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Compliance with North Dakota's smoke-free law among vape and tobacco specialty shops

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Abstract

Objective: To determine compliance with North Dakota's smoke-free law in vape shops and other tobacco specialty shops selling electronic nicotine delivery systems (ENDS) or e-liquids.

Design: In this 2019 descriptive study, shops ($n = 35$) were assessed for compliance with the smoke-free law by observation of indoor and outdoor areas for smoking or vaping, or evidence of such activity in prohibited areas, and the presence of required no-smoking signs.

Results: Only two shops (5.7%) were fully compliant with the smoke-free law. Full compliance for indoor and outdoor environments was 8.5% and 42.8%, respectively. Vaping occurred inside five shops (14.3%), and smoking occurred outdoors within required smoke-free areas in two (5.7%) shops. Four (11.4%) and 17 (48.6%) shops complied with indoor and outdoor signage requirements, respectively.

Conclusions: Overall compliance remained low, although much of the noncompliance was related to signage. Use or evidence of ENDS use occurred both indoors and outdoors where prohibited by law. Classifying ENDS as tobacco products would require tobacco licensure of shops selling ENDS and e-liquids, aiding in identification of the shops for education and enforcement efforts to ensure compliance with the law and to improve public health protection.

KEYWORDS
advocacy, air pollution, cross-sectional studies, environmental health, health policy, legislation, smoking, tobacco

1 | BACKGROUND

E-cigarettes and other electronic nicotine delivery systems (ENDS) produce an aerosol that is inhaled and exhaled by the user and can contain particulate matter and volatile organic compounds (National Academies of Sciences, Engineering, & Medicine [NASEM], 2018; Office on Smoking & Health, 2016). Exposure to this aerosol poses serious health risks to nonusers (NASEM, 2018) and users (World Health Organization [WHO], 2019). Also, there is no safe level of exposure to secondhand smoke from combustible cigarettes (National Center for Chronic Disease Prevention & Health Promotion, 2014). The U.S. Community Preventive Services Task Force (2012) recommends smoke-free policies, with strong evidence, to decrease exposure to secondhand smoke and reduce tobacco-related morbidity

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and mortality. The WHO (2020) specifically recommends prohibiting ENDS use indoors and in other smoke-free locations.

Electronic nicotine delivery systems (ENDS) or electronic cigarettes (e-cigarettes) have been the most commonly used tobacco product among youth in the United States since 2014 (Centers for Disease Control & Prevention [CDC], 2020a), with approximately 20% of high school students reporting current e-cigarette use (Wang et al., 2020) and, in 2018, approximately 8% of adults 18 to 24 years of age and 3% of adults ≥18 years reporting use (Creamer et al., 2019). E-cigarette sales increased 122.2% from 2014 to 2020 (Ali et al., 2020). Currently, 14.0% of adults aged ≥18 years (CDC, 2020b) and 4.6% of high school youth (CDC, 2020a) use combustible cigarettes. Thus, for anyone who is exposed to secondhand aerosols and secondhand cigarette smoke, the potential exists for harm.

In North Dakota (ND), e-cigarettes also have been the most commonly used tobacco product among youth since 2015 (ND Department of Health, 2021) with approximately 33% of high school students reporting current e-cigarette use in 2019 (U.S. Department of Health & Human Services [USDHHS], 2019). This compares with approximately 8% using combustible cigarettes, 5% using smokeless tobacco, and 5% using cigars in 2019 (USDHHS, 2019).

Although smoke-free laws are usually considered self-enforcing (CDC, 2012), the Population Assessment on Tobacco and Health study identified ENDS use in smoke-free areas as concerning (Dunbar et al., 2020). Also, ENDS use in smoke-free places may cause confusion because some aerosols look like cigarette smoke (Public Health Law Center, 2017; WHO, 2014). The WHO (2019) recommends regulation of all ENDS products to prevent uptake by nonsmokers, prevent renormalization of public smoking, and decrease health risks to both users and nonusers.

In the United States, 22 states, commonwealths, and territories currently restrict e-cigarette use in 100% smoke-free venues (American Nonsmokers' Rights Foundation, 2020a), and 29 states, commonwealths, and territories restrict combustible cigarettes (American Nonsmokers' Rights Foundation, 2020b). ND has one of the strongest laws in the United States to protect citizens from secondhand smoke (ND Department of Health, 2019). In 2012, ND voters approved an initiated measure prohibiting "electronic smoking device" use in all places where smoking is not allowed under ND's law (Ballotpedia.org, 2012). North Dakota Century Code (NDCC) §23-12-09 to §23-12-11 prohibits smoking and e-cigarette use in public places and places of employment, including smoking within 20 feet of all entrances, exits, operational windows, air intakes, and ventilation systems of enclosed areas where smoking is prohibited. Locations where smoking is prohibited are required to have signage posted clearly and conspicuously in every place and at every entrance. Section 12–10.4 states that shops can use their own signage or request signs from the state department of health.

In ND, state-level licensing of tobacco retailers occurs within the ND tax law (NDCC §57–36–25, n.d.). However, ENDS are not included as tobacco products in the law; thus, some e-cigarette and e-liquid shops are not licensed. Nonetheless, these shops are public spaces and places of employment, and are therefore required to be smoke-free and free of aerosols from e-cigarettes and ENDS. The lack of licensure of these shops makes it difficult to identify them for enforcement of the law where the likelihood of noncompliance is higher, given that they sell these products. As part of a multifaceted study on vape shops and e-liquids, we report on whether vape shops and other tobacco specialty shops statewide selling ENDS or e-liquids are compliant with ND's smoke-free law.

2 | METHODS

2.1 | Design

In this descriptive study, discrete data collection was performed at 35 shops meeting the inclusion criteria by trained personnel using a standardized data collection form from February 18, 2019, to March 14, 2019, between the hours of 11:00 a.m. and 6:00 p.m. The study was submitted to North Dakota State University's Institutional Review Board (IRB) and was determined not to require IRB approval or certification of exempt status because the study did not fit the regulatory definition of "research involving human subjects" (Institutional Review Board, personal communication, 2018).

2.2 | Sample

This study included licensed and unlicensed retailers appearing to primarily sell ENDS and e-liquids, with or without nicotine; these were labeled "vape shops." Also included were other tobacco specialty shops selling e-liquids and ENDS, such as vape kiosks, head shops, and tobacco shops, even if these products did not appear to be the primary tobacco-related items being sold. Ribisl et al., (2016) and State and Community Tobacco Control Research (n.d.) provided the following definitions for these shops. Vape kiosks were defined as "free-standing kiosks that sell vape products within a larger structure, such as a mall or public outdoor area" (Ribisl et al., 2016, p. 4), and head shops were defined as "retail outlets that sell paraphernalia related to recreational drug use (e.g., bongs, glassware, incense), music, countercultural art, and home décor" (Ribisl et al., 2016, p. 5). Tobacco shops were defined as "a smoke shop or other retailer that primarily sells tobacco products" (State & Community Tobacco Control Research, n.d., p. 4). We also included unique shops selling e-liquids along with other products, such as music and/or clothing.

Methods to identify the shops included (a) a review of the ND Attorney General office's "Current License List for Retail Tobacco Products" (North Dakota Office of Attorney General, 2018) for shop names indicating a vape shop or tobacco specialty shop; (b) an Internet search using Google Maps and Yelp, based on Lee et al. and's (2018) systematic review on identifying vape shops; and (c) names submitted by tobacco prevention coordinators at local public health units (LPHUs), similar to a previous study (Buettner-Schmidt & Miller, 2017). All shops identified by one of the three methods

were reverified as meeting the inclusion criteria by examining their Internet presence using Facebook, Yelp, and the shop's web page.

We excluded wholesale tobacco vendors, shops on the American Indian reservations because reservations are exempt from the law, and licensed tobacco retail shops that were also convenience stores, grocery stores, gas stations, or other similar stores because these were less likely to be similar to the traditional vape shops or other tobacco specialty shops. Other than shops on reservations, we assumed that because of state regulations requiring licensing of retailers selling tobacco but not those selling ENDS or e-liquids, the shops identified in the exclusion criteria were more likely to be compliant with the rules and regulations pertaining to ENDS products than the shops included in this study. Shops were also excluded if they did not actually sell e-liquids or ENDS, were not at the location provided, or were out of business.

After removing duplicates, 38 shops met the study criteria. Data were unable to be collected in three shops because two shops were never open despite repeated attempts to enter, and one shop's address was a residential home and the data collector did not feel comfortable entering. Thus, data collection was completed in 35 shops, for a 92.1% completion rate.

2.3 | Data collection

Data collection was performed discreetly in ND, without knowledge of the owners or shop staff, to avoid behavior change of owners, staff, or patrons (Bohac et al., 2010). Nine adults, in singles or pairs, completed the observations; at least one data collector per pair was trained using standardized protocols for data collection. A data collection form was developed from modifications to a previous study's (Buettner-Schmidt & Miller, 2017) data collection form and the "Standardized Tobacco Assessment for Retail Setting: Vape Shops (vSTARS)" tool (Ribisl et al., 2016). The vSTARS tool was modified with permission (A. Kong, personal communication, February 4, 2018). Data collectors completed one observation of each shop in ND, and the length of the observation varied because compliance with the smoke-free law was only one variable studied in a larger study on vape shops and e-liquids that included purchasing the e-liquids.

2.4 | Measures

Compliance was defined using NDCC §23–12–09 to §23–12–11 (NDCC, 2012) and assessed by observation. Interior assessment of compliance included (a) the presence of no-smoking signage conspicuously posted indoors; (b) the absence of smoking indoors; (c) the absence of vaping indoors; and (d) no evidence of recent smoking or vaping indoors, including used disposable tips. Other evidence included the presence of smoked butts of cigarettes, cigars, little cigars, etc., and tobacco ashes or products in ashtrays or other receptacles. Exterior assessment of compliance included the (a) presence of no-smoking signs at all entrances visible from the outside; (b) absence of smoking outdoors within 20 feet of doors, open windows, or ventilation systems; or (c) absence of vaping outdoors within 20 feet of doors, open windows, or ventilation systems.

2.5 | Analysis

Basic descriptive statistics for categorical data (frequencies and percentages) were used to summarize the data. For each compliance category, a generalized Fisher's exact test for contingency tables larger than 2×2 (Agresti, 2002) was used to compare the proportion of noncompliant shops among the four different shop types. Statistical significance was set at 5% ($p < .05$). All analyses were performed using R version 3.5.1.

3 | RESULTS

The 35 shops meeting the study criteria were grouped into four categories: vape shops ($n = 16$; 45.7%), head shops ($n = 10$; 28.6%), tobacco shops ($n = 6$; 17.1%), and other shops ($n = 3$; 8.6%). Shops included in the "other" category included a vape kiosk, a movie and gaming shop that sold e-liquids and vape mods, and a beauty salon that sold tobacco and electronic nicotine delivery system products. All of these shops were assessed for compliance with the law (Table 1). Two shops (5.7%) were fully compliant.

For indoor compliance, there were 30 (85.7%) shops where no smoking or vaping was observed. Vaping, not smoking, was observed in each of the five noncompliant shops, and used disposable tips were visible in one of these shops. In two of the five shops, it was the shop staff who were observed vaping. No shops had other evidence of recent smoking. For indoor signage, four shops (11.4%) had no-smoking signs displayed inside. Only one shop (2.9%) had an interior sign stating that vaping was not allowed; however, this shop also had a sign stating that vaping was allowed. In all, three shops (8.5%) were compliant with indoor requirements.

For outdoor compliance, no smoking was observed within 20 feet of a door, open window, or ventilation system in 33 shops (94.3%). One of the two shops where outdoor smoking was observed also had indoor vaping observed. For outdoor signage, approximately one half of the shops ($n = 17$; 48.6%) had no-smoking signs posted at all entrances. In all, 15 shops (42.8%) were fully compliant with the outdoor requirements (Table 1). No significant differences in noncompliance were observed among the four shop types for any compliance category. The data that support the findings of this study are available from the corresponding author upon reasonable request.

4 | DISCUSSION

The current study assessed 35 shops in ND, including vape shops, head shops, tobacco shops, kiosks, and other shops, for compliance

TABLE 1 Observations regarding compliance with ND's smoke-free law

Observation	All shops ($n = 35$)		Vape shops ($n = 16$)		Head shops ($n = 10$)		Tobacco shops ($n = 6$)		Other[a] ($n = 3$)	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Interior										
No evidence of recent vaping	30	85.7	12	75.0	9	90.0	6	100.0	3	100.0
No evidence of recent smoking	35	100.0	16	100.0	10	100.0	6	100.0	3	100.0
No used disposable tips	34	97.1	15	93.8	10	100.0	6	100.0	3	100.0
No-smoking signage clearly posted	4	11.4	3	18.8	1	10.0	0	0.0	0	0.0
Exterior										
No vaping within 20 feet of door/window/ventilation system	35	100.0	16	100.0	10	100.0	6	100.0	3	100.0
No smoking within 20 feet of door/window/ventilation system	33	94.3	14	87.5	10	100.0	6	100.0	3	100.0
No-smoking signs at all entrances	17	48.6	8	50.0	7	70.0	2	33.3	0	0.0

Note: Freq, frequency of shops that were compliant. No significant results for $p < .05$.

[a]"Other" included a vape kiosk, a movie and gaming shop that sold e-liquids and vape mods, and a beauty salon that sold tobacco and electronic nicotine delivery system products.

with the law. Only two (5.7%) of the shops were fully compliant, although most of the noncompliance was signage related. Vaping occurred inside 14.3% of shops, including four vape shops and one head shop. Outdoor smoking occurred within 20 feet of doors, open windows, or ventilation systems in two shops (5.7%), both vape shops. In total, six shops (17.1%) had indoor or outdoor smoking or vaping. Slightly fewer than half of the shops had the required outdoor signage, and only four (11.4%) of the shops had the required indoor signage.

A previous ND 2015 study of only unlicensed vape shops found that only one shop out of 16 was fully compliant with the law (Buettner-Schmidt & Miller, 2017). In that study, indoor vaping was observed in 19% of vape shops, and no outdoor smoking or vaping was observed. For signage, 38% of the shops had the required outdoor signage, and 6% had the required indoor signage.

Indoor vaping decreased slightly from 2015 to 2019, from 19% to 14%, and outdoor smoking in the required smoke-free area increased from 0% to 5.7%. Thus, even though ND's smoke-free law has been in effect since 2012, vaping and smoking still occurred in required smoke-free and vape-free areas. Compliance with signage increased from 2015 to 2019; however, compliance was still low both years and was the main reason for the low rates of full compliance.

Interestingly, an ND 2014 compliance study of restaurants and bars found that fewer than 3% had indoor smoking, and 33% had smoking outdoors within the designated smoke-free area (Buettner-Schmidt et al., 2018). In relation to signage, 82% were compliant with outdoor requirements, and 73% were compliant with indoor requirements.

Thus, this current study of ND vape shops had higher compliance with indoor smoking/vaping restrictions and lower compliance with outdoor restrictions than the 2015 ND study, although compliance was similar for both studies. Most of the noncompliance in both the 2015 and 2019 studies related to the lack of required signage. The 2014 study of restaurants and bars had a much higher level of signage compliance. The 2014 study also had much lower levels of indoor smoking or vaping and much higher levels of outdoor smoking or vaping.

One reason for this lower indoor compliance observed in the 2014 and 2019 ND vape and tobacco specialty shops studies compared with the 2014 restaurant and bar study may be the weaker vape- or smoke-free norms for e-cigarettes than traditional smoking (Nguyen & Bornstein, 2020). Signage is important to compliance (Wynne et al., 2018), and the fact that fewer than half of the shops were compliant with the signage requirements in both 2015 and 2019 may also have affected compliance.

A limitation of this study was that ND does not have a licensing system for shops that sell ENDS and e-liquids; therefore, more shops could have existed than the ones included. Our results only apply to the types of shops selling e-liquids in ND similar to those included in this study and cannot be generalized to other types of licensed tobacco retailers that sell e-liquids. Also, the limited number of days and hours of data collection may have resulted in missed observations of vaping or smoking, and in some locations, the data were collected by one trained data collector. Data collection in the winter and early spring may have impacted the results due to cold weather. This was a small observational study. However, we completed data collection in 92% of the eligible shops. Future studies may consider including repeated observations at each shop and/or independent observations by more than one data collector to strengthen the study.

This study has policy implications. In addition to the current statewide smoke-free law prohibiting ENDS use indoors and in other smoke-free locations, other policy recommendations should be advanced. One relevant policy recommendation is for ND to include ENDS and all other nicotine delivery systems in current tobacco control laws by classifying them as tobacco products in the legal definition of tobacco products (Public Health Law

Center, 2017; WHO, 2019). In ND, this would then require all shops selling ENDS and e-liquids to be licensed by the state, as are other tobacco retailers. One benefit of licensure may be to assist in the systematic identification of these shops for education and enforcement efforts to ensure compliance with smoke-free laws. Also, although smoke-free laws are generally self-enforcing, some compliance efforts may be needed to bring vape shops and other tobacco specialty stores into full compliance. Enforcement of smoke-free laws requires coordination of efforts (Public Health Law Center, 2017), and partnerships currently exist among the North Dakota Department of Health, North Dakota Department of Human Services, LPHUs, and local law enforcement, which allows for such coordination (Haynes et al., 2019). Compliance with smoke-free laws prevents secondhand exposure to both smoke and e-liquid aerosols (Buettner-Schmidt et al., 2018), and would improve public health.

Public health nurses lead communities and impact community norms and policies. As such, public health nurses, and indeed all nurses, have a responsibility to assist in protecting the health of populations from harmful exposures to secondhand aerosol and secondhand smoke. They can educate the community and business owners on the harms of such exposure, assist businesses in understanding and complying with the laws, and collaborate with others to provide required signage as needed. Finally, public health nurses should advocate for recommended policy changes and enforcement at all levels of government.

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COMPETING INTERESTS

The authors report no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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