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Smoke-free law compliance and predictive factors in Ethiopia: observational assessment of public places and workplaces

Sisay Derso Mengesha ,¹ Bitsat Shimeles,² Baharu Zewdie,² Asnakech Alermu,² Heran Gerba,³ Coral E Gartner ⁴

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/tc-2022-057750>).

¹Ethiopian Public Health Institute, Addis Ababa, Ethiopia
²Tobacco Control Unit, Ethiopian Food and Drug Administration, Addis Ababa, Ethiopia

³Ethiopian Food and Drug Administration, Addis Ababa, Ethiopia

⁴School of Public Health, University of Queensland, Herston, Queensland, Australia

Correspondence to

Sisay Derso Mengesha, Ethiopian Public Health Institute, Gullele Patriot Street, P.O. Box 1242, Addis Ababa, Ethiopia; sisdres23@yahoo.com

Received 19 September 2022

Accepted 21 February 2023

Published Online First

1 March 2023

ABSTRACT

Objectives The primary objective of this observational study was to assess the status of public place and workplace compliance with smoke-free provisions in Ethiopia.

Methods This study was conducted in four regions of Ethiopia (Oromia; Sidama; Harari; and Southern Nations, Nationalities, and Peoples' Region) from September to October 2021. Data were collected using a standardised smoke-free checklist. χ^2 tests were used to assess the association between categorical variables and the smoke-free status. Multivariable binary logistic regression analysis was used to identify factors associated with the presence of at least one person actively smoking.

Results Approximately 97% (95% CI 93.1%, 98.8%) of government buildings, 92.5% (95% CI 85.7%, 96.2%) of educational institutions, 89.8% (95% CI 86.3%, 92.5%) of bars, restaurants and cafés, 88.4% (95% CI 82.9%, 92.3%) of food establishments and 84.0% of hotels (95% CI 79.5%, 87.6%) were non-compliant with the tobacco control law. Overall, only 12.3% of sites met the requirements of the current smoke-free law. The multivariable logistic regression models showed that transit facilities (adjusted OR (AOR)=26.66 (95% CI 7.53, 94.41)) and being located in the Harari region (AOR=4.14 (95% CI 2.30, 7.45)) were strongly associated with the presence of active smoking observed during the site visit.

Conclusion This study indicated that public place and workplace non-compliance level was very high in all sites. This calls for more effective implementation of complete smoke-free provisions across all government buildings and institutions in all regions, such as public educational campaigns about the laws and enforcement action for non-compliance. Furthermore, all regional states should adopt Federal Proclamation 1112/2019.

INTRODUCTION

The Federal Democratic Republic of Ethiopia constitution states that every Ethiopian should enjoy a clean and healthy environment.¹ However, findings from the 2016 Global Adult Tobacco Survey (GATS) revealed secondhand smoke is prevalent in public places in Ethiopia with 60.4% of visitors to bars/nightclubs and 31.1% of visitors to restaurants exposed to secondhand smoke in these venues, while 29.3% of employees reported exposure in their workplace.² Another study by Defar *et al* estimated that approximately 10% and 12.6% of adults are exposed in their homes and workplaces, respectively.³

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Secondhand smoke (SHS) exposure puts everyone at risk and there is no safe level. However, national surveys including the 2016 Global Adult Tobacco Survey and Non-Communicable Disease Stepwise Survey 2015 indicated that SHS exposure at various public places and workplaces is very high in Ethiopia.
- ⇒ Only one previous study has assessed the compliance level of smoke-free legislation among governmental hospitals in Addis Ababa in Ethiopia. However, this study used the repealed tobacco control bill to assess the compliance level.
- ⇒ There has been limited research into variations in smoke-free status in public places in Ethiopia, and no published evaluation of compliance with smoke-free provisions in public places after the tobacco control law. This comprehensive law, which requires 100% smoke-free public places and workplaces, was implemented in February 2019.

WHAT THIS STUDY ADDS

- ⇒ This is the first study to evaluate the compliance of the smoke-free provisions in various public places and workplaces including hospitality and transit sites after the implementation of the tobacco control law in Ethiopia.
- ⇒ Overall, only 12.3% of sites were compliant with the new tobacco control bill. Transit sites and sites located in the Harari region were most likely to have active smoking present during the data collection.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ The results indicate stronger enforcement of the smoke-free law in all public places and regions is required.

In response to concerns about secondhand smoke exposure, the government of Ethiopia passed tobacco control proclamation No 1112/2019, which implements WHO's Framework Convention on Tobacco Control (FCTC) requirements.⁴ The new law that commenced in 2019 prohibits designated smoking areas (DSA) in public places (any part of any indoor workplaces, all indoor hospitality settings, all forms of public transport and all common areas within condominium housing) and



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To cite: Mengesha SD, Shimeles B, Zewdie B, *et al*. *Tob Control* 2024;**33**:e18–e24.

smoking within any indoor and outdoor spaces within 10 m of any doorway, openable window or air-intake mechanism of any public place or workplace and in any outdoor part of health-care facilities, government institutions, facilities such as schools intended mainly for those under the age of 21, higher educational institutions, youth centres and amusement parks. The law also requires the owner or another person in charge of the management of a public site to ensure no one smokes, uses or sells any tobacco products in prohibited areas and to forbid the placement of an ashtray or other comparable devices intended for tobacco use in such places. Additionally, a no smoking sign and clear, conspicuous notices prohibiting tobacco use must be posted by the owner of the public place or another authorised person.⁴

The regulatory body or inspector has the power to take several administrative measures in response to non-compliance with the smoke-free requirements, including warning letters, suspending certifications for registration or competence, or other licences. Anyone selling tobacco goods in places where sales are banned may be liable for a maximum penalty of 6 months in jail or 5000 birr in fines. Smoking or using tobacco products in legislated smoke-free areas can incur a maximum fine of 1000 birr.⁴ However, we are unaware of any fines being issued for non-compliance with these provisions.

The Ethiopian Food and Drug Authority (EFDA) has undertaken various tobacco control activities and supported regional regulatory bodies to execute their responsibility to control tobacco in their respective jurisdictions. As part of this effort, the EFDA received support from the Management Sciences for Health, a global non-profit advisory organisation, to expedite and strengthen the enforcement of smoke-free provisions in public places in the Oromia; Harari; Sidama; and Southern Nations, Nationalities, and Peoples' Region (SNNPR). Enforcement activities included posting 'no smoking' signs in public places, training owners and management of hospitality sites about the smoke-free provisions in selected cities, and media advocacy to raise community awareness. EFDA has worked collaboratively with three civil society organisations to achieve a smoke-free Addis Ababa since 2022.

To measure the impact of the smoke-free law implementation, a compliance assessment was undertaken in public places in 12 towns in the four regional states. Hence, this study aimed to assess the status of the implementation of smoke-free provisions, the level of compliance with smoke-free policies and associated factors in selected public places and workplaces in selected regions of Ethiopia.

METHODOLOGY

Study setting and data sources

This study was conducted from September to October 2021 in the 12 towns included in the smoke-free initiative pilot project in four regions of the country (Oromia, Sidama, Harari and SNNPR) (table 1). Public facilities such as food and beverage businesses (hotels, bars, restaurants, cafés, etc), schools, health facilities, government offices, youth centres, parks and transit facilities were assessed. Before data collection, lists of relevant sites were collected from government offices and town-level regulatory bodies. We followed a census approach and all public places and institutions in each town were included in the study. All identified sites consented (100% participation).

Data collection

Data were collected using a standardised smoke-free checklist. The standardised checklist was adopted from the compliance

Table 1 Summary list of study sites by area and role of respondents

Variable		Number of sites (n=1282)	%
Region	Town name		
Oromia	Jimma	154	12.0
	Adama	117	9.1
	Sebeta	100	7.8
	Shashemene	64	5.0
	Mojo	62	4.8
SNNPR	Alaba	99	7.7
	Wolaita Soda	98	7.6
	Arbaminch	94	7.3
	Hosanna	71	5.5
Sidama	Hawassa	200	15.6
	Bensa	51	4.0
Harar	Harer	172	13.4
Respondent	Role or function		
	Manager/director	999	77.9
	Assistant manager	15	1.2
	Owner	250	19.5
	Other	12	0.9
	Public relations	6	0.5
	Total	1282	100
SNNPR, Southern Nations, Nationalities, and Peoples' Region.			

study guide⁵ and the Ethiopian tobacco control proclamation No 1112/2019.⁴ First, the smoke-free checklist (see online supplemental materials) was approved by EFDA tobacco control experts and tobacco control and coordinating committee members, and the English version was translated into two local languages: Amharic and Afan Oromo. The checklists were then translated back into English to verify their consistency. In addition, the survey checklist was piloted in public places and a government building in Addis Ababa's smoke-free initiative project before actual data collection commenced.

Before data collection, both field supervisors and data collectors were trained for 3 days on tobacco smoke-free initiatives, the smoke-free laws, data collection protocols using handheld devices or mobile devices, interviewing techniques and how to identify the smell of cigarettes, cigarette butt identification, signs of a DSA, which breaches the smoke-free law, presence of ashtray/lighters, the existence of non-smoking signage or stickers on noticeable areas and presence of a person smoking tobacco within a prohibited area. In addition, EFDA-approved samples of 'no smoking signage or stickers' were used as showcards during data collection to identify the availability of required stickers or signage. To ensure data quality, surveys with tobacco control experts and coordinators provided remote and in-person supervision to all teams across all four regions.

During the data collection, the observational assessment was carried out in all indoor places and locations within the venue that were covered by the smoke-free law, including hospitality venues such as hotels, restaurants and others up to a 10 m radius from the indoor place, and the remainder were government buildings, youth centres, educational settings and healthcare facilities. Data collection was conducted during peak hours for each establishment type. For instance, food and drinking establishments were assessed during dining hours, nightclubs and bars during the late afternoon and evening and other government buildings during working hours.

During the site assessment (table 1), the data collector contacted the owner, manager or other responsible people of the site to obtain permission to conduct the study. This person (the respondent) then guided the data collector at the site and explained smoke-free implementation at the site and responded to interview questions. When the data collectors faced ambiguity regarding validating indicators of compliance, such as cigarette odour and butt, they interviewed the respondent for the site to assist with identifying the origin of the tobacco smoke odour or butt.

Study variables and smoke-free indicators

During the data cleaning, we created seven categories of public places and government buildings by merging similar types of institutions and public places. The first category included government-owned buildings and rented government offices. The second category, food and drink establishments, included various public places, such as recreational areas, youth centres, fast-food shops, traditional restaurants, grocery stores and other local drink houses (*Tella*, *Teji* and *Areki*—Ethiopian indigenous traditional fermented beverages). The third category was healthcare facilities that consisted of hospitals, health centres, dental clinics, specialty clinics, drugstores, pharmacies and health posts (both private and government owned). The fourth category was private and government educational facilities (all schools, training institutions and universities). The fifth category, transit facilities, included bus terminals, taxi ranks and transport stations. The sixth category included hotels (both rated star and non-star) and resorts. Finally, we labelled the seventh group by merging cafés, non-traditional restaurants and bars into one category.

To define smoke-free status, we used seven key variables developed from the 2019 tobacco control proclamation and directives. These included existence of DSA, presence of 'no smoking' signage or stickers, presence of an ashtray or lighter, presence of cigarette butt, presence of tobacco smell and at least one person found smoking during the visit. A public place was classed as smoke free when none of the indicators were violated.

Data analysis

The data were analysed using Stata SE V.16.0. To describe the smoke-free status of public places, we calculated the frequency and unweighted percentages of the seven smoke-free indicator variables. χ^2 tests were used to assess the associations between categorical indicator variables and smoke-free status according to the service or institution type and region.

Variables with a p value <0.20 from bivariate binary logistic regression analysis were entered into the final multivariable

model.⁶ After calculating the adjusted ORs (AOR) and 95% CIs, multivariable binary logistic regression analysis was used to identify factors associated with the presence of at least one person smoking in workplace or public places.

RESULTS

Distribution of sites

Table 2 presents the proportion and frequency of the types of service or businesses and their regions. Overall, 1282 sites were assessed for smoke-free status from four regions (table 2), including 374 bars, restaurants and cafés, 181 other food and drinking establishments, 318 hotels, 170 government buildings, 107 educational facilities, 120 healthcare facilities and 12 transit facilities.

Status of smoke-free provisions compliance

We examined the distribution of sites with indicators of existing smoke-free legislation by type of sites and region (table 3). Among the regions that reported sites with an illegal DSA, one-quarter (25.5% (95% CI 20.5%, 31.3%)) were from Sidama and about 22.7% (95% CI 17.0%, 29.5%) were from Harari regional states. Approximately 28.4% of DSAs were in hotels (14% (95% CI 10.7%, 18.4%)), and bars, restaurants and cafés (14% (95% CI 11.0%, 18.1%)), followed by food and drinking establishments (9.9% (95% CI 6.4%, 15.2%)). Overall, approximately 1 in 10 sites (10.1% (95% CI 8.5%, 11.8%)) had DSAs in prohibited indoor places. Hotels (29.2% (95% CI 24.5%, 34.5%)) and healthcare facilities (30.8% (95% CI 23.2%, 39.7%)) had a relatively higher percentage of sites with no smoking signage. On a regional basis, Harari (28.5% (95% CI 22.2%, 35.7%)) and Oromia (25.4% (95% CI 21.7%, 29.4%)) had a higher percentage of sites with no smoking stickers/signage than the overall percentage (19.2% (95% CI 17.1%, 21.4%)). Among the regions that reported the presence of ashtrays or lighters, Harari had the highest proportion of sites with these present (14.0% (95% CI 9.5%, 20.0%)), followed by the Oromia region (11.3% (95% CI 8.8%, 14.4%)). Among service or business types, food and drinking establishments were most likely to have an ashtray displayed, with a proportion of 19.3% (95% CI 14.2%, 25.8%), followed by hotels (11.3% (95% CI 8.3%, 15.3%)). Transit facilities, food and drinking establishments and hotels had a higher proportion of cigarette butts present than other institutions: 58.3% (95% CI 30.7%, 81.5%), 30.8% (95% CI 26.0%, 36.1%) and 29.8% (95% CI 23.6%, 36.9%), respectively. Among regional states, Harari (39.5% (95% CI 32.5%, 47.0%)) and SNNPR (22.7% (95% CI 18.6%, 27.3%)) had a

Table 2 Proportion and frequency of site type by region

Type of site (service or business)	Region									
	Harari		Oromia		SNNPR		Sidama		Total	
	n	%	n	%	n	%	n	%	n	%
Bar, restaurant and café	68	18.2	128	34.2	100	26.7	78	20.9	374	100
Transit facility	0	0.0	11	91.7	1	8.3	0	0.0	12	100
Educational facility	1	0.9	32	29.9	41	38.3	33	30.8	107	100
Food and drinking establishment	11	6.1	110	60.8	43	23.8	17	9.4	181	100
Government building	33	19.4	53	31.2	39	22.9	45	26.5	170	100
Healthcare facility	14	11.7	33	27.5	48	40.0	25	20.8	120	100
Hotel	45	14.2	130	40.9	90	28.3	53	16.7	318	100
Total	172	13.4	497	38.8	362	28.2	251	19.6	1282	100

SNNPR, Southern Nations, Nationalities, and Peoples' Region.

Table 3 Proportion of sites that did not comply with the smoke-free law by region and type of service or business

Variables	Smoke-free status indicators											
	Presence of DSA		Presence of no smoking sticker		Presence of ashtray		Presence of butts		Cigarette smell		Presence of someone smoking	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Overall	10.1	(8.5, 11.8)	19.2	(17.1, 21.4)	9.1	(7.7, 10.8)	21.5	(19.4, 23.9)	11.6	(10.0, 13.5)	7.7	(6.4, 9.3)
Type of site												
Bar, restaurant and café	14.2	(11.0, 18.1)	17.1	(13.6, 21.3)	8.8	(6.3, 12.2)	21.4	(17.5, 25.8)	11.5	(8.6, 15.2)	7	(4.8, 10.0)
Transit facility	0		0		50.0	(24.4, 75.6)	58.3	(30.7, 81.5)	50.0	(24.4, 75.6)	58.3	(30.7, 81.5)
Educational facility	2.8	(0.9, 8.3)	7.5	(3.8, 14.3)	1.9	(0.5, 7.2)	9.3	(5.1, 16.5)	0.9	(0.1, 6.3)	0.9	(0.1, 6.3)
Other food and drinking establishment	9.9	(6.4, 15.2)	19.9	(14.7, 26.4)	19.3	(14.2, 25.8)	29.8	(23.6, 36.9)	20.4	(15.2, 26.9)	12.2	(8.1, 17.8)
Government building	4.1	(2.0, 8.4)	4.7	(2.4, 9.1)	1.8	(0.6, 5.3)	12.4	(8.2, 18.2)	5.3	(2.8, 9.9)	6.5	(3.6, 11.3)
Healthcare facility	2.5	(0.8, 7.5)	30.8	(23.2, 39.7)	1.7	(0.4, 6.4)	5	(2.3, 10.7)	0.8	(0.1, 5.7)	0.8	(0.1, 5.7)
Hotel	14.2	(10.7, 18.4)	29.2	(24.5, 34.5)	11.3	(8.3, 15.3)	30.8	(26.0, 36.1)	16.4	(12.7, 20.8)	9.7	(6.9, 13.5)
Region												
Harari	22.7	(17.0, 29.5)	28.5	(22.2, 35.7)	14.0	(9.5, 20.0)	39.5	(32.5, 47.0)	23.8	(18.1, 30.8)	19.8	(14.5, 26.4)
Oromia	3.8	(2.4, 5.9)	25.4	(21.7, 29.4)	11.3	(8.8, 14.4)	16.7	(13.7, 20.2)	11.7	(9.1, 14.8)	7.2	(5.3, 9.9)
SNNPR	1.9	(0.9, 4.0)	13.0	(9.9, 16.9)	6.1	(4.0, 9.1)	22.7	(18.6, 27.3)	7.7	(5.4, 11.0)	5.0	(3.2, 7.8)
Sidama	25.5	(20.5, 31.3)	9.6	(6.5, 13.9)	6.0	(3.6, 9.7)	17.1	(13.0, 22.3)	8.8	(5.8, 13.0)	4.4	(2.4, 7.7)

DSA, designated smoking area; SNNPR, Southern Nations, Nationalities, and Peoples' Region.

higher proportion of sites where cigarette butts were found than the overall average of 21.5% (95% CI 19.4%, 23.9%). Overall, the presence of cigarette smell and at least one person smoking was found in 11.6% (95% CI 10.0%, 13.5%) and 7.7% (95% CI 6.4%, 9.3%) of sites, respectively. Specifically, transit stations had a high proportion of sites with cigarette smell and active smoking, with proportions of 50% (95% CI 24.4%, 75.6%) and 58% (95% CI 30.7%, 81.5%), respectively. Harari had a higher proportion of sites with a cigarette smell (23.8% (95% CI 18.1%, 30.8%)) and at least one person smoking (19.8% (95% CI 14.5%, 26.4%)) during the assessment than the overall averages.

More than 80% of sites (n=1036) did not have signage or stickers warning people not to smoke within a prohibited area or describing the site as a smoke-free area. However, among the sites that had smoke-free signage (n=246), about 76% (n=188) posted stickers at appropriate places, and respondents reported that close to 96% (n=181) of the stickers were in languages that were understandable for their customers, clients and workers. However, 23.6% (n=58) of no smoking signage or stickers were posted in areas where the signage was not visible to customers, or service providers such as workers and visitors.

Table 4 shows the aggregated smoke-free status of the sites based on aggregation of the seven smoke-free indicators. Across all regions, the proportion of sites that were smoke-free was 12.3% (95% CI 10.6%, 14.2%). Oromia had the highest proportion of smoke-free sites (19.3% (95% CI 16.1%, 23.0%)) and Sidama, the lowest (5.6% (95% CI 3.3%, 9.2%)).

No transit facilities were smoke free and close to 97% (95% CI 93.1%, 98.8%) of government buildings were non-compliant. Fewer than one in three healthcare facilities (29.2% (95% CI 21.7%, 37.9%)) met the smoke-free policy (table 4). Among hospitality sites, hotels had better smoke-free compliance (16.0% (95% CI 12.4%, 20.5%)) than other sites. The remaining types of sites had lower than the overall smoke-free compliance rate.

Factors associated with the presence of a person smoking

To identify the factors associated with the presence of at least one person smoking in a prohibited area, variables including labelled DSA, no sticker/signage, region and type of site were analysed (table 5). The highest percentage was used as the reference category for each factor. Bivariate analyses indicated that region, type of site and labelled DSA were significantly associated with the presence of at least one person smoking at the site

Table 4 Aggregated smoke-free status of the site type and region

Variables	Smoke-free compliance rate				
	Smoke free		Non-smoke free		Total
	%	95% CI	%	95% CI	
Overall	12.3	(10.6, 14.2)	87.7	(85.8, 89.4)	100
Region					
Harari	7.6	(4.4, 12.6)	92.4	(87.4, 95.6)	100
Oromia	19.3	(16.1, 23.0)	80.7	(77.0, 83.9)	100
SNNPR	9.7	(7.0, 13.2)	90.3	(86.8, 93.0)	100
Sidama	5.6	(3.3, 9.2)	94.4	(90.8, 96.7)	100
Type of institution					
Bar, restaurant and café	10.2	(7.5, 13.7)	89.8	(86.3, 92.5)	100
Transit facility	0		100		100
Educational facility	7.5	(3.8, 14.3)	92.5	(85.7, 96.2)	100
Food and drinking establishment	11.6	(7.7, 17.1)	88.4	(82.9, 92.3)	100
Government building	2.9	(1.2, 6.9)	97.1	(93.1, 98.8)	100
Healthcare facility	29.2	(21.7, 37.9)	70.8	(62.1, 78.3)	100
Hotel	16.0	(12.4, 20.5)	84.0	(79.5, 87.6)	100

SNNPR, Southern Nations, Nationalities, and Peoples' Region.

Table 5 Multivariable logistic regression model of factors associated with active smoking in prohibited areas

Variables	Bivariate			Multivariate		
	COR	95% CI	P value	AOR	95% CI	P value
Region			<0.001			
Oromia (reference)	1.00			1.00		
Harari	3.15	(1.90, 5.23)	<0.001	4.14	(2.30, 7.45)	<0.001
SNNPR	0.67	(0.37, 1.20)	0.178	0.90	(0.48, 1.66)	0.725
Sidama	0.59	(0.29, 1.17)	0.132	0.69	(0.31, 1.50)	0.344
Type of site			<0.001			
Bar, restaurant and café (reference)	1.00			1.00		
Transit facility	18.74	(5.56, 63.14)	<0.001	26.66	(7.53, 94.41)	<0.001
Educational facility	0.13	(0.02, 0.94)	0.044	0.20	(0.03, 1.50)	0.116
Food and drinking establishment	1.85	(1.02, 3.27)	0.043	2.49	(1.32, 4.72)	0.005
Government building	0.93	(0.45, 1.92)	0.836	0.88	(0.41, 1.87)	0.736
Health facility	0.11	(0.02, 0.84)	0.033	0.14	(0.02, 1.07)	0.058
Hotel	1.45	(0.84, 2.49)	0.184	1.69	(0.96, 2.98)	0.07
Presence of labelled DSA	2.49	(1.47, 4.23)	<0.001	1.99	(1.07, 3.70)	0.03
Absence of 'No smoking signage'	1.48	(0.83, 2.65)	0.187	2.02	(1.07, 3.79)	0.029
Constant				0.03	(0.01, 0.06)	<0.001

Values in bold signifies p-value <0.05.

AOR, adjusted OR; COR, crude OR; DSA, designated smoking area; SNNPR, Southern Nations, Nationalities, and Peoples' Region.

($p < 0.001$). Multivariable logistic regression models showed that the presence of labelled DSA, absence of 'No smoking signage' within prohibited areas, Harari region and all types of sites other than educational facilities, healthcare facilities and government buildings were associated with the presence of someone smoking at the site (table 5). The odds of active smoking were 27 times higher at transit sites compared with the reference category of 'bar, restaurant, and café' (AOR=26.66 (95% CI 7.53, 94.41)). Furthermore, the odds of at least one person smoking in a prohibited area was twofold higher in other food and drinking establishments (AOR=2.49 (95% CI 1.32, 4.72)) and hotels (AOR=1.69 (95% CI 0.96, 2.98)) than at the reference category sites. Moreover, sites with a labelled DSA and the absence of 'no smoking' signage had twofold higher odds of a person smoking than at sites without a labelled DSA and the presence of 'no smoking' signage (table 5).

DISCUSSION

This study presents results from observational assessments and interviews with key site personnel at public places and workplaces in 12 towns selected for smoke-free initiative projects in four regions of Ethiopia. Newly legislated smoke-free provisions and tobacco control laws have not been implemented in all regions of Ethiopia. Hence, understanding the compliance level of smoke-free provisions, implementation and enforcement in the study sites provides useful information for implementing additional smoke-free provisions and other tobacco control regulations across the country. Our study used several indicators including existence of a DSA, smoking within 10 m of doorway or window, presence of smoke-free stickers/signage, presence of ashtrays/lighters in any indoor place, presence of cigarette butts within a prohibited area, presence of tobacco smell and active smoking within a prohibited area to assess compliance with smoke-free laws. The findings showed low compliance with smoke-free laws in the public places and workplaces of towns in the four regions, indicating the need for all regional governments to both adopt the national tobacco control regulations in their context and to enforce them to protect everyone from exposure to secondhand smoke in public places.

The Federal Democratic Republic of Ethiopia House of People passed one of the strongest African tobacco control bills in 2019,⁴ which legislated 100% smoke-free government buildings, educational facilities and healthcare settings. However, our study showed that few healthcare facilities, educational institutions and other workplaces, including government buildings, and no transit facilities currently comply with the new smoke-free provisions. This low compliance with smoke-free provisions in government buildings, particularly in healthcare facilities, is consistent with a previous study conducted by Tadesse and Zawdie in Addis Ababa, Ethiopia, which also reported an absence of no smoking signage from a high proportion of hospital areas (97%), and most hospitals had low compliance with smoke-free provisions.⁷ Another study in Ghana also found low compliance with smoke-free policies was linked to poor air quality in healthcare settings,⁸ demonstrating the importance of achieving compliance with smoke-free laws. Hence, additional efforts are required to build on the current smoke-free initiative in Ethiopia to create healthy public places.

Similar to a previous research by Navas-Acien *et al*, which reported higher non-compliance with smoke-free laws in hospitality settings than in education and hospitals,⁹ we also found hospitality settings had higher proportions of cigarette butts, active smoking and cigarette odour in prohibited indoor places than in other settings. For these settings, a relatively high number of sites had people smoking in a prohibited area within a 10 m radius of the indoor places. Further, the regression analysis indicated transit facilities, and food and drinking establishments were associated with the presence of active smoking, indicating these should be key locations for compliance activities. Our study findings found a comparable proportion of sites with active smoking in hospitality settings as reported by Gravelly *et al*, who observed active smoking at approximately 18% of hospitality venues in Kampala, Uganda.¹⁰ The result is also consistent with the findings of the 2016 Ethiopian GATS, which found 60% of adults visiting bars and nightclubs reported being exposed to secondhand smoke.² These findings further strengthen the case for the accelerated implementation of Article 8 of the FCTC as well as the existing national tobacco control

regulations, such as banning smoke within a 10 m radius of all indoor public places and posting EFDA-approved no smoking signs at proper locations within the establishments. While we observed positive association between the existence of a DSA and absence of 'no smoking stickers/signage' and active smoking, a total ban on smoking in indoor areas is required to adequately protect patrons and staff. The previous study in Uganda showed that the levels of indoor fine particulate matter of 2.5 μm or less (PM_{2.5}) were at hazardous levels (concentration of 267.6 $\mu\text{g}/\text{m}^3$) in venues which allowed smoking to occur.¹⁰

Similar to our study, other research has also demonstrated a high correlation between the presence of cigarette butts and ashtrays and active smoking, including research in Greece,¹¹ and Turkey⁹ demonstrating the utility of these measures as proxies for smoking on-site. Overall, we observed smoking in 99 sites during the data collection. Among the regions, Harari was predictive of the presence of active smoking. Numerous studies including GATS, Demographic and Health Survey, Guliani *et al* and Mengesha *et al* indicated that smoking was more prevalent in Harari than in any of these regions—Oromia, Sidama and SNNPR,^{2 12–14} potentially explaining these results.

Legislating and enforcing 100% smoke-free laws in all indoor places can effectively protect non-smokers, improve air quality and support people who smoke to quit. After implementing the smoke-free law in England, Ireland and Scotland, salivary cotinine levels among adults who did not smoke reduced by ~80%.^{15–17} Similarly, in New York, the concentration of PM_{2.5}, a measure of indoor air quality, declined from 324 to 34 $\mu\text{g}/\text{m}^3$ after the smoke-free law took effect.¹⁸ Reduction in indoor PM_{2.5} levels and the number of people observed smoking in restaurants, cafeterias and coffee shops was also observed in Vietnam and Scotland 5 years after the introduction of a smoke-free law.^{19 20} A study conducted in Georgia by Bakhturidze *et al* also indicated that, in addition to the tremendous improvement in indoor air quality, the implementation of comprehensive smoke-free provisions with a high compliance rate had positive effects on the reduction of secondhand smoke exposure, a decline in cardiovascular illness and enhanced demand for tobacco cessation services.²¹ Hence, Ethiopia's smoke-free laws are an important step towards protecting the health of its citizens. However, our study found that public places and government buildings had low compliance rates with smoke-free provisions, regardless of the type of site and region, indicating that greater enforcement is needed.

Strengths and limitations

The present study has limitations regarding the determination of cigarette smell because smell is subjective and may indicate smoking nearby rather than at the actual site. In addition, there were no prior measurements before the 2019 laws for comparison and the assessment did not include air quality measures, such as PM_{2.5}. Because larger sites took slightly longer to assess than smaller sites, there was a greater chance of observing smoking at larger sites. Furthermore, sites were alerted to the study because consent and assistance from a site representative was obtained. Given the low smoke-free compliance rate observed, it is unlikely that this impacted the results. However, if smoke-free law enforcement activities increase, the use of covert methods may be required for future studies to avoid observer bias. Despite these limitations, our findings are the first of their kind for Ethiopia and provide baseline evidence for future smoke-free compliance assessment using prospective data. Our study's other strengths include the use

of a standardised checklist, trained data collectors and a census strategy followed in each town.

CONCLUSION

This study indicated that the non-compliance level in public places and workplaces was very high, particularly in hospitality settings, workplaces and transit facilities. Only 12.5% of the establishments complied with the 2019 smoke-free policy. This calls for the effective implementation of comprehensive smoke-free provisions in all private establishments and government buildings. In addition, the adoption and full implementation of federal proclamation No 1112/2019 in all regions is urgently recommended.

Twitter Sisay Derso Mengesha @DersoSisay and Coral E Gartner @CoralGartner

Acknowledgements The authors thank the Ethiopian Food and Drug Authority for its funding and logistical support.

Contributors SDM and BS developed the research questions and study methodology. SDM (corresponding author) analysed the data, and designed and drafted the manuscript. BS, AA and HG were responsible for manuscript editing and data collection. CEG provided critical comments on the analysis and draft manuscript and contributed to manuscript editing.

Funding The Ethiopian Food and Drug Authority was the source of funding for this study.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the School of Pharmacy Ethical Review Committee at the Addis Ababa University (ERB/SOP/484/14/2022). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. The data sets used in this study were part of the smoke-free initiative project, which is not publicly available. Data can be accessed by fulfilling the data-sharing policy of the Ethiopian Food and Drug Authority.

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ORCID iDs

Sisay Derso Mengesha <http://orcid.org/0000-0002-5753-5677>

Coral E Gartner <http://orcid.org/0000-0002-6651-8035>

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