

Original investigation

A Two-Wave Observational Study of Compliance With Youth Access and Tobacco Advertising Provisions of the Cigarettes and Other Tobacco Products Act in India

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Abstract

Introduction: The Indian Cigarettes and Other Tobacco Products Act prohibits youths' access to tobacco products at points-of-sale and near educational institutions, requires signage stating these restrictions in these venues, and bans outdoor advertisements. This observational study examined compliance with these provisions, changes in compliance over 1 year, and factors associated with compliance.

Methods: Data were collected in 2012 and 2013 from points-of-sale ($n = 555$ in 2012, $n = 718$ in 2013), educational institutions ($n = 277$ in 2012, $n = 276$ in 2013), and neighborhoods ($n = 104$ in 2012, $n = 125$ in 2013) in 25 urban and rural towns in five states. Compliance across years was compared using chi-square tests. Multilevel regression equations assessed factors associated with compliance at Wave 2 and change in compliance from Wave 1 to Wave 2.

Results: Most points-of-sale had no/low compliance, with little change over time (58% to 63%, $P = .108$). The proportion of educational institutions observing just 1–2 provisions increased (39% to 52%, $P = .002$). Most neighborhoods complied with the advertisement ban at both waves (91% to 96%, $P = .172$). In the multilevel analysis, point-of-sale compliance increased in small cities; compliance decreased at points-of-sale and increased at institutions in mid-sized cities. Changes in point-of-sale compliance were due to compliance with access restrictions and signage requirements; changes in educational institution compliance were due to compliance with the sales ban.

Conclusions: Compliance with provisions regarding the sale and display of tobacco products is moderate, while compliance with the advertisement ban remains high in these five Indian states. Greater enforcement will further reduce youths' exposure to tobacco products.

Implications: The study adds to the literature on compliance and changes in compliance with policy to prohibit youth access to tobacco products in India, a country that has large geographic disparities in youth smoking prevalence. The findings highlight several important areas on which

efforts can focus to improve compliance among points-of-sale, educational institutions, and neighborhoods to limit youths' exposure and access to tobacco products. Rural areas and large cities in particular need more concerted efforts.

Introduction

Environmental characteristics affect health behaviors, including smoking.¹ Social exposure to tobacco use in the physical environment (such as proximity to and accessibility of tobacco products at points-of-sale) and symbolic environment (such as tobacco advertisements in the media) influences individuals' beliefs that smoking is a prevalent and normative behavior, thus encouraging initiation and experimentation.² For youth, schools and neighborhoods are important environments for social exposure to tobacco use. Density of tobacco points-of-sale in neighborhoods and near schools is positively associated with smoking prevalence, experimentation, and susceptibility among youth.³⁻⁶ Illegal tobacco sales to youth are more likely to occur in points-of-sale near schools, thus increasing youth access.^{7,8} Moreover, strong evidence suggests that exposure to tobacco promotion and marketing (including outdoor advertisements) is associated with favorable attitudes towards smoking, susceptibility to smoking, and smoking behavior among youth.^{4,9}

In India, the prevalence of current tobacco use is 14.6% among youth (aged 13–15 years),¹⁰ but with substantial regional variation (ranging from 3.3% in Goa to 62.8% in Nagaland).¹¹ Smokeless tobacco comprises a large proportion of tobacco use among youth, with the prevalence of current use (9.0%) about double that of cigarettes (4.4%).¹² The 2009 Global Youth Tobacco Survey in India indicated substantial accessibility of cigarettes at points-of-sale by youth, with 47% of youth reporting that they buy cigarettes in a store.¹⁰ Moreover, 74% of youth reported seeing cigarette advertisements on billboards in the past 30 days and 87% reported exposure to tobacco advertisements (including all types of tobacco) in other venues, such as magazines and movies.^{10,13} To address youth access and exposure to tobacco products and marketing, the Government of India enacted three provisions as part of the Cigarettes and Other Tobacco Products Act (COTPA) in 2003: prohibition of outdoor advertisement of tobacco products, except at the entrance and interior of points-of-sale (Section 5), prohibition on tobacco product sales to minors (Section 6), and prohibition on display and sale of tobacco products within 100 yards of any educational institution (Section 6). Starting in 2008, the Union Ministry of Health implemented national media campaigns to increase awareness about rules that were notified under COTPA. Additionally, sporadic efforts sponsored by local non-governmental organizations were undertaken in some states, particularly after 2008, to increase awareness about various provisions of the law. Little is known, however, about current compliance with these regulations, changes in compliance over time, and city-level variation in compliance. Moreover, much of the research has relied on self-reported exposure.

The objective of this observational study was to assess compliance with the COTPA requirements that restrict youth access and exposure to tobacco products and advertising within their environments, specifically points-of-sale, educational institutions, and neighborhoods. Tobacco products included all types of tobacco, including smokeless. In addition, this study assessed changes in compliance over a 1-year period and the factors associated with changes.

Methods

Sample

This two-wave observational study took place in India in five states (Bihar, Karnataka, Kerala, Maharashtra, and Rajasthan) in May–August 2012 (Wave 1) and August–December 2013 (Wave 2). These states were purposively chosen to be geographically diverse and to reflect the varying levels of advocacy efforts undertaken across the states. A two-stage sampling strategy was used to select 25 urban cities and rural towns (first stage), and then points-of-sale, educational institutions, and catchment areas (as a proxy for neighborhoods) within each city and town (second stage). Five cities and towns were selected for inclusion in each state: the largest city (≥ 2 million residents), a mid-sized city (half million to 1.9 million residents), a small city ($<$ half million residents), and two rural towns in close proximity to the largest and mid-sized cities.

Each selected city or town was stratified geographically into five equal catchment areas for the point-of-sale and outdoor advertisement data collection. The researchers first identified the city/town center and defined a catchment area within a 300-yard radius. The researchers defined four points (north, south, east, and west) two kilometers from the city center for urban cities and $\frac{1}{2}$ kilometer from the town center for rural towns. From each point, a catchment area within a 100-yard radius was identified, for a total of five catchment areas (center, north, south, east, and west). With aid from the local research agency and data collectors, maps of the catchment areas were drawn, and eight streets (approximately 300 yards in length each) to the north, south, east, and west of the neighborhood center were selected for observation. The following rules were then implemented across all sites. On these eight streets, one point-of-sale was systematically chosen: the point-of-sale on the left-hand side of the street. If none were on the left-hand side, data collectors observed a point-of-sale on the right. If there were more than two points-of-sale, the second was observed. All outdoor advertisements were assessed. The same procedures were used across all cities and at both data waves. Points-of-sale included convenience, kirana (small neighborhood store), or general stores; tobacco product stores; mobile stores (those on wheels); stores and kiosks selling Paan (local betel leaf chew with or without tobacco), cigarette, or Gutka (commercially powdered version of paan); Paan kiosks or tables attached to or outside of restaurants; restaurants, cafés, and tea stalls selling tobacco products; and mobile vendors carrying tobacco product bags or boxes.

A stratified random sampling procedure was used to select educational institutions for observation. First, the cities and rural towns were stratified geographically into four equal zones around the north, south, east, and west of the city/town center. All primary and secondary educational institutions in each zone and all colleges in each city/town were listed. One primary school and one secondary school were randomly selected from each zone, and two colleges were randomly selected from the city/town. We did not stratify or select according to the type of institution (ie, private and government), although this information was noted. From each selected institution, a 100-yard radius was drawn and all points-of-sale selling tobacco within that distance were identified for inclusion. The same procedures took place across cities and data waves.

Data Collection

The observational data collection tool was developed by the first and second authors with substantial contributions by the rest of the research team located both in the United States and India. The tool was pretested and modified based on inputs from the field and from stakeholders. The finalized tool was translated into the local languages. During observation, trained data collectors evaluated points-of-sale for the following COTPA requirements: (1) sign displayed anywhere on the exterior or (if applicable) interior stating that tobacco cannot be sold to people less than 18 years old; (2) tobacco products were not accessible by youth (located behind the cashier's counter and not within six inches of candy); and (3) no minor was selling tobacco products. The two survey questions about easy access of tobacco products by youth (location behind the counter and near candy) were adapted from another study.¹⁴ Educational institutions were evaluated for the following COTPA requirements: (1) sign displayed stating that tobacco products cannot be sold within 100 yards; and (2) absence of any shops, stalls, kiosks, or mobile vendors selling tobacco products within 100 yards. Data collectors evaluated each educational institution and traveled by foot on every street within 100 yards to observe all permanent or mobile tobacco product points-of-sale. To evaluate for compliance with the COTPA requirement prohibiting outdoor advertisements of tobacco products, data collectors travelled to catchment areas and recorded any advertisement on the street that was not displayed at the entrance of or inside a point-of-sale. Advertisements at the entrance of and inside points-of-sale, because they are not prohibited by COTPA, were excluded in the analysis.

For quality assurance, an independent observer visited 10% of the venues to ensure that they were visited according to plan and the data collection process was followed according to protocol. The quality assurance representative either conducted a thorough back-check of venues already observed by the data collectors or accompanied the data collectors on their observations. Discrepancies were resolved through discussion. The purpose of the quality assurance was to correct issues as they arose in the field; no quality assurance data were collected. These methods helped ensure the quality of data collection throughout the study.

Because no human subjects participated in this research, this activity was deemed to be Not Human Subjects Research by the Johns Hopkins University Bloomberg School of Public Health Institutional Review Board.

Statistical Analysis

Total compliance of points-of-sale with COTPA requirements was categorized as none/low (compliant with 0–1 measure) and moderate/high (compliant with 2–3 measures). Compliance of educational institutions was categorized as none (compliant with 0 measures) or any (compliant with 1–2 measures). Catchment areas were categorized as not compliant (≥ 1 outdoor advertisements present) or compliant (no outdoor advertisements present). The frequency and proportion of points-of-sale, educational institutions, and catchment areas compliant with COTPA were compared by wave of data collection using chi-square tests. Because of the small state sample size ($n = 5$) for the multilevel analysis, states were grouped into four regions based on the five zones of India: north (Rajasthan), south (Karnataka and Kerala), east (Bihar), and west (Maharashtra). Multivariable, multilevel mixed-effects logistic regression adjusting simultaneously for city-level random intercept, region, city size, and venue factors (store type for points-of-sale, and institutional level

and type for educational institutions) was used to determine city/town and venue factors associated with compliance at Wave 2.

To identify factors associated with change in compliance in the 1-year period, points-of-sale, educational institutions, and neighborhoods were geographically paired across waves. Because many points-of-sale were mobile (in which sellers travel from area to area carrying the tobacco products with them), the exact stores could not be paired from the first year to the second year. Instead, the same catchment areas were visited and the same sampling procedures took place during both waves. At Wave 2, data collectors attempted to visit the same streets as Wave 1 or the closest geographically. For each year separately, compliance was calculated for all points-of-sale within a given catchment area to obtain an area-level compliance score for points-of-sale (ie, percentage of points-of-sale with moderate/high compliance in the area). Next, the same geographic catchment areas within a city were paired across years; for example, the east catchment area in a city in Wave 1 was paired with the same east catchment area in the same city in Wave 2. Area-level compliance with point-of-sale requirements was then compared between the 2 years. Fourteen catchment areas had point-of-sale data in Wave 2 but were missing in Wave 1. To assess compliance with the ban on outdoor advertisements, at Wave 2 the same catchment areas from Wave 1 were visited; data collectors attempted to visit the same streets as Wave 1 or the closest geographically. Catchment areas were paired geographically across waves using the same procedure as points-of-sale. Compliance in catchment areas was then compared between the 2 years. Twenty-one catchment areas had outdoor advertisement data in Wave 2 but were missing in Wave 1. The same educational institutions were visited at both waves and paired across waves based on level (primary, secondary, or college), type (government or private), and city. Data from 20 institutions in Wave 1 and 19 institutions in Wave 2 were missing.

Multilevel mixed-effects linear and logistic regression models simultaneously adjusting for city-level and area-level random intercepts, region, city size, and wave were performed to estimate the change in compliance for points-of-sale and outdoor advertisements. For educational institutions, a multilevel mixed-effects logistic regression model simultaneously adjusted for city-level and school-level random intercepts, region, city size, wave, institution level, and institution type to assess the change in compliance. Models with an interaction between city size and wave were also performed (with a Wald test of the interactive effect) to assess effect modification by city size. If the Wald test for the interaction term was statistically significant ($P < .05$), post hoc analysis was conducted to stratify by city size. Analyses were performed using Stata version 13.¹⁵

Results

Comparison of Compliance at Waves 1 and 2

A total of 555 points-of-sale were observed in Wave 1 (2012) and 718 in Wave 2 (2013). In the unadjusted analysis, more than half of the points-of-sale at both waves had no or low total compliance, with no significant change over the 1-year period (Table 1). The proportion of point-of-sale establishments compliant with the requirement prohibiting easy access to tobacco products by youth (ie, located behind the cashier's counter and not within six inches of candy) decreased from Wave 1 to Wave 2 (39.8% vs. 31.1%, respectively, $P < .001$), but the proportion compliant with the signage requirement doubled (4.5% vs. 9.8%, respectively, $P < .001$).

Table 1. Unadjusted Comparison of Compliance With COTPA Requirements Restricting Tobacco Product Access and Marketing Exposure By Youth (<18 Years) in Points-of-Sale, Educational Institutions, and Catchment Areas in Five States in India at Waves 1 and 2 (2012 vs. 2013)

	Wave 1 (2012), n (%)	Wave 2 (2013), n (%)	P ^b
Points-of-sale	N = 555	N = 718	
No minor is selling tobacco products	523 (94.2)	676 (95.4)	.375
Tobacco products are not within easy reach of youth	221 (39.8)	223 (31.1)	.001
Signage states sales to minors are prohibited	25 (4.5)	70 (9.8)	<.001
Level of total compliance ^a			
None/low	324 (58.4)	451 (62.8)	
Moderate/high	231 (41.6)	267 (37.2)	.108
Educational institutions	N = 277	N = 276	
No tobacco vendors are within 100 yards	96 (34.7)	123 (44.6)	.017
Signage states tobacco products cannot be sold	18 (6.5)	36 (13.0)	.010
Level of total compliance			
None	168 (60.7)	132 (47.8)	
Any	109 (39.4)	144 (52.2)	.002
Catchment areas	N = 104	N = 125	
No outdoor tobacco advertisements are present	95 (91.4)	120 (96.0)	.172

COTPA = Cigarettes and Other Tobacco Products Act.

^aNone/low = compliant with 0–1 provisions; moderate/high = compliant with 2–3 provisions.

^bBold typeface indicates $P < .05$.

A total of 277 educational institutions were observed in Wave 1 and 276 in Wave 2. In contrast to points-of-sale, educational institutions experienced significant increases in total compliance over the 1-year period in the unadjusted analysis. The proportion of educational institutions with any level of compliance substantially increased from 39.4% ($n = 109$) in Wave 1 to 52.2% ($n = 144$) in Wave 2 ($P < .010$). Looking at the specific requirements, compliance improved with the ban on sales within 100 yards (34.7% vs. 44.6%, respectively, $P < .050$) and with the signage requirement (6.5% vs. 13.0%, respectively, $P = .010$).

A total of 104 catchment areas in Wave 1 and 125 in Wave 2 were observed for compliance with the ban on outdoor tobacco advertisements. Sixteen advertisements were observed in Wave 1 compared to 10 in Wave 2. Nearly all catchment areas had high compliance with the ban on outdoor tobacco advertisements at both waves, with no significant change over time (91.4% and 96.0%, $P > .050$) in the unadjusted analysis.

Factors Associated With Compliance at Wave 2

In the multilevel analysis adjusting for city-level random intercept, region, and store type at Wave 2, points-of-sale in small cities had 2.48 greater odds of moderate/high compliance than those in rural towns (95% confidence interval [CI]: 1.00, 6.14; $P < .05$; [Table 2](#)). No differences were seen by store type. Among educational institutions, secondary institutions had 2.20 greater odds of any compliance than primary institutions (95% CI: 1.23, 3.91; $P < .01$). Compliance did not differ by city/town size or institution type. No differences in compliance with the ban on outdoor advertisements among catchment areas were seen by city size ([Supplementary Table 1](#)).

Factors Associated With Change in Compliance Over 1-Year Period

In the multilevel analysis, change in compliance from Wave 1 to Wave 2 differed by city size for points-of-sale and educational institutions, but not outdoor advertisements within catchment areas. The proportion of moderately/highly compliant points-of-sale among catchment areas did not significantly change over the 1-year period ([Table 3](#)).

However, the change in compliance differed by city size (Wald test $P = .002$). In the stratified analysis, compliance increased in small cities ($\beta = 0.25$, $P = .001$) and decreased in rural towns ($\beta = -0.16$, $P < .05$) and mid-sized cities ($\beta = -0.20$, $P < .05$; [Table 3](#)). Based on the specific point-of-sale requirements, it appears the significant increase in compliance in small cities was largely driven by increased compliance with the signage requirement ($\beta = 0.10$, $P = .001$) and restricting youths' access to tobacco products (ie, located behind the cashier's counter and not within six inches of candy; $\beta = 0.17$, $P < .05$; [Supplementary Table 2](#)). The significant decrease in compliance in rural towns and mid-sized cities was largely due to decreased compliance with restricting youths' access ($\beta = -0.15$, $P < .05$, and $\beta = -0.29$, $P < .001$, respectively; [Supplementary Table 2](#)).

Odds of any compliance among educational institutions significantly increased in the 1-year period (odds ratio [OR]: 1.91, 95% CI: 1.31, 2.78; [Table 4](#)). Change in compliance differed by city size (Wald test $P = .0052$). In the stratified analysis, mid-sized cities experienced 10.92 greater odds of compliance from Wave 1 to Wave 2 (95% CI: 2.69, 44.31; [Table 4](#)). Post hoc analysis stratified by institution level and type revealed that compliance increased in secondary (OR: 2.36, 95% CI: 1.28, 4.36) and public (OR: 2.03, 95% CI: 1.22, 3.36) educational institutions over the 1-year period, but no significant changes were seen in primary institutions, colleges, or private institutions ([Supplementary Tables 3 and 4](#)). Compliance with the ban on sales within 100 yards increased overall (OR: 1.69, 95% CI: 1.15, 2.48) and among institutions in mid-sized cities (OR: 9.46, 95% CI: 2.32, 38.53; [Supplementary Table 5](#)). Compliance with the signage requirement also increased (OR: 2.72, 95% CI: 1.35, 5.49), but no differences were seen by city size ([Supplementary Table 5](#)). Among secondary institutions, compliance with the ban on sales and signage requirements increased (OR: 1.82, 95% CI: 1.01, 3.30, and OR: 4.20, 95% CI: 1.41, 12.53, respectively; [Supplementary Table 3](#)). Among public educational institutions, compliance with the ban on sales increased (OR: 1.88, 95% CI: 1.10, 3.21), while compliance with the signage requirements increased among private institutions (OR: 4.39, 95% CI: 1.27, 15.17; [Supplementary Table 4](#)).

Table 2. Multivariable, Multilevel Logistic Regression of the Odds of Compliance Among Points-of-Sale (POS) and Educational Institutions at Wave 2 (2013), Adjusting for City-Level Random Intercept

	Odds of POS compliance (N = 716 ^a)			Odds of educational institution compliance (N = 276)		
	OR	95% CI	P ^b	OR	95% CI ^b	P ^b
City size ^c						
Rural	REF	—	—	REF	—	—
Small cities	2.48	1.00, 6.14	.049	0.45	0.15, 1.35	.156
Mid-sized cities	0.75	0.30, 1.88	.538	0.78	0.27, 2.25	.641
Large cities	1.59	0.64, 3.92	.317	0.68	0.23, 2.03	.494
Region						
North	REF	—	—	REF	—	—
West	1.20	0.41, 3.48	.741	0.55	0.16, 1.89	.342
South	0.97	0.37, 2.58	.957	1.13	0.39, 3.27	.827
East	0.76	0.26, 2.19	.609	0.40	0.12, 1.37	.145
POS type						
Convenience, kirana, or general store	REF	—	—	—	—	—
Tobacco product store	1.10	0.44, 2.77	.833	—	—	—
Other type of permanent store	1.30	0.85, 2.00	.226	—	—	—
Mobile store	1.01	0.38, 2.69	.986	—	—	—
Institution level						
Primary	—	—	—	REF	—	—
Secondary	—	—	—	2.20	1.23, 3.91	.007
College	—	—	—	1.50	0.67, 3.35	.320
Institution type						
Private	—	—	—	REF	—	—
Public	—	—	—	1.10	0.64, 1.88	.737

OR = odds ratio; CI = confidence interval.

^aTwo POS were missing the type of store and dropped from the analysis.

^bBold typeface indicates P < .05.

^cSmall cities (fewer than half a million inhabitants), mid-sized cities (half a million to 1.9 million inhabitants), large cities (at least 2 million inhabitants).

Table 3. Multivariable, Multilevel Linear Regression of the Change in the Area-Level Proportion of Moderately or Highly Compliant Points-of-Sale From Wave 1 to Wave 2 (2012 vs. 2013) Overall and Stratified by City Size, Adjusting for City- and Area-Level Random Intercepts

	Model 1 overall (N = 210)		Model 2 rural towns (n = 62)		Model 3 small cities ^a (n = 50)		Model 4 mid-sized cities ^a (n = 48)		Model 5 large cities ^a (n = 50)	
	β (SE)	P	β (SE)	P ^b	β (SE)	P ^b	β (SE)	P ^b	β (SE)	P
Wave 2 vs. Wave 1	-0.03 (0.04)	.529	-0.16 (0.08)	.039	0.25 (0.08)	.001	-0.20 (0.08)	.018	0.03 (0.07)	.679
City size ^a										
Rural	—	—	—	—	—	—	—	—	—	—
Small cities	-0.003 (0.07)	.968	—	—	—	—	—	—	—	—
Mid-sized cities	-0.05 (0.07)	.483	—	—	—	—	—	—	—	—
Large cities	0.0001 (0.07)	.998	—	—	—	—	—	—	—	—
Region										
North	—	—	—	—	—	—	—	—	—	—
West	-0.05 (0.09)	.554	0.27 (0.14)	.064	-0.19 (0.14)	.157	-0.07 (0.13)	.614	-0.15 (0.12)	.207
South	-0.08 (0.07)	.291	0.31 (0.13)	.014	-0.26 (0.12)	.029	-0.18 (0.11)	.120	-0.19 (0.10)	.063
East	-0.02 (0.08)	.778	0.44 (0.13)	.001	-0.31 (0.14)	.025	-0.19 (0.13)	.143	-0.15 (0.12)	.186

β = beta coefficient; SE = standard error.

^aSmall cities (fewer than half a million inhabitants), mid-sized cities (half a million to 1.9 million inhabitants), large cities (at least 2 million inhabitants).

^bBold typeface indicates P < .05.

Odds of catchment area compliance with the outdoor advertisement ban did not change in the 1-year period (OR: 2.34, 95% CI: 0.69, 7.98; [Supplementary Table 6](#)).

Discussion

The aim of this observational study was to assess compliance with the provisions of COTPA related to restricting youth access and

exposure to tobacco products (including smokeless tobacco) and outdoor advertisements among five Indian states and to assess the change in compliance over a 1-year period. We observed characteristics of the points-of-sale, educational institutions, and catchment areas (proxy for neighborhoods) because these venues can constitute a significant source of social exposure to tobacco that can influence youths' beliefs about smoking and encourage experimentation and initiation.² Research has shown that smoking prevalence is higher in

Table 4. Multivariable, Multilevel Logistic Regression of the Change in the Odds of Any Compliance Among Educational Institutions From Wave 1 to Wave 2 (2012 vs. 2013) Overall and Stratified by City Size, Adjusting for City- and School-Level Random Intercepts

	Model 1 overall (N = 553)		Model 2 rural towns (n = 198)		Model 3 small cities ^a (n = 115)		Model 4 mid-sized cities ^a (n = 120)		Model 5 large cities ^a (n = 120)	
	OR (95% CI)	P ^b	OR (95% CI)	P ^b	OR (95% CI)	P ^b	OR (95% CI)	P ^b	OR (95% CI)	P ^b
Wave										
Wave 1	REF	—	REF	—	REF	—	REF	—	REF	—
Wave 2	1.91 (1.31, 2.78)	.001	1.07 (0.59, 1.92)	.831	1.31 (0.51, 3.38)	.578	10.92 (2.69, 44.31)	.001	2.56 (1.05, 6.22)	.038
City size ^a										
Rural	REF	—	—	—	—	—	—	—	—	—
Small cities	0.40 (0.14, 1.11)	.080	—	—	—	—	—	—	—	—
Mid-sized cities	0.33 (0.12, 0.91)	.033	—	—	—	—	—	—	—	—
Large cities	0.46 (0.17, 1.27)	.134	—	—	—	—	—	—	—	—
Region										
North	REF	—	REF	—	REF	—	REF	—	REF	—
West	0.58 (0.18, 1.85)	.355	0.94 (0.22, 3.95)	.932	0.05 (0.01, 0.40)	.005	14.21 (1.80, 112.06)	.012	0.11 (0.02, 0.70)	.019
South	1.02 (0.38, 2.78)	.966	0.93 (0.27, 3.21)	.907	0.49 (0.12, 1.92)	.303	1.44 (0.31, 6.64)	.643	1.38 (0.31, 6.09)	.667
East	0.35 (0.11, 1.11)	.075	0.55 (0.14, 2.22)	.405	0.04 (0.004, 0.33)	.003	4.34 (0.67, 28.07)	.123	0.07 (0.01, 0.53)	.009
Institution level										
Primary	REF	—	REF	—	REF	—	REF	—	REF	—
Secondary	1.99 (1.31, 3.01)	.001	1.29 (0.69, 2.43)	.429	4.02 (1.15, 14.01)	.029	3.28 (0.94, 11.49)	.063	2.26 (0.83, 6.10)	.109
College	1.59 (0.88, 2.85)	.122	1.61 (0.55, 4.74)	.385	2.03 (0.44, 9.36)	.365	2.01 (0.42, 9.72)	.384	1.67 (0.45, 6.22)	.441
Institution type										
Private	REF	—	REF	—	REF	—	REF	—	REF	—
Public	1.05 (0.71, 1.55)	.813	1.35 (0.71, 2.58)	.359	0.98 (0.33, 2.92)	.973	1.27 (0.43, 3.79)	.667	0.80 (0.33, 1.94)	.616

OR = odds ratio; CI = confidence interval.

^aSmall cities (fewer than half a million inhabitants), mid-sized cities (half a million to 1.9 million inhabitants), large cities (at least 2 million inhabitants).

^bBold typeface indicates $P < .05$.

rural areas and smaller towns compared to large cities, which might indicate low compliance with COTPA provisions in these less populated areas.¹⁶ Less populated areas might have fewer resources for enforcement. Most non-governmental and governmental implementation efforts are focused in urban areas as rural areas are dispersed with poor infrastructure. Therefore, we stratified the analysis by city/town size to look at differences in compliance. We expected odds of compliance to be higher in the large cities compared to rural towns. Our results indicate moderate total compliance among points-of-sale and educational institutions and high compliance among catchment areas in 2012, with some improvements 1 year later. Compliance with COTPA provisions regarding youth access at points-of-sale (Section 6) appears to be lower than compliance with provisions for smoke-free public places (Section 4).¹⁷ Governmental and non-governmental agencies need to intensify efforts to educate point-of-sale owners and educational institution administrators about COTPA requirements.

These findings highlight several important areas for targeted educational and enforcement efforts to improve point-of-sale compliance. Although total compliance did not increase overall, changes in compliance varied substantially by city/town size. Our hypothesis regarding differences in compliance by city/town size was not supported. Small cities had the greatest odds of compliance at Wave 2 compared to rural towns and they also saw an increase in compliance, whereas mid-sized cities had a small decrease in compliance. In addition to total compliance, compliance with specific COTPA provisions varied substantially by the size of the city or town. Very few points-of-sale had signage stating that sales to minors are prohibited, and compliance on this measure only increased among small cities. This finding of low compliance is supported by other research in one Indian state in which most participants reported never or rarely seeing signage at points-of-sale.¹⁸

Nearly a third of points-of-sale complied with the restrictions on youth access to tobacco products (that is, products were not within easy reach of youth). Indeed, most respondents in the 2009 Global Youth Tobacco Survey in India reported being able to buy cigarettes in stores.¹⁰ Notably, nearly all points-of-sale were compliant with the requirement prohibiting sales of products by youth and continued to be over time. According to our findings, owners and managers of all types of points-of-sale would benefit from increased education and enforcement, with greater efforts needed to increase compliance with signage requirements and locating tobacco products behind the cashier's counter and not within six inches of candy to reduce accessibility in particular. Our findings show that, overall, efforts to increase compliance are equally needed across all city and town sizes, and governmental and non-governmental organizations can coordinate enforcement and educational efforts to further improve compliance. The moderate level of point-of-sale compliance might be partially explained by a 2006 Mumbai High Court decision to stay the point-of-sale advertising provisions of COTPA, which resulted in non-enforcement. However, the Supreme Court reversed this decision and ordered the government to immediately implement the rules in July 2013.¹⁹ Civil organizations can use this order to urge policy makers to begin enforcement.

Our findings also highlight several important areas on which efforts can focus to improve educational institution compliance. Although total compliance did not increase overall, compliance at Wave 2 was highest among secondary institutions and increased among secondary institutions and institutions in mid-sized cities. Similar to points-of-sale, compliance with specific COTPA provisions varied by the size of the city or town. Very few educational institutions had signage stating the ban on sales, and compliance on this measure increased. This finding of low compliance is supported

by survey research in one Indian state which found that most participants reported never or rarely seeing signage at educational institutions.¹⁸ By Wave 2 nearly half the educational institutions were compliant with the ban on sales within 100 yards, and compliance increased significantly in mid-sized cities. Compliance with the sales ban is critical given that tobacco retail density near educational institutions is associated with youth susceptibility to future smoking and ability to purchase tobacco products.^{5,20} Targeted educational and enforcement efforts among local police and other government officials as well as school administrators might be most beneficial at primary and college educational institutions as well as institutions in rural towns, small cities, and large cities.

In contrast to points-of-sale and educational institutions, we found that the majority of observed catchment areas were compliant with the ban on outdoor tobacco advertisements, with little room for improvement over the 1-year period. However, other studies have found that most youth report seeing cigarette and other tobacco product (including smokeless) advertisements on billboards¹⁰, television, and other media venues.¹³ These studies conducted surveys with students, in contrast to our observational study of environmental characteristics, which might account for the difference in findings. Notably, a popular, commercially available chewing material in India called “paan masala” (including “gutka”), which consists of betel leaf, areca nut and other ingredients, can be made with or without tobacco, and advertisements for the tobacco-free varieties often use the same or similar names, formatting, and color scheme as the varieties with tobacco.²¹ Therefore, advertisements of non-tobacco varieties might serve as a proxy for advertisements of varieties with tobacco and be a significant source of social exposure to tobacco for youth. This phenomenon might account for high reports of advertising exposure by youth.¹⁰ Our study assessed only tobacco advertisements, and further research is needed to determine the prevalence of outdoor advertisements of tobacco-free smokeless varieties and their impact on tobacco attitudes and behaviors among youth. Additional regulation might be needed to address this loophole in the legislation and prevent the use of proxy advertisements.

It is noteworthy that COTPA prohibits outdoor tobacco product advertisements but excludes advertisements displayed at the entrance or interior of points-of-sale. After implementation of COTPA, tobacco advertisements on the exterior of these venues substantially increased,²² perhaps to offset the loss of outdoor advertising. A study with adults found that most had seen tobacco advertising in point-of-sale windows or interiors.²³ Therefore, youth might still be substantially exposed to tobacco advertising at points-of-sale in their neighborhoods, despite the ban on outdoor advertisements. Further research is needed to assess youths’ level of exposure to tobacco advertising at points-of-sale.

Local non-governmental organizations are currently engaging in aggressive advocacy efforts in four of the states evaluated in this study to increase compliance with COTPA provisions related to smoke-free public places (Section 4); tobacco advertisement, promotion, and sponsorship prohibition (Section 5); and youth access at educational institutions (Section 6). Regarding youth access and exposure to tobacco products and marketing, these organizations are working with educational institutions to increase compliance with the signage requirements and with police to increase enforcement of the access requirements at points-of-sale. Compliance may be limited due to a variety of factors, including lack of awareness and resources for enforcement among educational institution administrators, point-of-sale owners, and police officers. Training

workshops and media advocacy at the district-level are being used to address the lack of awareness of COTPA provisions among law enforcement officials and the general public, but greater improvements are needed. Enforcement of COTPA is challenging given an overwhelming number of law enforcement priorities that compete for attention from an inadequate number of police personnel. There might be additional barriers to shifting norms towards more robust implementation and enforcement, such as insufficient political will to support the COTPA provisions. Our findings suggest that city size is an important factor to consider in advocacy and educational efforts. Another wave of evaluation would be beneficial to assess the impact of additional efforts to improve compliance in these states.

This study has several strengths and limitations. The stratified systematic and random sampling strategies to select points-of-sale, educational institutions, and streets for observation helped to capture a range of venues in diverse parts of the cities. However, the limited sample size and purposive selection of states might have limited the generalizability of our results within the selected cities as well as to other cities and states. About two-thirds (68%) of India’s population lives in rural areas.²⁴ We sampled two rural towns and three cities of varying sizes in every state to capture a variety of sites, but further research in rural towns is needed. Tobacco-free smokeless product advertisements could have served as a source of social exposure to tobacco products, but they were not systematically captured in this study. The study did not include statistical assessments of the reliability of the data collection. We used translated data collection instruments, local data collectors, and rigorous quality assurance methods to help ensure high quality, valid and reliable data.

Our findings from geographically diverse cities and rural towns in India indicate that compliance with COTPA restrictions on youth access and exposure to tobacco products at points-of-sale and educational institutions is moderate with improvements in some areas over time. Rural areas and large cities in particular need more concerted efforts. Stricter regulations regarding advertisements and better education and enforcement of current regulations might reduce youths’ social exposure to tobacco in their environment and lead to de-normalization of tobacco use in the country.

Supplementary Material

Supplementary Tables 1–6 can be found online at <http://www.ntr.oxfordjournals.org>

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Declaration of Interests

None declared.

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