistani males followed by the cancer of mouth, bladder and neck, all strongly associated with tobacco use (31). Considering the debilitating effects of smoking, efforts are needed to stop young boys from starting smoking as well as to help men quit smoking. Pakistan needs to build a culture where smoking is not socially acceptable for either gender.

Globally an upward trend has been observed for smoking among females at the later stages of the smoking epidemic (32). Pakistan might also experience a similar trend. The tobacco industry markets their products to women with a notion of modern, fashionable and empowered women (33). Local data collection with female university students suggest that female smoking is increasing in the country (34). Studies show that the reason for starting and quitting smoking are different for males and females (29,35). The tobacco industry does research to market their products in gender sensitive ways (6,29). Similar efforts are required at the tobacco control policy level. Further study of the motivations for smoking among females may generate findings to design gender specific interventions.

### What this study adds

This study identifies inequalities in smoking prevalence in Pakistan. People with lower income, rural households and less educated males are the most vulnerable groups identified in our study.

### Limitations of this study

The study is based on the secondary data set from PDHS 2012-13, a high quality nationally representative dataset, with a limitation that only very few questions were asked related to smoking habits. In particular, although the household questionnaire referenced smoking a variety of tobacco products (including huka and berry), the individual questionnaire was related to cigarette smoking only, thereby failing to identify individual exposure to other types of smoked tobacco. The Global Adult Tobacco Survey in Pakistan in 2014 suggests that 85% of tobacco smokers are cigarette smokers in the country suggesting that our individual level data analysis is missing 15% of smokers who use other products (2). In addition, the individual level data was collected from ever-married men and women who may not truly represent the entire smoking population. Further, the findings rely on self-reported smoking prevalence which might be less than the actual smoking behaviour. However, the findings still give us an idea of the size and direction of disparities in smoking habits in Pakistan.

## Conclusion

Smoking disparities in Pakistan can impose harm to those who are already disadvantaged and can least afford the financial or health costs of tobacco. This demands adoption of an equity oriented approach in designing tobacco control policies instead of the mainstream approach in the country. Current tobacco control policies need to be tailored to gender differences, rural areas, low SES and less educated people.

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**Table 1: Characteristics of included households.**

	Number (%)	Weighted number (%)
Frequency household members smoke inside the house		
Never	7,950 (61.5)	7,543 (58.3)
Daily	4,585 (35.5)	5,063 (39.1)
Weekly	267 (2.1)	210 (1.6)
Monthly	41 (0.3)	34.2 (0.3)
Less than Monthly	88 (0.7)	86.1 (0.7)
Wealth quintile		
Poorest	2,398 (18.5)	2,556 (19.8)
Poorer	2,387 (18.5)	2,601 (20.1)
Middle	2,422 (18.7)	2,609 (20.2)
Richer	2,489 (19.3)	2,555 (19.8)
Richest	3,235 (25.0)	2,618 (20.2)
Geography		
Urban	6,327 (48.9)	4,379 (33.9)
Rural	6,604 (51.1)	8,558 (66.2)

**Table 2: Association between household characteristics and smoking in the house. Results from multivariate analysis adjusting for survey design.**

	Never smoke inside the house*	Smoke inside the house*	Odds Ratio	95% confidence interval	
Wealth Quintile					
Poorest	1,369 (53.6)	1,187 (46.4)	1.01	0.82	1.24
Poorer	1,418 (54.5)	1,183 (45.5)	0.98	0.83	1.16
Middle	1,430 (54.8)	1,179 (45.2)	Reference category	-	-
Richer	1,523 (59.6)	1,032 (40.4)	0.87	0.73	1.03
Richest	1,803 (68.9)	815 (31.1)	0.62	0.51	0.74
Geography					
Urban	2,851 (65.1)	1,529 (34.9)	Reference category	-	-
Rural	4,692 (54.8)	3,866 (45.2)	1.21	1.04	1.43

\*Weighted data



**Table 3: Characteristics of included men and women.**

	Men		Women	
	No. (%)	Weighted No. (%)	No. (%)	Weighted No. (%)
Prevalence of cigarette smoking				
Non-smoker	2,245 (71.7)	2,267 (72.4)	13,349 (98.6)	13,361 (98.7)
<10 daily	262 (8.4)	255 (8.1)	123 (0.9)	120 (0.9)
10-19 daily	327 (10.4)	280 (8.9)	24 (0.2)	14 (0.1)
20+ daily	298 (9.5)	332 (10.6)	42 (0.3)	44 (0.3)
Total	3,132	3,134	13,538	13,540
Age				
15-29	749 (23.9)	776 (24.8)	5,328 (39.4)	5,430 (40.1)
30-39	1,223 (39.1)	1,234 (39.4)	4,728 (34.9)	4,743 (35.0)
40-49	1,160 (37.0)	1,124 (35.9)	3,482 (25.7)	3,368 (24.9)
Geography				
Urban	1,519 (48.5)	1,107 (35.3)	6,337 (46.8)	4,523 (33.4)
Rural	1,613 (51.5)	2,027 (64.7)	7,201 (53.2)	9,017 (66.6)
Education				
None	849 (27.1)	905 (28.9)	7,618 (56.3)	7,731 (57.1)
Primary	536 (17.1)	657 (21.0)	1,829 (13.5)	2,154 (15.9)
Secondary	999 (31.9)	1,081 (34.5)	2,411 (17.8)	2,402 (17.7)
Higher	748 (23.9)	491 (15.7)	1,680 (12.4)	1,253 (9.3)
Wealth index				
Poorest	584 (18.7)	606 (19.4)	2,484 (18.4)	2,586 (19.1)
Poorer	581 (18.6)	574 (18.3)	2,586 (19.1)	2,676 (19.8)
Middle	548 (17.5)	567 (18.1)	2,586 (19.1)	2,698 (19.9)
Richer	641 (20.5)	713 (22.7)	2,652 (19.6)	2,785 (20.6)
Richest	778 (24.9)	673 (21.5)	3,230 (23.9)	2,795 (20.6)

**Table 4: Association between participant characteristics and cigarette smoking status. Results from multivariate analysis adjusting for survey design.**

	Non-smokers*	Smokers*	Odds Ratio	95% confidence interval
<b>Men</b>				
Age				
15-29	629 (81.1)	146 (18.9)	Reference category	-
30-39	899 (72.9)	335 (27.1)	1.72	1.19-2.47
40-49	739 (65.7)	385 (34.3)	2.19	1.53-3.14
Geography				
Urban	808 (73.0)	299 (27.0)	Reference category	-
Rural	1,460 (72.0)	568 (28.0)	0.91	0.66-1.25
Education				
None	592 (65.4)	313 (34.6)	Reference category	-
Primary	474 (72.2)	183 (27.8)	0.73	0.53-1.02
Secondary	798 (73.9)	283 (26.2)	0.67	0.48-0.92
Higher	403 (82.1)	88 (17.9)	0.43	0.29-0.64
Wealth index				
Poorest	456 (75.2)	151 (24.9)	0.65	0.41-1.04
Poorer	395 (68.8)	179 (31.2)	0.96	0.66-1.40
Middle	388 (68.3)	180 (31.7)	Reference category	-
Richer	494 (69.3)	219 (30.7)	0.98	0.66-1.46
Richest	535 (79.5)	138 (20.5)	0.61	0.39-0.95
<b>Women</b>				
Age				
15-29	5,407 (99.6)	22 (0.4)	Reference category	-
30-39	4,665 (98.4)	78 (1.6)	3.84	2.24-6.60
40-49	3,289 (97.7)	78 (2.3)	5.49	3.15-9.59
Geography				
Urban	4,487 (99.2)	37 (0.8)	Reference category	-
Rural	8,875 (98.4)	142 (1.6)	0.66	0.24-1.85
Education				
None	7,569 (97.9)	162 (2.1)	Reference category	-
Primary	2,146 (99.6)	8 (0.4)	0.32	0.08-1.21
Secondary	2,396 (99.8)	6 (0.3)	0.33	0.10-1.06
Higher	1,251 (99.8)	2 (0.2)	0.32	0.07-1.45
Wealth index				
Poorest	2522 (97.5)	65 (2.5)	1.64	0.82-3.30
Poorer	2629 (98.2)	47 (1.8)	1.13	0.56-2.29
Middle	2657 (98.5)	41 (1.5)	Reference category	-
Richer	2765 (99.3)	21 (0.7)	0.54	0.25-1.19

Richest	2789 (99.8)	5 (0.2)	0.15	0.05-0.48
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\*Weighted data

