RESEARCH ARTICLE

Compliance with smoke-free legislation and smoking behaviour: an observational field study in Karachi, Pakistan

Komal Moorpani, Shiraz Shaikh, Hira Tariq

Abstract

Objective: To observe compliance with smoke-free law at different public places in an urban setting.

Method: The cross-sectional study was conducted from January to June 2022 after approval from the ethics review board of Jinnah Sindh Medical University, Karachi, at public places, including public and private offices, health institutions, education institutions, malls, markets and eateries, in 5 districts of Karachi. Boundary, entrance, waiting areas/corridors, toilet areas and eating areas were assessed using a checklist for smoke-free law compliance. Places were considered compliant if no smoking activity, cigarette butt litter or ashtrays was found. Data was analysed using SPSS 21.

Results: Out of 400 places observed, there were 80(20%) in each of the 5 districts. Overall, 36(44%) of the venues showed indoor compliance and 10(12%) showed outdoor compliance. Presence of cigarette butts was observed at 350(87.5%) outdoor places around the boundary of the premises. Only 38(9.5%) of the places had no smoking boards outdoors and at the entrance, with 16(4%) being clearly visible. Also, 27(43%) of educational institutions had a cigarette shop within 50 metres of the boundary.

Conclusion: The city was found to have poor implementation of smoke-free laws, especially for outdoor areas, exposing the public to constant second-hand smoke.

Key Words: Smoking, Second-hand smoke, Smoke-free policies, Karachi.

(JPMA 74: 305; 2024) **DOI: https://doi.org/10.47391/JPMA.9215**

Introduction

According to the World Health Organisation (WHO), tobacco is responsible for around 6 million deaths worldwide annually[1]. If not curbed, the habit of smoking may lead to 1 billion deaths in the 21st century[2]. Tobacco is consumed commonly in the form of smoking, which is not only harmful to the smoker but also has detrimental consequences, like cardiovascular effects, coronary heart disease, lung cancer, breast cancer and genitourinary cancer, for those inhaling it as second-hand smoke (SHS)[3,4]. Among children, exposure to SHS can cause sudden infant death syndrome (SIDS), acute respiratory infections, ear problems, allergies, severe asthma, growth stunting and cognitive impairments[5,6]. It is estimated that around 880,000 people are killed by SHS annually worldwide[7].

A strict ban on smoking tobacco with 100% compliance with smoke-free laws can fully protect the citizens from SHS in public[8]. The implementation of smoke-free laws not only reduces exposure, but also promotes reduced cigarette consumption, and encourages quitting[9]. Currently, 96 countries, including Pakistan, have implemented moderate to complete smoke-free policies in accordance with Article 8 of the WHO Framework Convention on Tobacco Control.[10].

While developed countries are seeing a decline in smoking burden due to strict laws, the burden is consistently increasing in developing countries. Research conducted in Europe, the United States and the United Kingdom shows a decrease of at least 15-22% in environmental tobacco smoke after enforcement of smoke-free policies[11]. Compliance with the laws in developed countries ranges from 75% to 95%[12]. While many low- and middle-income countries (LMICs) have implemented smoke-free laws, most still face challenges with implementation[13-14]. Implementing effective smoke-free laws in LMICs presents distinct challenges. Limited awareness of smoking hazards and SHS's risks, coupled with deeply ingrained cultural norms, can impede policy support and adherence. Scarce resources hinder enforcement efforts, impacting the hiring of inspectors and monitoring systems. Additionally, the tobacco industry's influence on policy-making poses a significant obstacle. The prevalence of informal economies further complicates regulation implementation. Weak regulatory frameworks can undermine the efficacy of smoke-free laws[15].

APPNA Institute of Public Health, Jinnah Sindh Medical University, Karachi, Pakistan.

Correspondence: Hira Tariq. Email: hiratariq14@hotmail.com

ORCID ID. 0000-0002-2841-2600

Submission complete: 13-02-2023 **Review began**: 21-03-2023

Acceptance: 28-10-2023 **Review end:** 27-09-2023

Pakistan has been facing a consistent increase in smoking burden over the last 2 decades[16]. In Pakistan, tobacco consumption is responsible for around 200,000 deaths annually[17]. In 2002, Pakistan became a signatory to WHO framework, and passed an ordinance for the prohibition of smoking in enclosed spaces[18]. The current study was planned to observe compliance with smoke-free law at different public places in a local urban setting.

Methods

The cross-sectional study was conducted from January to June 2022 after approval from the ethics review board of Jinnah Sindh Medical University (JSMU), Karachi, at public places, including public and private offices, health institutions, education institutions, malls, markets and eateries, in 5 districts of Karachi; Central, South, East, West and Korangi. The selection of the done using convenience sampling technique. All the public and private places outlined in the Smoking Ordinance of 2002(19) were covered except stadiums and auditoriums due to lack of access.

The sample size was calculated using OpenEpi software (20) with expected compliance with smoke-free laws 50%, confidence level 95% and bound on error of 5%.

Boundary, entrance, waiting areas/corridors, and toilet areas and eating areas were assessed using a checklist for smoke-free law compliance. The checklist had 4 items: number of people present and the number of people seen smoking, the presence or absence of cigarette butts, cigarette packets and ashtray, the presence or absence of no-smoking signs, and their level of visibility, and in the case an educational institution, the presence or absence of any shop selling cigarettes or any other smoking substance or any other tobacco product within 50 metres of the premises.

A place was considered compliant if no one was observed smoking, no cigarette butt litter was found, and no smoking aids, like ash trays, were present.

University students who volunteered for the study were trained as data collectors. Each study site was visited during regular working hours. There were 3 data collectors for each district, covering 4-6 places daily. Random checks by the principal investigator were done to ensure the quality of data collection. The districts were first studied through Google Maps, and places meeting the criteria were shortlisted along with peak operational time for such places. Shopping Malls, markets and eateries were covered mostly during lunch hours, evening and night to observe smoking behaviours during busy hours. Hospitals were observed during peak outpatient department (OPD) times and visiting hours. For universities and colleges, real-time data was collected during study breaks by the volunteer students. Private and public offices were observed during operational hours. Observations were made at a particular location ranging from 20 minutes for most locations till a maximum of 1 hour. Data was collected on printed checklists that were later submitted to the principal investigator. All the variables were categorised as yes/no.

A venue was considered compliant if no one was observed smoking, no cigarette butt litter was found, and no smoking aids, like ash trays, were present.

Data was analysed using SPSS 21, and was presented as frequencies and percentages. Occurrence of compliance indoors and outdoors was compared between different sites and types of places using chi-square test. $P<0.05$ was considered significant.

Results

Of the 400 places observed, 80(20%) were in each of the 5 districts. There were 162(40%) eateries, 55(14%) public and private offices, 55(14%) shopping malls, 64(16%)

Table-1: Level of compliance with smoke-free indicators at outdoor and indoor places (n=400).

Variable	Boundary (Outdoor)	Entrance	Waiting Area Corridor/Reception	Toilets
Anyone found smoking				
Yes	325(81.3 %)	101(25.3%)	15(3.80%)	6(1.5%)
No	75(18.7%)	299(74.7%)	385(96.2%)	357(89.2%)
Not Available	0(0%)	0(0%)	0(0%)	37(9.3%)
Presence of cigarette butts				
Yes	350(87.5%)	314(78.5%)	138(36.5%)	115(28.7%)
No	50(12.5%)	86(21.5%)	262(63.5%)	283(70.8%)
Not Available	0(0%)	0(0%)	0(0%)	2(0.5%)
Presence of cigarette packet				
Yes	284(71%)	168(42.0%)	39(9.8%)	13(3.3%)
No	116(29%)	232(58.0%)	361(90.2%)	350(87.5%)
Not Available	0(0%)	0(0%)	0(0%)	37(9.2%)
Presence of ashtray	NA			NA
Yes		16(4.0%)	10(2.5%)	
No		384(96%)	390(97.5%)	
Not Available		0(0%)	0(0%)	
Presence of no smoking sign				
Yes	38(9.5%)	38(9.5%)	89(22.2%)	38(9.4%)
No	362(90.5%)	362(90.5%)	311(77.8%)	327(81.8%)
Not Available	0(0%)	0(0%)	0(0%)	35(8.8%)
Visibility of no smoking sign				
Yes				
No	16(4%)	16(4.0%)	65(16.3%)	16(4.0%)
Not Available	384(96%)	384(96%)	335(83.7%)	349(87.2%)
	0(0%)	0(0%)	0(0%)	35(8.8%)

Table-2: Comparison with composite compliance indicator in indoor and outdoor environments between districts and types of place.

Variable	Indoor		*P*-value	Outdoor		*P*-Value
District	Yes	No		Yes	No	
Central (n=80)	35 (43.8%)	45 (56.2%)		09 (11.25%)	71 (88.75%)	
South (n=80)	31 (38.8%)	49 (61.2%)		07 (8.75%)	73 (91.25%)	
East (n=80)	33 (41.3%)	47 (58.7%)	p=0.348	14 (17.50%)	66 (82.5%)	P=0.558
West (n=80)	37 (46.3%)	43 (53.7%)		07 (8.75%)	73 (91.25%)	
Korangi (n=80)	41 (51.3%)	39 (48.7%)		12 (15.0%)	68 (85%)	
Type of place	Yes	No		Yes	No	
Private & Public Offices (n=55)	37 (67.3%)	18 (32.7%)		04 (7.27%)	51 (92.73%)	
Health Institutions (n=64)	38 (59.3%)	26 (40.7%)		11 (17.1%)	53 (82.9%)	
Educational Institutes (n=62)	31 (50.0%)	31 (50.0%)	p<0.001	20 (32.2%)	42 (67.8%)	p<0.001
Malls & Markets (n=56)	13 (23.2%)	43 (76.8%)		01 (1.7%)	55 (98.3%)	
Eateries (n=163)	58 (35.3%)	105 (64.7%)		13(7.9%)	150 (92.1%)	

health institutions and 64(16%) educational institutions.

Anyone smoking was observed at majority of outdoor places within the boundary 325(81.3%), 101(25.3%) at the entrance, 15(3.8%) in waiting areas, and 6(1.5%) toilet areas. Cigarette butts were observed 350(87.5%) outdoor places, 314(78.5%) entrances, 138(36.5%) waiting areas, and 115(28.7%) toilet areas. Ashtray was visible at 16(4%) places at the entrance and 10(2.5%) waiting areas. No smoking sign was seen at 38(9.5%) places outdoors, in 38(9.5%) places at the entrance, and in 89(22.2%) places in waiting areas (Table 1). There were 27(43%) institutions that had cigarette vendors within 50 meters. The collective compliance rate for indoor indicators stood at 36(44.3%) across all locations, whereas the corresponding rate for outdoor compliance was 10(12.3%).

The trend for compliance indoors and outdoors was similar across all districts and the difference was statistically non-significant (p>0.05). Among the types of places, shopping malls had the worst compliance both indoors and outdoors (p<0.001) (Table 2).

Discussion

The study highlighted a significant lack of adherence to smoke-free regulations across Karachi. When examining indoor compliance using a composite indicator, an average compliance rate of 44% was noted, while outdoor compliance fared even worse at 12%. A recent study in Karachi found an average compliance rate of 56%, slightly better likely due to the study's smaller scale[21]. Notably, the compliance rates did not show significant variation across different districts, indicating an overall poor adherence. This issue is compounded by the high presence of cigarette-associated litter across all districts, a common phenomenon in densely populated cities, with Karachi being the third most populous city globally. This correlation between population density and cigarette litter has also been confirmed in studies conducted in other urban areas, such as a coastal city in Iran[22].

The current study revealed that compliance with smoke-free regulations was notably low in shopping malls and eateries. Despite "no smoking" signs being displayed in 45% of eateries and 59% of malls and markets, these establishments exhibited the worst adherence to smoke-free laws, both indoors and outdoors, along with a high incidence of active smoking near their boundaries and entrances. The observation aligns with findings from various studies conducted across different regions, including Indonesia, South India, Nepal and Turkey[13,22-26].

In contrast, public and private offices demonstrated the highest compliance rates for indoor composite indicators at 66.7% in the current study. Similar observations were reported from Nepal, where 75% of public offices complied with smoke-free policies[24]. This discrepancy could be attributed to better surveillance and enforcement mechanisms in formal office settings.

Analysing educational institutions and health facilities, the current study found indoor compliance rates of 50% and 59.4%, respectively. These figures differ from a previous study in Karachi which reported much higher compliance rates of 89% for health facilities and 70% for educational institutions. The differences in findings could potentially be attributed to the current study's inclusion of three additional districts beyond the South and East regions covered in the earlier research[21]. In Chandigarh, India, compliance within health institutions was as low as 37%[24]. Notably, 43% of educational institutions in the current study were located within 50 meters of cigarette selling facilities, contravening legal prohibitions. This parallels the findings of a study in Karachi, which revealed that 94% of universities had easy access to cigarette vendors within 500 meters of their entrances[18]. The presence of no smoking signage remained scarce overall, consistent with the outcomes of two other studies in Karachi[18,21].

Interestingly, the current study demonstrated a higher level of compliance indoors compared to outdoors. Qualitative studies have repeatedly shown that smokers tend to prefer outdoor smoking spaces[27-28]. This

observation helps explain the discrepancy between the number of smokers observed and the prevalence of cigarette butts in the current data. This trend was apparent across most types of locations, except for eateries where individuals were typically directed to designated outdoor smoking areas. Notably, the most robust indoor compliance was observed in public and private offices, likely due to vigilant monitoring by security personnel and staff members.

The current study has a few limitations. Data collection was difficult, particularly for West and Korangi districts, due to security issues because of which some locations were not observed for the designated 20 minutes. Security guards for banks and some educational institutions did not allow the data collectors for the required time as well, and, therefore, the volunteers were asked to just observe, and then to fill the forms later while being in a safe spot. This could have led to recall bias. Some office complexes did not allow for observation indoors, and in such cases, the data collectors had to rely on information provided by their employees who were approached during their smoking break outside. Similar difficulty was observed for educational institutions. Besides, the study employed convenience sampling technique, and that could have also introduced selection bias.

Despite the limitations, however, the current study offers significant insights into the compliance levels of 400 public venues with smoke-free regulations. Comprehensive surveillance needs to be applied to all public establishments to ensure rigorous enforcement of the relevant laws. It is equally imperative to provide training and education to staff members regarding smoke-free legislations. Additionally, it is crucial to prominently display awareness messages outlining the detrimental consequences of smoking and exposure to SSH at all public venues.

Conclusion

Karachi overall was found to have poor compliance with smoke-free laws, especially outdoors. Government and stakeholders need to realise the deadly impact of SSH exposure. With strict surveillance and enforcement, Pakistan can reach its goal of reducing tobacco use by 30% in 2025.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. World Health Organization. WHO report on the global tobacco epidemic, 2013: enforcing bans on tobacco advertising, promotion and sponsorship. World Health Organization. [Online] Cited 2013 July 11]. Available from: URL: https://www.who.int/publications/i/item/9789241505871
2. Global Burden of Disease. Washington, DC: Institute of Health Metrics, 2019. [Online] [Cited 2021 July 17]. Available from:URL: https://www.healthdata.org/research-analysis/gbd
3. Morris PB, Ference BA, Jahangir E, Feldman DN, Ryan JJ, Bahrami H, et al. Cardiovascular effects of exposure to cigarette smoke and electronic cigarettes: clinical perspectives from the prevention of cardiovascular disease section leadership council and early career councils of the American College of Cardiology. J Am Coll Cardiol. 2015; 66:1378-91. doi: 10.1016/j.jacc.2015.07.037.
4. Clancy L. Reducing Lung Cancer and Other Tobacco-Related Cancers in Europe: Smoking Cessation Is the Key. Oncologist. 2013; 19:16-20. doi: 10.1634/theoncologist.2013-0085.
5. Zhou S, Rosenthal DG, Sherman S, Zelikoff J, Gordon T, Weitzman M. Physical, behavioral, and cognitive effects of prenatal tobacco and postnatal second-hand smoke exposure. Curr Probl Pediatr Adolesc Health Care. 2014; 44:219-41. doi: 10.1016/j.cppeds.2014.03.007.
6. Yolton K, Dietrich K, Auinger P, Lanphear BP, Hornung R. Exposure to environmental tobacco smoke and cognitive abilities among US children and adolescents. Environ Health Perspect. 2005; 113:98-103. doi: 10.1289/ehp.7210.
7. Chen CH, Lee JI, Jhan JH, Lee YC, Geng JH, Chen SC, et al. Second-hand smoke increases the risk of developing kidney stone disease. Sci Rep. 2021; 11:17694. doi: 10.1038/s41598-021-97254-y.
8. Mowery PD, Babb S, Hobart R, Tworek C, MacNeil A. The impact of state preemption of local smoking restrictions on public health protections and changes in social norms. J Environ Public Health. 2012; 2012:632629.doi: 10.1155/2012/632629.
9. Haw SJ, Gruer L. Changes in exposure of adult non-smokers to second-hand smoke after implementation of smoke-free legislation in Scotland: national cross sectional survey. BMJ. 2007; 335:549. doi: 10.1136/bmj.39315.670208.47.
10. Hyland A, Barnoya J, Corral JE. Smoke-free air policies: past, present and future. Tob Control. 2012; 21:154-61. doi: 10.1136/tobaccocontrol-2011-050389.
11. Vardavas CI, Kondilis B, Travers MJ, Petsetaki E, Tountas Y, Kafatos AG. Environmental tobacco smoke in hospitality venues in Greece. BMC Public Health. 2007; 7:1-7. doi: 10.1186/1471-2458-7-302.
12. Reis MF, Namorado S, Aguiar P, Precioso J, Nunes B, Veloso L, et al. Patterns of Adherence to and Compliance with the Portuguese Smoke-Free Law in the Leisure-Hospitality Sector. PLoS One. 2014; 9: e102421. doi: 10.1371/journal.pone.0102421.
13. Byron MJ, Cohen JE, Frattaroli S, Gittelsohn J, Drope JM, Jernigan DH. Implementing smoke-free policies in low-and middle-income countries: A brief review and research agenda. Tob Induc Dis. 2019; 17:60. doi: 10.18332/tid/110007.
14. Gilmore AB, Fooks G, Drope J, Bialous SA, Jackson RR. Exposing and addressing tobacco industry conduct in low-income and middle-income countries. Lancet. 2015; 385:1029-43. doi: 10.1016/S0140-6736(15)60312-9.
15. Byron MJ, Cohen JE, Frattaroli S, Gittelsohn J, Drope JM, Jernigan DH. Implementing smoke-free policies in low- and middle-income countries: A brief review and research agenda. Tob Induc Dis. 2019; 17:60. doi: 10.18332/tid/110007.
16. Mushtaq N, Mushtaq S, Beebe LA. Economics of tobacco control in Pakistan: estimating elasticities of cigarette demand. Tob Control. 2011; 20:431-5.
17. Siddiqi K, Siddiqui F, Boeckmann M, Islam Z, Khan A, Dobbie F, et

al. Attitudes of smokers towards tobacco control policies: findings from the Studying Tobacco users of Pakistan (STOP) survey. Tob Control. 2022; 31:112-6.
18. Khan AJ, Sohail A, Maan M. Tobacco control laws in Pakistan and their implementation: A pilot study in Karachi. J Pak Med Assoc. 2016; 66:875-9.
19. Pakistan Details - Tobacco Control Laws. [Online] 2023 [Cited 2023 August 22]. Available from: URL: http://www.tobaccocontrollaws.org/legislation/country/pakistan/laws
20. Dean AG, Sullivan KM, Soe MM, Mir RA. OpenEpi: open source epidemiologic statistics for public health. 2013. [Online] [Cited 2013 April 06]. Available from: URL: https://www.openepi.com/Menu/OE_Menu.htm
21. Ahsan H, Hoe C, Aslam F, Wright K, Cohen J, Kennedy R. Compliance with smoke-free policies at indoor and outdoor public places: an observational study in Pakistan. East Mediterr Health J. 2022; 28:50-7. doi: 10.26719/emhj.22.005.
22. Yousefi Nasab A, Oskoei V, Rezanasab M, Alinejad N, Hosseinzadeh A, Kashi G. Cigarette butt littering consequences: a study of pollution rate on beaches and urban environments. Environ Sci Pollut Res Int. 2022; 29:45396-403. doi: 10.1007/s11356-022-19155-5.
23. Banandur PS, Kumar MV, Gopalkrishna G. Awareness and compliance to anti-smoking law in South Bengaluru, India. Tob Prev Cessat. 2017; 3:123.doi: 10.18332/tpc/76549.
24. Basnet LB, Budhathoki SS, Adhikari B, Thapa J, Neupane B, Moses T, et al. Compliance with the smoke-free public places legislation in Nepal: A cross-sectional study from Biratnagar Metropolitan City. PLoS One. 2022; 17:e0264895.
25. Goel S, Sardana M, Jain N, Bakshi D. Descriptive evaluation of cigarettes and other tobacco products act in a North Indian city. Indian J Public Health. 2016; 60:273-9. doi: 10.4103/0019-557X.195858.
26. Navas-Acien A, Çarkoğlu A, Ergör G, Hayran M, Ergüder T, Kaplan B, et al. Compliance with smoke-free legislation within public buildings: a cross-sectional study in Turkey. Bull World Health Organ. 2016; 94:92-102. doi: 10.2471/BLT.15.158238.
27. Merculieff ZT, Koller KR, Sinicrope PS, Hughes CA, Bock MJ, Decker PA, et al. Developing a Social Media intervention to connect Alaska Native People who smoke with resources and support to quit smoking: the Connecting Alaska Native Quit Study. Nicotine Tob Res. 2021; 23:1002-9. doi: 10.1093/ntr/ntaa253.
28. Vardavas CI, Connolly G, Karamanolis K, Kafatos A. Adolescents perceived effectiveness of the proposed European graphic tobacco warning labels. Eur J Public Health. 2009; 19:212-7. doi: 10.1093/eurpub/ckp015.

Author's Contributions

KM: Literature search, study design and concept, questionnaire design, data collection, analysis, and interpretation.

SS: Supervised literature search, study design and concept, questionnaire design, data collection, analysis, interpretation and manuscript design.

HT: Co-supervision literature search, study design and concept, questionnaire design, data collection, analysis, interpretation, drafting manuscript and final review.