

# Smokers' and non-smokers' secondhand smoke experiences and interactions to reduce exposure in Armenia and Georgia

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## ABSTRACT

**INTRODUCTION** Armenia and Georgia have high rates of smoking and secondhand smoke exposure (SHSe). Greater progress in recent smoke-free legislation in Georgia and Armenia provides a pivotal time for examining the impact on smokers' and non-smokers' experiences and interactions regarding SHSe.

**METHODS** Surveys were conducted in 28 communities in Armenia (n=705) and Georgia (n=751) in 2018 and assessed past 30-day SHSe and smoking in different contexts, as well as attitudes toward and interactions regarding SHSe.

**RESULTS** In this sample (mean age 43.4 years, SD=13.5; 60.5% female; 27.3% smokers), SHSe among non-smokers was usually in homes (42.7%), cars (42.4%), and outdoor public places (38.2%); smokers also reported smoking usually in these places (70.0%, 62.1%, and 60.0%, respectively). Smokers indicated greater likelihood of putting out cigarettes and non-smokers indicated greater likelihood of asking smokers to put them out in places where smoking was prohibited versus allowed (76.5% vs 57.3%, and 46.6% vs 30.7%, respectively). Moreover, 89.9% of smokers indicated being very likely to put out cigarettes around small children if asked and 75.8% indicated trying to minimize SHSe. While 39.7% of participants reported seeing requests to smokers to put out cigarettes in the past 6 months, only 23.3% of smokers reported being asked to do so. Non-smokers in Georgia versus Armenia reported greater likelihood of engaging in behaviors to lower SHSe ( $p<0.001$ ).

**CONCLUSIONS** Smoke-free legislation may catalyze more behaviors to lower SHSe, particularly among non-smokers; however, private settings (e.g. homes) remain prominent SHSe sources. Public health efforts must consider implications of such policies on SHSe in private settings.

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## INTRODUCTION

Low- and middle-income countries (LMICs) are disproportionately affected by tobacco-related diseases and deaths<sup>1,2</sup> including those attributed to secondhand smoke exposure (SHSe)<sup>3</sup>. The World Health Organization (WHO) Framework Convention

on Tobacco Control (FCTC) requires implementing comprehensive smoke-free policies in countries that ratify the FCTC<sup>4</sup>. Smoke-free policies are effective in protecting non-smokers from SHSe<sup>4</sup>, reducing SHSe in restaurants, workplaces, and other public settings<sup>5</sup> (mitigating harmful health effects<sup>6</sup>), reducing

opportunities to smoke, shifting social norms<sup>7</sup>, and preventing youth from initiating tobacco use<sup>7</sup>. Unfortunately, about 80% of the world's population is not properly protected by these policies<sup>8</sup>.

Smoke-free policies are especially important in LMICs<sup>9</sup>. The smoking prevalence among men in LMICs such as Armenia (52.3%) and Georgia (57.7%) are among the highest in the world (11th and 6th highest, respectively). Women's smoking prevalence is much lower (1.5% and 5.7%, respectively)<sup>10</sup>, underscoring high SHSe rates<sup>11,12</sup>, even where smoking is prohibited<sup>11</sup>. According to 2016–2017 data, past 30-day SHSe was 26.6% in homes and 56.4% in workplaces in Armenia<sup>13</sup>; in Georgia, 43.0% reported daily SHSe at home and 15.8% daily SHSe at their workplaces<sup>14</sup>.

Both Armenia (2004) and Georgia (2006) ratified the FCTC; however, implementation of FCTC-recommended tobacco control measures have been delayed<sup>15</sup>. In 2004, smoke-free policies were introduced in educational, cultural, healthcare, public transportation and other public settings in Armenia, except dining facilities (e.g. restaurants). In February 2020, new tobacco control legislation was adopted extending existing smoke-free bans to all public places and to all types of tobacco products (e.g. hookah, heated tobacco products, electronic cigarettes). In 2017–2018, Georgia implemented progressive tobacco control laws including comprehensive smoke-free bans in a wide range of indoor and outdoor public places, which applied to all types of tobacco products. In both countries, the launch of these policies was reinforced by media campaigns. Enforcement of smoke-free policies is done via law enforcement (State Hygiene and Anti-Epidemics Inspectorate in Armenia, patrol police of the Ministry of Internal Affairs in Georgia), and fines for first offences are 500 GEL for venue managers and 100 GEL for citizen smokers in Georgia, and 5000 AMD for smokers in Armenia (GEL: 1000 Georgian Lari about 300 US\$; AMD: 1000 Armenian Drams about 1.9 US\$). While compliance with any smoke-free policies has historically been low<sup>15,16</sup>, compliance has been increasing in Georgia since the comprehensive country-wide smoke-free policy went into effect (269 violations in 2018; 192 in 2019).

While there has been substantial research examining factors related to compliance with

smoke-free air policies, little research has examined whether reports of smokers' smoking behaviors and non-smokers exposure to smoking in various contexts coincide. Public support and favorable attitudes toward smoke-free policies can contribute to effective policy adoption<sup>17</sup>, implementation<sup>18</sup>, and impact. Despite general public support for smoke-free policies in LMICs<sup>9</sup>, some studies show low levels of compliance with smoke-free policies<sup>9</sup>. Such compliance issues may be related to several factors, such as low perceived health risks of smoking<sup>19</sup> and social norms conducive to smoking<sup>20–24</sup>. Social norms may drive the extent to which smoking in certain places or around certain people is deemed more or less acceptable among both smokers and non-smokers<sup>12</sup>, and thus may influence how salient such behaviors are across contexts<sup>25</sup>.

Additionally, little research has examined how smokers and non-smokers interact regarding measures to reduce SHSe. Despite some evidence that smokers may choose to comply with smoke-free policies and voluntarily engage in behaviors to reduce SHSe among non-smokers<sup>26–28</sup>, there is limited enforcement of and compliance with smoke-free policies in general<sup>9</sup> and specifically in Armenia and Georgia<sup>15,16</sup>. Thus, examining how non-smokers and smokers negotiate issues related to SHSe is critical. Non-smokers can be assertive about asking smokers to distance themselves or to stop smoking altogether where it is restricted, providing social enforcement for these policies<sup>19,29,30</sup>. With smoking so pervasive in Armenia and Georgia and with striking sex differences in tobacco use, it is particularly important to understand how comfortable ordinary citizens feel in engaging in social interactions that could influence SHSe and/or compliance with smoke-free policies.

Based on previous research<sup>19,31</sup>, the current study and analyses are informed by Social Cognitive Theory (SCT)<sup>32</sup>, which posits that health-related behaviors (including tobacco use, cessation, and efforts to alter SHSe) are impacted by a broad range of personal cognitive and behavioral factors, as well as environmental (e.g. social factors). More specifically, SCT – when applied to SHSe and related behaviors – takes into account the effects of prior experiences (e.g. observational learning), social norms, attitudes towards SHSe and measures to

reduce it, and self-efficacy to impact SHSe, among other factors. From this perspective, a relevant consideration in the context of Armenia and Georgia is how policy may have impacted SHSe and related attitudes and behaviors. Given that Georgia established more progressive tobacco control policies (including smoke-free policies) earlier than Armenia, Georgians may have experienced greater shifts in social norms that have impacted smoking behaviors and attitudes towards efforts to lower SHSe.

Leveraging this perspective, the current study examined SHSe-related experiences of smokers versus non-smokers in Armenia and Georgia. Specifically, we examined: 1) where smokers report smoking and where non-smokers are exposed to smoking across countries; 2) experiences with and attitudes toward measures to reduce SHSe across smokers and non-smokers and across countries; and 3) self-reported willingness to take measures to reduce SHSe across smokers and non-smokers and across countries. We also examined sociodemographic and smoking-related characteristics related to these outcomes.

## METHODS

### Ongoing study overview

The ongoing parent study has been more fully described elsewhere<sup>33</sup> but is briefly described here. This study uses a matched-pairs community-randomized controlled trial to examine the effectiveness of local coalitions in promoting smoke-free air in Armenia and Georgia. This study defines a 'community' as a distinct municipality. We purposively selected 14 communities per country with: 1) small to medium populations; and 2) local public health coordinating centers with sufficient capacity to engage in the proposed research. Communities were paired in each country based on region (and distance from Yerevan or Tbilisi), population size, and local public health branch/center budget and then randomly assigned to be in the intervention versus control conditions. The present study was approved by the Institutional Review Boards of [omitted for blind review].

### Data collection

Among all 28 intervention and control communities,

population-level surveys (i.e. of community members) were conducted before the launch of the coalition member trainings (October–November 2018) and again at the end of the 3-year period. The current analyses focus on the baseline population-level surveys conducted in October–November 2018.

In each of the 28 communities, we aimed to complete 50 surveys of eligible participants (aged  $\geq 18$  years). Sampling strategies were different in the two countries because of availability of household data in Armenia (but not in Georgia) and the utility of 'clusters' (i.e. geographically defined areas of 150 households) in Georgia (but not in Armenia). In both countries, we obtained census data for all households within the municipality limits from the Bureau of Statistics. In Armenia, the household data include identifiers, whereas in Georgia, no identifiers are included but rather include cluster assignment. Thus, the sampling design (described below) differs to accommodate the data available in each country.

In Armenia, household addresses in each city were randomly ordered; assessments began at the beginning of the list and continued until the target recruitment in each city ( $n=50$ ) was reached. In total, 1128 households were visited, of which 27.4% ( $n=309$ ) were ineligible (9.3% no household member eligible, 10.6% closed door/not home/don't live there anymore, 6.6% non-existing address). Among the 819 eligible, 705 agreed to participate, yielding a participation rate of 86.1% ( $n=705/819$ ).

In Georgia, using cluster assignment data, multistage cluster sampling was used to select study participants. First, 5 clusters in each city were identified, then 15 households per cluster were selected using a random walk method. Specifically, the total number of households was divided by 15 (assuming about 75% response rate) to determine how many households needed to be skipped before arriving at the next designated household. For example, if the municipality included 150 households, the data collector would go from the first selected household to the 10th. In total, 958 households were visited, of which 5.0% ( $n=48$ ) were ineligible (no household member eligible or unable to reach household member). Among the 910 eligible, 751 agreed to participate, yielding a participation rate of 82.5% ( $n=751/910$ ).

At each household selected, using the respective

approaches above in each country, the KISH method<sup>34</sup> was used to identify target participants in each household, who we approached in-person at their homes, provided a study description, obtained informed consent and administered the survey via electronic tablets. Surveys were conducted by trained interviewers, who orally posed the questions to participants in their respective language (Armenian, Georgian) and recorded their responses. Participants were not compensated for participation.

## Measures

### *Sociodemographics*

Current analyses included age, sex, education, employment, marital status, and children aged <18 years in the home.

### *Smoking characteristics*

We assessed lifetime cigarette use among all participants; among lifetime users, we assessed past 30-day cigarette smoking (not at all, some days, every day). Among current smokers (i.e. those reporting smoking on some days or every day), we assessed number of days smoked, cigarettes smoked per day (CPD), importance of quitting, confidence in quitting, readiness to quit in the next 30 days, and quit attempts in the past year<sup>35</sup>.

### *Places smoking occurs*

Smokers were asked: ‘During the past 30 days, on how many days did you smoke tobacco products?’. With response options: home; car; indoor area at work; indoors at a public place (e.g. school buildings, stores, restaurants, and sports arenas); and outdoors at a public place (e.g. school grounds, parking lots, stadiums, and parks)<sup>36</sup>. Participants could indicate if they did not work outside the home or did not have indoor areas at their work. Questions were developed to assess specific locations where smokers smoked. We asked: ‘In the past 30 days, how often did you smoke in the following locations?’. The settings are listed in Table 2 and responses were: have not been, never, almost never or rarely, several times a month, several times a week, almost daily, regularly – several hours a day, don’t know, or refused to answer<sup>36</sup>.

Non-smokers were asked: ‘In the past 30 days, on how many days did someone smoke in your home; did you breathe the smoke from someone smoking

tobacco products in your home; did someone smoke in your car; did you breathe the smoke from someone smoking tobacco products in your car; has anyone smoked in the indoor area where you work; did you breathe the smoke from someone who was smoking tobacco products in an indoor public place; and did you breathe the smoke from someone who was smoking tobacco products in an outdoor public place?’<sup>36</sup>. Using newly developed questions, we also asked: ‘In the past 30 days, how often did you see anyone smoke in the following locations?’. The settings are listed in Table 2 and responses were: have not been, never, almost never or rarely, several times a month, several times a week, almost daily, regularly – several hours a day, don’t know, or refused to answer.

### *Interactions regarding smoking*

Using newly developed questions, smokers were asked: ‘If someone around you asked you to put out your cigarette in a place where smoking is allowed, how likely would you be to put out your cigarette?’. We also asked this question with regard to places where smoking is prohibited. We asked: ‘If there were small children around you in a public place, how likely would you be to put out your cigarette?’ and ‘How much do you try to minimize the amount that non-smokers are exposed to your cigarette smoke?’. Responses for these 4 questions were: not at all, a little, somewhat, very, don’t know or refused to answer. Smokers were then asked: ‘In the past 6 months, how often have you been asked to put out your cigarette in a public place?’. Responses were: never, rarely, sometimes, frequently, don’t know, or refused to answer.

Non-smokers were asked: ‘Assuming you wanted someone who was smoking around you to put out their cigarette, how likely would you be to ask them to do so in an area where smoking is allowed?’. We also asked this question with regard to places where smoking is prohibited. Responses for these questions were: not at all, a little, somewhat, very, don’t know, or refused to answer.

Both smokers and non-smokers were asked: ‘In the past 6 months, how often have you witnessed any one being asked to put out their cigarette in an area where smoking is not allowed?’. Responses were: never, rarely, sometimes, frequently, don’t know, or

refused to answer. They were also asked: ‘To what extent do you agree that there should be fines for smokers violating smoking bans?’. Responses were: not at all, a little, somewhat, very much, don’t know, or refused to answer.

Index scores were created to summarize their interactions regarding SHSe. For smokers, this index score was a total of the following items: likelihood of putting cigarettes out if asked in places where smoking is allowed; likelihood of putting cigarettes out if asked in places where prohibited; likelihood of putting out cigarettes when small children are present; extent to which they try to minimize SHSe among others; and level of support for fines for violating smoke-free policies (Cronbach’s alpha of 0.63). For non-smokers, this index score was a total of the following items: likelihood of asking smokers to put cigarettes in places where smoking is allowed; likelihood of asking smokers to put cigarettes in places where prohibited; and level of support for fines for violating smoke-free policies (Cronbach’s alpha of 0.72).

### Data analysis

We first conducted descriptive analyses to characterize participants. We then conducted bivariate analyses to examine differences between smokers and non-smokers and differences among those in Armenia and Georgia in relation to sociodemographics and tobacco use related characteristics. We obtained univariate statistics regarding smokers’ and non-smokers’ reports of experiences related to smoking behavior and SHSe in various contexts (i.e. number of days of smoking or witnessing smoking) and conducted independent samples t-tests.

We calculated univariate statistics regarding smokers’ and non-smokers’ reports of experiences and willingness to engage in interactions regarding SHSe and reduction, and conducted independent samples t-tests. To assess correlates of the index scores created to summarize interactions regarding SHSe among smokers and non-smokers, we conducted multilevel random intercept linear regression analyses using GenLinMixed with an identity link function accounting for the random effect of municipality. We first ran unconditional models to estimate the unconditional intra-class correlation (ICC) and then expanded to the full

model by adding fixed effects for country, age, sex, employment status, relationship status, children in the home, together in one step. Additionally, the models also included fixed effects for appropriate tobacco use characteristics (smoking frequency and quitting importance/confidence among smokers; and former smoking status among non-smokers). We modeled an unstructured covariance matrix and excluded cases with missing data on covariates (<3%). Full Model ICCs were calculated for all full models. All analyses were conducted in SPSS v. 26, and alpha was set at 0.05.

## RESULTS

### Bivariate comparisons by smoking status and country

In this sample (mean age = 43.4 years, SD=13.5; 60.5% female; 27.3% smokers; Table 1), current smoking rates were 20.4% in Armenia and 33.8% in Georgia (men: Armenia 63.8%, Georgia 64.1%,  $p=0.942$ ; women: Armenia 2.0%, Georgia 5.2%,  $p=0.010$ ). Smokers (vs non-smokers) were more likely male, with  $\leq$ high school education, and employed; those living in Georgia (vs Armenia) were older and more likely male, with  $>$ high school education, employed, higher income, married or living with a partner, and without children in the home ( $p<0.05$ ).

### Smoking and SHSe in various settings

Among smokers, the majority reported past 30-day smoking in their home (70.0%) and others’ homes (71.0%; Table 2), albeit more prevalent in Armenia than in Georgia (82.2% vs 63.0%,  $p<0.001$ ; and mean number of days smoked in own home, Armenia 22.27 vs Georgia 12.61 ( $p<0.001$ )). Other areas without smoking regulations in both countries where smoking was frequently reported were their car (62.1%) and others’ cars (73.4%). The next frequently reported area where smoking behavior was reported were outdoor public spaces (60.0%), particularly without smoke-free regulations in Armenia (e.g. restaurants 91.7%, bars 77.8%, beaches/parks/playgrounds 71.8%) and with partial restrictions in Georgia (9.0%, 10.0%, and 46.9%, respectively). The mean number of days smoked in those places was also higher in Armenia compared to Georgia. In public places where smoking was totally banned, both in Armenia and Georgia, smoking behavior was less likely to occur,

Table 1. Participant characteristics and bivariate comparisons of smokers versus non-smokers

Characteristics	All participants n=1456	Smokers n=398 (27.3%)	Non-smokers n=1058 (72.7%)	p	Armenia n=705	Georgia n=751	p
	n (%) or M (SD)	n (%) or M (SD)	n (%) or M (SD)		n (%) or M (SD)	n (%) or M (SD)	
<b>Country, n (%)</b>				<0.001			-
Armenia	705 (48.4)	144 (36.2)	561 (53.0)		-	-	
Georgia	751 (51.6)	254 (63.8)	497 (47.0)		-	-	
<b>Age (years), M (SD)</b>	43.35 (13.49)	43.38 (13.26)	43.34 (13.59)	0.957	42.56 (13.41)	44.08 (13.53)	0.032
<b>Sex, n (%)</b>				<0.001			<0.001
Male	575 (39.5)	368 (92.5)	207 (19.6)		210 (29.8)	365 (48.6)	
Female	881 (60.5)	30 (7.5)	851 (80.4)		495 (70.2)	386 (51.4)	
<b>Education level, n (%)</b>				0.027			<0.001
Less than high school	223 (15.3)	66 (16.6)	157 (14.8)		161 (22.8)	62 (8.3)	
High school	260 (17.9)	85 (21.4)	175 (16.5)		53 (7.5)	207 (27.6)	
Vocational school	407 (28.0)	100 (25.1)	307 (29.0)		230 (32.6)	177 (23.6)	
Some college	98 (6.7)	34 (8.5)	64 (6.0)		35 (5.0)	63 (8.4)	
College degree or more	468 (32.1)	113 (28.4)	355 (33.6)		226 (32.1)	242 (32.2)	
<b>Employment, n (%)</b>				<0.001			<0.001
Employed	713 (49.0)	275 (69.1)	438 (41.4)		311 (44.1)	402 (53.5)	
Unemployed/other	743 (51.0)	123 (30.9)	620 (58.6)		394 (55.9)	349 (46.5)	
<b>Income per month, n (%)</b>				0.090			<0.001
≤500 GEL/100000 AMD	563 (46.3)	423 (47.7)	140 (42.3)		315 (52.1)	248 (40.5)	
>500 GEL/100000 AMD	654 (53.7)	463 (52.3)	191 (57.7)		290 (47.9)	364 (59.5)	
<b>Marital status, n (%)</b>				0.085			0.017
Married/living with partner	1061 (72.9)	277 (69.6)	784 (74.1)		534 (75.7)	527 (70.2)	
Other	395 (27.1)	121 (30.4)	274 (25.9)		171 (24.3)	224 (29.8)	
<b>Children under 18 years in the home, n (%)</b>				0.174			<0.001
No	702 (49.0)	205 (51.9)	497 (47.9)		296 (43.4)	406 (54.1)	
Yes	731 (51.0)	190 (48.1)	541 (52.1)		386 (56.6)	345 (45.9)	
<b>Smoking status, n (%)</b>							
Smokers	398 (27.3)	-	-	-	144 (20.4)	254 (33.8)	0.001
Male	368 (64.0)	-	-	-	134 (63.8)	234 (64.1)	0.942
Female	30 (3.41)	-	-	-	10 (2.0)	20 (5.2)	0.010
<b>Former smoker, n (%)</b>							0.188
No	-	-	956 (90.4)	-	24 (42.1)	32 (31.7)	
Yes	-	-	102 (9.6)	-	33 (57.9)	69 (68.3)	
<b>Smoking frequency, n (%)</b>							0.448
Every day	-	350 (87.9)	-	-	129 (89.6)	221 (87.0)	
Some days	-	48 (12.1)	-	-	15 (10.4)	33 (13.0)	
<b>CPD, M (SD)</b>	-	21.27 (10.79)	-	-	21.72 (11.12)	21.02 (10.62)	0.548
<b>Readiness to quit in next 6 months, n (%)</b>							0.080
No	-	240 (83.3)	-	-	83 (78.3)	157 (86.3)	
Yes	-	48 (16.7)	-	-	23 (21.7)	25 (13.7)	
<b>Lifetime quit attempt, n (%)</b>							<0.001
No	-	166 (43.7)	-	-	35 (25.9)	131 (53.5)	
Yes	-	214 (56.3)	-	-	100 (74.1)	114 (46.5)	
<b>Importance of quitting, M (SD)</b>	-	5.74 (3.23)	-	-	6.47 (3.71)	5.33 (2.86)	0.001
<b>Confidence in quitting, M (SD)</b>	-	4.79 (3.18)	-	-	4.78 (3.88)	4.79 (2.73)	0.967

CPD: cigarettes per day. M: mean. SD: standard deviation. GEL: 1000 Georgian Lari about 300 US\$. AMD: 1000 Armenian Drams about 1.9 US\$.

Table 2. Smokers' reported smoking behaviors in various contexts: by country comparison

Characteristics	Any smoking			p	Number of days smoked			p
	Total n=398	Armenia n=144	Georgia n=254		Total n=398	Armenia n=144	Georgia n=254	
	n (%)	n (%)	n (%)		M (SD)	M (SD)	M (SD)	
<b>Location smoked in the past 30 days</b>								
Indoor areas at work <sup>b</sup>	92 (34.3)	48 (46.6)	44 (26.7)	0.001	6.93 (11.15)	10.08 (12.63)	4.95 (9.65)	<0.001
Indoor public places	58 (15.8)	44 (34.4)	14 (5.8)	<0.001	1.95 (6.23)	4.92 (9.41)	0.37 (2.30)	<0.001
Outdoor public places	219 (60.0)	105 (80.2)	114 (48.7)	<0.001	10.76 (12.35)	18.50 (12.65)	6.42 (9.82)	<0.001
<b>Specific public places<sup>c</sup></b>								
Healthcare facilities (e.g. hospitals and clinics)	20 (9.8)	17 (21.0)	3 (2.4)	<0.001	0.15 (0.52)	0.27 (0.59)	0.06 (0.46)	0.005
Schools (e.g. kindergartens, primary, secondary)	8 (6.4)	6 (13.0)	2 (2.5)	0.021	0.10 (0.47)	0.22 (0.70)	0.04 (0.25)	0.040
Colleges, universities, or vocational schools	8 (12.3)	5 (17.9)	3 (8.1)	0.236	0.12 (0.33)	0.18 (0.39)	0.08 (0.28)	0.242
Theaters	3 (4.6)	3 (16.7)	0 (0.0)	0.004	0.11 (0.56)	0.39 (1.04)	0.00 (0.00)	0.011
Public transportation (e.g. trains, buses, mini-vans)	21 (8.4)	15 (19.2)	6 (3.5)	<0.001	0.12 (0.49)	0.31 (0.79)	0.04 (0.23)	<0.001
Grocery stores	26 (8.4)	14 (20.0)	12 (5.0)	<0.001	0.14 (0.54)	0.24 (0.55)	0.11 (0.53)	0.066
Shopping malls	18 (8.3)	13 (14.4)	5 (3.9)	0.006	0.16 (0.61)	0.29 (0.84)	0.06 (0.35)	0.007
Government institutions or offices	39 (29.3)	34 (59.7)	5 (6.6)	<0.001	0.54 (1.01)	1.16 (1.26)	0.08 (0.32)	<0.001
Private place of employment	80 (44.4)	33 (60.0)	47 (37.6)	0.005	1.12 (1.53)	1.55 (1.58)	0.94 (1.47)	0.013
Restaurants, cafes or cafeterias	90 (39.5)	77 (91.7)	13 (9.0)	<0.001	0.75 (1.11)	1.82 (1.11)	0.13 (0.42)	<0.001
Pubs, bars, or night clubs	40 (25.6)	28 (77.8)	12 (10.0)	<0.001	0.46 (0.90)	1.56 (1.18)	0.13 (0.40)	<0.001
Beaches, parks, playgrounds	103 (56.6)	51 (71.8)	52 (46.9)	0.001	1.32 (1.43)	1.85 (1.55)	0.98 (1.24)	<0.001
The homes of others	235 (71.0)	88 (73.3)	147 (69.7)	0.480	1.28 (1.08)	1.39 (1.09)	1.22 (1.07)	0.173
The private cars of others	204 (73.4)	73 (74.5)	131 (72.8)	0.758	1.34 (1.09)	1.43 (1.16)	1.29 (1.04)	0.306
Home	261 (70.0)	111 (82.2)	150 (63.0)	<0.001	16.10 (13.92)	22.27 (12.23)	12.61 (13.63)	<0.001
Car <sup>a</sup>	141 (62.1)	53 (66.3)	88 (59.9)	0.343	15.11 (14.12)	17.60 (14.25)	13.75 (13.91)	0.049

a Among those owning a car. b Among those working outside the home in a workplace with indoor areas. c Among those exposed to those settings in the past 30 days. ■ No restrictions. ■ Partial restrictions. ■ Total ban.

but more frequently reported by smokers in Armenia: healthcare facilities (21.0% vs 2.4%), educational facilities (e.g. schools, 13.0% vs 2.5%), colleges, universities, or vocational schools (17.9% vs 8.1%), and theaters (16.7% vs 0.0%, p<0.05).

Aligning with smokers' reports, non-smokers reported usually witnessing smoking in their homes (42.7%) and others' homes (77.0%; Table 3). Significantly more non-smokers in Armenia versus Georgia reported smoking in the home (57.9% vs 25.5%, p<0.001; mean number of days Armenia 13.33, Georgia 7.64, p<0.001). Non-smokers in Armenia versus Georgia were more likely to report

seeing smoking in both indoor (42.3% vs 5.7%, p<0.001) and outdoor public places (57.7% vs 17.9%, p<0.001). Smoking was most frequently seen in public settings with no smoke-free regulations in Armenia and with partial regulations in Georgia; in all those public places, non-smokers in Armenia reported significantly more smoking and mean numbers of days witnessing smoking. In line with the experiences reported by smokers, non-smokers in Armenia versus Georgia also reported seeing smoking more frequently in public places with complete smoking bans: healthcare facilities (27.3% vs 3.2%), educational facilities (e.g. schools, 14.7%

Table 3. Non-smokers' experiences with smoking in various contexts: by country comparison

Characteristics	Saw any smoking			p	Number of days seen			p
	Total	Armenia	Georgia		Total	Armenia	Georgia	
	n=1158 n (%)	n=561 n (%)	n=497 n (%)		n=1158 M (SD)	n=561 M (SD)	n=497 M (SD)	
<b>Location saw someone smoking in the past 30 days</b>								
Indoor areas at work <sup>b</sup>	88 (22.5)	57 (30.0)	31 (15.4)	0.001	2.21 (5.95)	3.63 (7.75)	0.88 (2.97)	<0.001
Indoor public places	246 (24.5)	218 (42.3)	28 (5.7)	<0.001	1.38 (3.67)	2.48 (4.72)	0.21 (1.28)	<0.001
Outdoor public places	380 (38.2)	293 (57.7)	87 (17.9)	<0.001	3.60 (7.16)	6.33 (8.91)	0.75 (2.48)	<0.001
<b>Specific public places<sup>c</sup></b>								
Healthcare facilities (e.g. hospitals and clinics)	112 (16.9)	103 (27.3)	9 (3.2)	<0.001	0.25 (0.64)	0.41 (0.80)	0.04 (0.20)	<0.001
Schools (e.g. kindergartens, primary, secondary)	52 (9.4)	46 (14.7)	6 (2.5)	<0.001	0.15 (0.55)	0.23 (0.68)	0.04 (0.25)	<0.001
Colleges, universities, or vocational schools	56 (23.1)	47 (32.4)	9 (9.2)	<0.001	0.50 (1.07)	0.74 (1.26)	0.15 (0.52)	<0.001
Theaters	22 (14.1)	20 (24.1)	2 (2.7)	<0.001	0.22 (0.61)	0.37 (0.78)	0.04 (0.26)	<0.001
Public transportation (e.g. trains, buses, mini-vans)	202 (26.7)	172 (45.4)	30 (7.9)	<0.001	0.39 (0.77)	0.69 (0.93)	0.10 (0.37)	<0.001
Grocery stores	183 (18.0)	154 (28.4)	29 (6.1)	<0.001	0.31 (0.79)	0.49 (0.95)	0.11 (0.49)	<0.001
Shopping malls	103 (15.6)	86 (21.9)	17 (6.3)	<0.001	0.21 (0.57)	0.30 (0.68)	0.07 (0.30)	<0.001
Government institutions or offices	140 (40.9)	130 (55.6)	10 (9.3)	<0.001	0.72 (1.07)	1.00 (1.16)	0.12 (0.43)	<0.001
Private place of employment	156 (43.9)	113 (63.1)	43 (24.4)	<0.001	0.80 (1.12)	1.21 (1.23)	0.38 (0.81)	<0.001
Restaurants, cafes or cafeterias	245 (52.4)	213 (82.2)	32 (15.3)	<0.001	0.88 (1.04)	1.44 (1.03)	0.20 (0.49)	<0.001
Pubs, bars, or night clubs	56 (35.7)	41 (77.4)	15 (14.4)	<0.001	0.69 (1.08)	1.70 (1.23)	0.18 (0.48)	<0.001
Beaches, parks, playgrounds	286 (67.0)	199 (83.6)	87 (46.0)	<0.001	1.40 (1.32)	1.77 (1.23)	0.94 (1.29)	<0.001
The homes of others	661 (77.0)	422 (87.4)	239 (63.7)	<0.001	1.23 (0.94)	1.49 (0.92)	0.88 (0.85)	<0.001
The private cars of others	372 (67.9)	227 (67.8)	145 (68.1)	0.939	1.03 (0.96)	1.04 (0.97)	1.03 (0.95)	0.927
<b>Home</b>	445 (42.7)	320 (57.9)	125 (25.5)	<0.001	7.04 (11.79)	10.98 (13.33)	2.58 (7.64)	<0.001
Breathed smoke	443 (42.4)	316 (57.1)	127 (25.8)	<0.001	6.73 (11.53)	10.47 (13.10)	2.53 (7.52)	<0.001
<b>Car<sup>a</sup></b>	146 (26.0)	88 (29.8)	58 (21.7)	0.029	3.71 (8.77)	5.09 (10.01)	2.17 (6.86)	<0.001
Breathed smoke	145 (24.5)	83 (26.9)	62 (21.9)	0.162	2.66 (7.17)	3.81 (8.79)	1.40 (4.53)	<0.001

a Among those owning a car. b Among those working outside the home in a workplace with indoor areas. c Among those exposed to those settings in the past 30 days. ■ No restrictions. ■ Partial restrictions. ■ Total ban.

vs 2.5%), colleges, universities, or vocational schools (32.4% vs 9.2%), and theaters (24.1% vs 2.7%, p<0.001).

### Interactions regarding smoking and SHSe

Smokers were more likely to report that they would put out a cigarette if asked in places where smoking was prohibited versus allowed (76.5% very likely vs 57.3%; Table 4); non-smokers reported similarly (46.6% vs 30.7%). Moreover, 89.9% of smokers indicated being very likely to put out their cigarettes

around small children and 35.2% reported very much trying to minimize SHSe. Reports of seeing requests to put cigarettes out or being asked to put them out in the past 6 months were rare (68.0% of participants never witnessed such requests; 76.7% of smokers had been asked).

Smokers in Armenia versus Georgia were less likely to report they would put out cigarettes around small children (p=0.002). Non-smokers in Armenia versus Georgia were less likely to report that they would ask smokers to put cigarettes out in places

Table 4. The experiences of smokers and non-smokers with and attitudes toward interactions to reduce SHSE

Likelihood of putting out/asking to put out cigarettes <sup>a</sup>	All (N=1456)		Smokers (N=398)		p	Non-smokers (N=1058)		p
	Smokers	Non-smokers	Armenia	Georgia		Armenia	Georgia	
	N=398	N=1058	N=144	N=254		N=561	N=497	
	M (SD) or n (%)		M (SD) or n (%)	M (SD) or n (%)				
<b>In a place where smoking is allowed, M (SD)*</b>	2.30 (1.0)	1.64 (1.2)	2.39 (1.1)	2.25 (0.9)	0.203	1.54 (1.18)	1.77 (1.1)	0.001
Not at all	35 (10.2)	245 (23.9)	17 (12.9)	18 (8.6)	<0.001	150 (27.0)	95 (20.2)	<0.001
A little	23 (6.7)	193 (18.8)	10 (7.6)	13 (6.2)	-	124 (22.3)	69 (14.7)	-
Somewhat	88 (25.7)	272 (26.5)	10 (7.6)	78 (37.1)	-	115 (20.7)	157 (33.4)	-
Very	196 (57.3)	315 (30.7)	95 (72.0)	101 (48.1)	-	166 (29.9)	149 (31.7)	-
<b>In a place where smoking is prohibited, M (SD)*</b>	2.63 (0.78)	2.05 (1.1)	2.65 (0.9)	2.63 (0.7)	0.802	1.94 (1.1)	2.19 (1.0)	<0.001
Not at all	19 (5.4)	130 (12.6)	10 (7.5)	9 (4.2)	<0.001	84 (15.1)	46 (9.6)	<0.001
A little	8 (2.3)	166 (16.0)	5 (3.8)	3 (1.4)	-	106 (19.0)	60 (12.6)	-
Somewhat	55 (15.8)	257 (24.8)	7 (5.3)	48 (22.2)	-	126 (22.6)	131 (27.4)	-
Very	267 (76.5)	482 (46.6)	111 (83.5)	156 (72.2)	-	241 (43.3)	241 (50.4)	-
<b>In a public place with small children, M (SD)*</b>	2.87 (0.4)	-	2.78 (0.6)	2.92 (0.3)	0.002	-	-	-
Not at all	4 (1.1)	-	4 (3.0)	0 (0.0)	0.018	-	-	-
A little	3 (0.8)	-	2 (1.5)	1 (0.4)	-	-	-	-
Somewhat	30 (8.2)	-	14 (10.4)	16 (6.9)	-	-	-	-
Very	330 (89.9)	-	114 (85.1)	216 (92.7)	-	-	-	-
<b>Try to minimize non-smokers' exposure, M (SD)*<sup>a</sup></b>	1.97 (1.0)	-	2.06 (1.0)	1.92 (1.0)	0.200	-	-	-
Not at all	47 (12.9)	-	16 (12.1)	31 (13.3)	0.354	-	-	-
A little	41 (11.2)	-	13 (9.8)	28 (12.0)	-	-	-	-
Somewhat	152 (41.6)	-	50 (37.9)	102 (43.8)	-	-	-	-
Very	125 (34.2)	-	53 (40.2)	72 (30.9)	-	-	-	-
<b>Agree with fines for violating bans, M (SD)*<sup>a</sup></b>	1.36 (1.1)	2.41 (0.9)	1.30 (1.2)	1.39 (1.0)	0.452	2.34 (0.90)	2.49 (0.8)	0.006
Not at all	116 (31.4)	63 (6.1)	57 (40.4)	59 (25.8)	<0.001	42 (7.7)	21 (4.4)	0.015
A little	66 (17.8)	63 (6.1)	19 (13.5)	47 (20.5)	-	33 (6.0)	30 (6.3)	-
Somewhat	127 (34.3)	291 (28.4)	30 (21.3)	97 (42.4)	-	170 (31.0)	121 (25.4)	-
Very	61 (16.5)	609 (59.4)	35 (24.8)	26 (11.4)	-	304 (55.4)	305 (63.9)	-
<b>Past 6 months, saw request to put out cigarette where not allowed, M (SD)*<sup>b</sup></b>	0.54 (0.9)	0.73 (1.0)	1.11 (1.1)	0.21 (0.6)	<0.001	1.03 (1.1)	0.39 (0.7)	<0.001
Never	261 (68.0)	595 (57.4)	56 (39.4)	205 (84.7)	<0.001	247 (44.7)	348 (72.0)	<0.001
Rarely	62 (16.1)	208 (20.1)	34 (23.9)	28 (11.6)	-	110 (19.9)	98 (20.3)	-
Sometimes	38 (9.9)	147 (14.2)	33 (23.2)	5 (2.1)	-	126 (22.8)	21 (4.3)	-
Frequently	23 (6.0)	86 (8.3)	19 (13.4)	4 (1.7)	-	70 (12.7)	16 (3.3)	-
<b>Past 6 months, asked to put out cigarette in public place, M (SD)*<sup>b</sup></b>	0.34 (0.7)	-	0.63 (1.00)	0.18 (0.4)	<0.001	-	-	-
Never	286 (76.7)	-	89 (66.4)	197 (82.4)	<0.001	-	-	-
Rarely	57 (15.3)	-	16 (11.9)	41 (17.2)	-	-	-	-
Sometimes	19 (5.1)	-	18 (13.4)	1 (0.4)	-	-	-	-
Frequently	11 (2.9)	-	11 (8.2)	0 (0.0)	-	-	-	-

a Scale: 0 = not at all, to 3 = a lot/very. b Scale: 0 = never, to 3 = frequently. \* Reported as mean with standard deviation on scale of 0 to 3; otherwise given as frequency and percentage, n (%).

Table 5. Smokers’ and non-smokers’ interactions index related to experiences with and attitudes toward interactions to reduce SHSe

	Smokers’ interactions index (N=306)		Non-smokers’ interactions index (N=963)	
	B (95% CI)	p	B (95% CI)	p
Constant	1.80 (1.49 – 2.12)	<0.001	1.77 (1.49 – 2.06)	<0.001
<b>Country</b>				
Armenia	Ref.	-	Ref.	-
Georgia	0.07 (-0.08 – 0.23)	0.345	0.25 (0.03 – 0.47)	0.028
<b>Age</b>	0.00 (-0.00 – 0.01)	0.643	0.00 (-0.00 – 0.01)	0.178
<b>Sex</b>				
Male	Ref.	-	Ref.	-
Female	0.42 (0.21 – 0.64)	<0.001	0.07 (-0.09 – 0.23)	0.402
<b>Employment status</b>				
Employed	Ref.	-	Ref.	-
Unemployed/other	-0.02 (-0.14 – -0.10)	0.758	-0.02 (-0.12 – 0.08)	0.651
<b>Marital status</b>				
Married/cohabitating	Ref.	-	Ref.	-
Other	-0.15 (-0.30 – -0.01)	0.038	0.05 (-0.07 – 0.17)	0.420
<b>Children aged &lt;18 years in home</b>				
No	Ref.	-	Ref.	-
Yes	-0.05 (-0.17 – 0.07)	0.464	0.03 (-0.08 – 0.14)	0.576
<b>Former smoker</b>				
No	-	-	Ref.	-
Yes	-	-	-0.25 (-0.46 – -0.04)	0.019
<b>Smoking frequency</b>				
Every day	Ref.	-	-	-
Some days	0.12 (-0.09 – 0.33)	0.272	-	-
<b>Importance of quitting</b>	0.05 (0.03 – 0.07)	<0.001	-	-
<b>Confidence in quitting</b>	0.02 (0.00 – 0.04)	0.023		
<b>Unconditional ICC (%)</b>	6.4		12.37	
<b>Full Model ICC (%)</b>	7.4		10.99	

where smoking is both allowed (p=0.001) and prohibited (p<0.001), and less likely to support violation fines (2.34 vs 2.49, p=0.006) (Table 4).

Among smokers, index scores indicating greater self-reported likelihood of putting out their cigarettes if asked or in the presence of children, minimizing SHSe, and favoring fines for violating bans were associated with being female (p<0.001), reporting greater importance of quitting (p<0.001) and confidence in quitting (p=0.023), and not being married/cohabitating (p=0.038; Table 5). Among non-smokers, index scores reflecting greater self-reported likelihood of asking smokers to put their

cigarettes out and favoring fines for violating bans were associated with living in Georgia (p=0.028) and not being former smokers (p=0.019). We also documented other significant associations (e.g. age, children in the home).

**DISCUSSION**

In countries like Armenia and Georgia where smoking is prevalent, SCT suggests that shifting social norms is critical in changing people’s attitudes and behaviors regarding SHSe<sup>32</sup>. Within this context, social enforcement of smoke-free policies may promote a cultural shift towards SHSe reduction. Current

findings indicate that communities in Armenia and Georgia have begun to promote cultures in which citizens advocate for compliance with smoke-free policies. These social norms shifts could be catalyzed by additional support from government and law officials and renewed efforts to promote and enforce the policies<sup>31,37</sup>. More visible, active government enforcement would promote greater confidence among individuals to socially enforce smoke-free policies<sup>31</sup>. In addition, prior research suggests that women may be particularly crucial in leading social enforcement of smoke-free air policies because of disparities in smoking prevalence and SHSe, as well as women's role in protecting children<sup>31</sup>. Intervention efforts to encourage pro-policy interactions could model peer-to-peer social enforcement via mini dialogues on the radio or public service announcement campaigns.

This study documented that smokers' and non-smokers' experiences were alike in terms of places where smoking was most likely to occur. Among the most frequently reported places were homes and cars, where most SHSe occurs among children and adults<sup>6</sup>, underscoring the need for voluntary smoke-free policies in these places. While smoking was usually reported in places where it is not prohibited, it also occurred where it is prohibited, in both Armenia and Georgia. In Georgia where there is comprehensive tobacco control legislation, compliance with existing policies was higher, suggesting that comprehensive smoke-free policies are important in optimizing compliance and effectiveness, as found in other studies<sup>38,39</sup>.

Furthermore, non-smokers in Georgia (compared to Armenia) reported greater likelihood of engaging in behaviors to reduce SHSe. The literature suggests that comprehensive smoke-free policies will eventually become socially acceptable and complied with among smokers<sup>27,40,41</sup>, non-smokers will become more assertive in dealing with public violations<sup>19</sup>, and support for smoke-free policies increases once implemented<sup>27,40</sup>.

Differences in tobacco control activities across countries are important factors in interpreting findings from this study<sup>33</sup>. Comprehensive tobacco control policies have been implemented in Georgia since 2017–2018. Additionally, Georgia was included in the 15 FCTC parties that receive direct assistance in the scope of the FCTC 2030 project.

This also triggered Georgia's implementation and enforcement of smoke-free policies<sup>33</sup>. In contrast, Armenia only recently adopted progressive legislation, with comprehensive smoke-free policies taking full effect on indoor smoking in 2022<sup>42</sup>.

Current findings have implications for LMICs, especially with no comprehensive smoke-free legislation. The findings can be used as a basis for policymakers for evidence-based decision making, advocacy, and adoption of comprehensive smoke-free policies. In the stage of the initial rollout of the legislation, well-planned enforcement is critical. Promoting women and policymakers as change agents and public messaging to promote social accountability may catalyze social norms change and compliance. Future research is needed to qualitatively explore experiences with smoke-free policies to better comprehend the enforcement gaps and assess opportunities to catalyze behaviors that realize the potential impact of smoke-free legislation. Additionally, research comparing countries in different phases of policy implementation and using different strategies to implement policies may advance the evidence base to inform future public health practice. Research is also needed to consider how public policies impact smoking and SHSe in private settings, and how to intervene to ensure that displacement (i.e. more SHSe in private settings) does not occur as public policies become implemented.

### Limitations

The study results might not be generalizable to the general adult population of Armenia and Georgia as the study participants were selected from 14 communities in each country. Due to differences in sampling and recruitment methods, response rates and proportions of smokers/non-smokers and men/women differed across countries, which must be noted when interpreting findings. Finally, the use of self-reported measures implicates bias reporting (particularly social desirability bias), and the cross-sectional nature of the study limits the ability to investigate causal relationships.

### CONCLUSIONS

Results indicate high levels of SHSe and good concordance between non-smokers' and smokers'

reports of where SHSe is most likely to occur. Private places such as homes and cars were revealed as key sources of SHSe, thus warranting attention as smoke-free public policies are implemented and enforced. Findings also suggest that smoke-free legislations can lead to changes in attitudes and cultural norms towards smoking, smoke-free policies, and social enforcement of smoke-free policies. However, current findings also underscore that additional efforts are needed to catalyze such change via media campaigns and other public health strategies.

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#### CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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All authors contributed to funding acquisition, project administration, the overall conceptualization of the study, and the reviewing of the final manuscript. CB, AH, VH and ZS led the data analysis and writing of the original version of the manuscript.

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