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Understanding Tobacco Use Behaviors in California Health Care and School Settings:
Latinos and the Context of Location

By

CINDY VERONICA VALENCIA
DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

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in

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ABSTRACT

The dissertation focus is on the tobacco use behaviors in California's health care and school settings, with an emphasis on Latinos and the context of location. Chapter one used data from the California Health Interview Survey to examine the association between race/ethnicity (Latino and Non-Latino white) and provider cessation advice and assistance among smokers with California Medicaid in the post-Affordable Care Act period. Logistic regression was used to examine the association between race/ethnicity and each outcome, adjusted for sociodemographic, tobacco behavior, health care factors, and acculturation measures. Chapter two was a pragmatic randomized trial to examine the impact of a local area code with a proactive outreach strategy among unassisted patients who smoke on the outcome of consenting to an e-referral to evidence-based tobacco treatment with the state quitline. Log-binomial regression was used to examine the association between area code and patient consent to a Helpline e-referral among self-reported smokers, adjusted for age, gender, and preferred language (English and Spanish). Chapter three used data from the California Department of Public Health to examine the association of urbanicity and school staff reports of e-cigarettes on high school grounds. Data were linked from the California Department of Education and California Healthy Kids Survey to include school-level factors, such as student demographics and student past 30-day e-cigarette use prevalence. Logistic regression was performed to assess the association between urbanicity and school staff observation of e-cigarettes on school grounds, adjusted for both individual-level school staff and school-level characteristics. Altogether, two of the chapters contribute to the gap in knowledge around why Latino smokers are advised less by providers, while the last study aims to contribute to the limited research around school staff perspectives and e-cigarettes at high schools.

INTRODUCTION

Smoking continues to be the leading cause of preventable death in the United States (U.S.).[1] Nationally, 14.0% of adults were cigarette smokers in 2018, this translates to 34 million people.[2] Today, dual use of e-cigarettes and regular cigarettes is more common.[3] E-cigarette use is now considered an "epidemic" among U.S. youth, and such a rapid rise in youth use has raised fears of creating a new generation of nicotine and tobacco users.[4,5] Increasing cessation support and decreasing initiation among youth can prevent lung cancer and other tobacco-related diseases.[6] Latinos are the largest and second-fastest growing racial/ethnic minority group in the U.S. and while smoking prevalence among Latino adults is lower than whites (9.9%),[7] the total number of smokers is higher compared to other racial/ethnic groups with a higher prevalence.

Latino smokers tend to be non-daily, light smokers (e.g. less than 5 cigarettes per day)[8], however, there are differences based on acculturation level[9] and geographic location. Although, definitions vary broadly in general acculturation describes the process of acquiring cultural elements (e.g. behaviors, attitudes, norms, and values) of the host culture.[10] U.S.-born Latinos with a higher level of acculturation are more likely to be daily smokers and smoke more cigarettes per day than foreign-born Latinos.[9,11,12] Rural California communities start smoking at a younger age[13], are increasingly Latino[14], and have some of the highest smoking rates in California.[15] In California public schools over half of the students are Latino (54.9%) and 10.3% reported using tobacco products.[16] Latinos make up a large share of the nation's youth, it is important to develop tailored strategies to prevent and reduce e-cigarette use.

Studies show Latino smokers are less likely to be screened and receive cessation assistance by a provider during doctor's visits.[17-20] Access to health insurance coverage and healthcare is a known barrier among Latinos[21], but through the ACA many Latinos gained

healthcare access and it is unknown if disparities around access to tobacco treatment persist in California. In California, 40% of all smokers are covered by Medi-Cal. California has more than 2.5 million smokers, a third are Latino and 1 million smokers reside in Los Angeles county. Few post-ACA studies exist to examine why Latinos are advised less,[22-24] and none have focused on the Medi-Cal population in California. To gain a better understanding of Latino tobacco use and cessation behaviors, we must consider acculturation measures (country of origin, years lived in the U.S., and preferred language) when creating future prevention, screening, and treatment strategies.

This dissertation uses the social-ecological model (SEM), which provides a framework for understanding how multilevel factors can influence tobacco use and cessation behaviors among Latinos. The SEM considers the interactions between the person and environmental factors that determine behavior. There are four levels of the SEM: individual (e.g. language barriers, cultural beliefs), interpersonal (e.g. family roles, social ties), community/organizational (e.g. access, health care system practices/school practices), policy/society (e.g. policies and norms).[25]

The dissertation focus is on the tobacco use behaviors in California's health care and school settings, with an emphasis on Latinos and the context of location. Chapter one used data from the California Health Interview Survey to examine the association between race/ethnicity (Latino and Non-Latino white) and provider cessation advice and assistance among smokers with California Medicaid in the post-Affordable Care Act period. Logistic regression was used to examine the association between race/ethnicity and each outcome, adjusted for sociodemographic, tobacco behavior, health care factors, and acculturation measures. Chapter two was a pragmatic randomized trial to examine the impact of a local area code with a proactive

outreach strategy among unassisted patients who smoke on the outcome of consenting to an e-referral to evidence-based tobacco treatment with the state quitline. Log-binomial regression was used to examine the association between area code and patient consent to a Helpline e-referral among self-reported smokers, adjusted for age, gender, and preferred language (English and Spanish). Chapter three used data from the California Department of Public Health to examine the association of urbanicity and school staff reports of e-cigarettes on high school grounds. Data were linked from the California Department of Education and California Healthy Kids Survey to include school-level factors, such as student demographics and student past 30-day e-cigarette use prevalence. Logistic regression was performed to assess the association between urbanicity and school staff observation of e-cigarettes on school grounds, adjusted for both individual-level school staff and school-level characteristics. Altogether, two of the chapters contribute to the gap in knowledge around why Latino smokers are advised less by providers, while the last study aims to contribute to the limited research around school staff perspectives and e-cigarettes at high schools.

Chapter One: Factors associated with the disparities in provider smoking cessation advice and assistance received by Latino versus Non-Latino white smokers on California Medicaid (Medi-Cal)

ABSTRACT

Importance: Previous studies have reported that Latino smokers are less likely than Non-Latino (NL) white smokers to receive provider advice to quit and assistance for cessation. California expanded its Medicaid program and applied the Affordable Care Act's (ACA) comprehensive tobacco cessation benefits for all members. It is not known if expanded coverage has helped resolve this disparity.

Objective: To examine the association between race/ethnicity (Latino and NL white) and provider cessation advice and assistance among smokers with California Medicaid (Medi-Cal) in the post-ACA period, adjusting for tobacco behavior, health care, and acculturation.

Design, Setting, and Participants: Data from 2014, 2016-2018 California Health Interview Survey were used. The study included Latino and NL white current smokers ages 18-64 years old who had Medi-Cal insurance and saw a provider in the past 12 months (n=1,861).

Main Outcomes and Measures: The two primary outcomes were self-reported receipt of provider advice to quit smoking and assistance with cessation (information or referral). Logistic regression was used to examine the association between race/ethnicity and each outcome, adjusted for sociodemographic, tobacco behavior, health care factors (e.g., number of office visits, chronic disease), and acculturation measures (e.g., English language proficiency, country of birth).

Results: Latino smokers were less likely than NL whites to receive provider advice (38.3% Latinos vs. 55.3% NL White, p=0.01) or cessation assistance (21.8% Latinos vs. 35.7% NL

White, p=0.05). In the unadjusted model, compared to NL whites, Latino smokers were less likely to receive provider advice (OR=0.5, 95% CI: 0.3-0.9) and also less likely to receive cessation assistance (OR=0.4, 95% CI: 0.2-0.9). However, in the adjusted model, race was no longer significant. Multivariable logistic regression showed that smokers with more office visits (adjusted OR=2.3, 95% CI 1.5-3.6) and those with at least one chronic disease (adjusted OR=2.0, 95% CI 1.2-3.4) were more likely to receive advice from a provider. Additionally, daily smokers compared with non-daily smokers (adjusted OR=2.3, 95% CI 1.0-5.0) were more likely to receive assistance.

Conclusion and Relevance: Despite having Medi-Cal coverage, Latino smokers continued to receive less provider advice and assistance than NL Whites. Having a chronic disease and greater office visits increased the likelihood to receive advice. Daily smokers were more likely to receive cessation assistance. Future efforts to eliminate these ongoing disparities for Latino Medi-Cal smokers might consider the use of novel strategies to engage tobacco users outside of the clinical encounter, such as population-based proactive outreach and community-based engagement.

INTRODUCTION

Tobacco use is the leading cause of preventable death in the United States.[26] Nationally, 14.0% of adults are cigarette smokers.[27] While smoking prevalence among Latino adults (8.8%) is lower than whites (15.5%)[28], the total number of smokers is higher because the population of Latinos in the U.S. is larger than other racial/ethnic groups with a higher prevalence. Latinos are the largest and second-fastest-growing racial/ethnic minority group in the U.S. A better understanding of Latino tobacco use and cessation behaviors is needed to inform future prevention, screening, and treatment strategies.

Access to health insurance coverage and health care services, including tobacco cessation treatment, is a known barrier among Latinos[21], but through the Affordable Care Act (ACA) many Latinos gained healthcare access. Few studies have examined whether tobacco treatment disparities persist in the post-ACA era, or specifically between Latinos and NL white smokers. Pre-ACA studies reported that Latino smokers were less likely than NL white smokers to receive advice to quit and cessation assistance from a health professional;[17-20] these studies examined racial/ethnic differences across the overall population. Only one national post-ACA study has explored how these trends compare among Latino and NL white adults, which reinforced findings of previous studies that reported continued disparities between Latino and NL white adults in provider advice to quit.[22] A regional post-ACA study of newly enrolled Kaiser Permanente patients in Northern California[23] reported that Spanish-speaking, light/nondaily smokers had significantly lower rates of provider advice to quit (56%), compared with English-speaking patients light/nondaily smokers (84%). Similarly, Spanish-speaking daily smokers reported lower rates of provider advice to quit (70%), compared with English-speaking daily smokers (84%). The study findings highlight the importance of assessing language and smoking intensity among Latino populations to provide comprehensive services.

In California, the ACA expansion increased access to Medi-Cal to 2.8 million people by the Fall of 2014, of these 41% were newly insured non-elderly Latinos[29] and the percent of smokers covered by Medi-Cal increased substantially from 19.3% before the ACA to 41.5% after the ACA.[30]. Therefore, there is a need to assess smoking intensity, access to cessation advice, and acculturation measures to better understand Latino tobacco use and treatment. Acculturation describes the process of acquiring cultural elements (e.g. behaviors, attitudes, norms, and values) of the host culture.[10] Studies show U.S. born Latinos with a higher level of

acculturation are more likely to be daily smokers, and smoke more cigarettes per day than foreign-born Latinos.[8,11,12]

This study compares provider advice and assistance among Latino and non-Latino white smokers with Medi-Cal, in the post-ACA period, and associated factors. California provides a unique setting to examine Latino tobacco use, screening, referrals, and cessation behaviors as it has approximately 3 million smokers and a third are Latino. I hypothesized that lower acculturation and lower smoking intensity (e.g. non-daily smoking) were contributing factors for why Latinos received less provider advice and cessation assistance.

METHODS

Design

Data from the 2014 and 2016-2018 California Health Interview Study (CHIS), an ongoing cross-sectional survey that is representative of the California population were analyzed. Primary outcomes were not included in CHIS 2015 or 2019 and therefore these years were not included in this secondary analysis. CHIS is a stratified random-digit-dial telephone survey of landline and cell-phone-only households, with more than 20,000 participants each year. The survey is conducted in English, Spanish, Chinese (Cantonese and Mandarin), Korean, and Vietnamese. The overall adult response rate in 2018 was 42.3%. Detailed survey methodology is published elsewhere.[31]

Sample

The study inclusion criteria included adults reporting insurance coverage with Medi-Cal, 18 years to 64 years old (up to the Medicare eligibility cut-off), who self-identified as Latino or NL white, had a provider visit in the past 12 months, and currently smoked cigarettes (N=1,861).

Current smokers were defined as ever having smoked 100 cigarettes in their lifetime and smoked every day or some days in the past 30 days.

Outcome

To assess provider advice to quit smoking and provider assistance with referral or cessation information, smokers were asked: "In the past 12 months, did a doctor or other health professional advise you to quit smoking?" and "In the past 12 months, did a doctor or other health professional refer you to, or give you information about, a cessation program?" These questions were only administered to current smokers in the survey.

Covariates

Covariates reflect four domains that may influence provider advice and assistance: sociodemographic factors, smoking behavior, measures of acculturation, and health care factors. 1) Sociodemographic variables included: age (18-29; 30-39; 40-49; 50-64), gender (male vs female), education (less than high school education or high school graduate vs. any college), and race/ethnicity (Latino, NL white). 2) Smoking behavior variables included: smoking intensity (daily or non-daily smoking), stopped smoking in the past year for one day or longer (yes vs. no) and thinking about quitting in the next six months (yes vs. no). 3) The measures of acculturation included: birthplace (the U.S. or foreign-born) and English language proficiency (English only, speaking English well or very well, not speaking English well or not at all). The health care factors re-classification of the chronic health conditions, frequency of doctors' visits, and psychological distress variables were modeled after the variable categories chosen in Shu-Hong Zhu et al (2018) CHIS Medicaid smoker study.[30] 4) The health care factors variables included: number of office visits to a 'medical doctor' in the past 12 months (1-4 vs. 5+), having at least one chronic disease (yes vs. no), and experiencing psychological distress in the past year (yes vs.

no). Participants were classified as having at least one chronic disease if they were told by a doctor that they had one or more of these conditions: heart disease, hypertension, diabetes, or current asthma. The Kessler Psychological Distress Scale (K6) was used to classify adults as experiencing psychological distress. Scores on the six dimensions were coded and summed to produce a total score of 0-24, with a 0 indicating no distress at all and 24 indicating extreme distress. Scores of >=13 were considered as having severe psychological distress. The survey year variable was included to assess trends in each outcome over the 2014, 2016-2018 time period.

Analysis

The prevalence of each covariate was estimated for Latino and NL White smokers and differences were assessed using chi-square tests. In addition, the prevalence of each outcome was estimated for all covariates, and differences were assessed using chi-square tests. Logistic regression was used to examine the association between race and each outcome. To assess whether acculturation factors and the number of office visits were mediators, four different models were conducted. Model 1 included race to obtain a crude odds ratio for the primary exposure. Model 2 additionally included the acculturation variables, English proficiency, and born in the United States. Model 3 (health care) additionally included the number of office visits. The final model (model 4) included all covariates. Model 4 included all covariates. These variables were selected based on previous study findings. All estimates were weighted to adjust for the complex survey design. All analyses were conducted using SAS 9.4 (SAS, Cary, North Carolina.

RESULTS

Table 1 displays the characteristics of Latino and NL white smokers on Medi-Cal who reported seeing a provider in the past year. Compared with NL White smokers, Latino smokers had a higher percentage of non-daily smoking, fewer office visits, no chronic disease, limited English proficiency, and foreign-born. There were no significant differences by age, gender, quit attempt in the past year, or thinking about quitting smoking in the next 6 months.

Among those who had a provider visit in the past year, more than half of adult smokers on Medi-Cal had not received provider advice and almost three-quarters had not received provider assistance to quit smoking (Table 2). Compared with NL white smokers, Latino smokers had a lower percentage who reported having received provider advice (38.3% Latino vs. 55.3% NL white, p=0.01) and assistance (21.8% Latino vs. 35.7% NL white, p=0.05). Groups reporting a higher percentage of receiving provider advice or assistance included 50-64 year-olds, daily smokers, those with at least one chronic disease, and those who visited the doctor 5 or more times in the past year. There was no change in either provider advice or assistance over time.

Results from the unadjusted logistic regression analysis revealed that race/ethnicity was significantly associated with both outcomes (Table 3 and Table 4). Compared to NL white smokers, Latino smokers were half as likely to receive provider advice to quit smoking (OR=0.5, 95% CI: 0.3-0.9) and to receive provider assistance (OR=0.5, 95% CI: 0.3-1.0). The OR for race and provider advice changed very little after the introduction of English language proficiency and country of birth variables in model 2 (adjusted OR=0.5, 95% CI: 0.2, 0.9) and the number of office visits in model 3 (adjusted OR=0.54, 95% CI=0.3,1.1), suggesting that acculturation measures and health care factors were not intermediate factors in the association between race

and provider advice. The only significant predictor for provider assistance was daily smoking (Table 4).

The adjusted ORs for each outcome from the multivariable models are also presented in Tables 3 and 4. In the final adjusted model, Latinos were 40% less likely to receive provider advice or assistance compared with NL white smokers, but the ORs for each outcome were no longer significant (Table 3 and 4). Smokers with at least one chronic health condition were twice as likely to receive provider advice to quit smoking (adjusted OR=2.0, 95% CI: 1.2-3.4). Similarly, smokers who visited the doctor 5 times or more in the past year were 2.3 times as likely to receive advice (adjusted OR=2.3, 95% CI 1.5-3.6). Compared with non-daily smokers, daily smokers were 2.3 times as likely to report receiving a referral or cessation information (adjusted OR=2.3, 95% CI 1.0-5.0), but daily smoking was not associated with provider assistance to quit smoking (OR 1.7, 95% CI: 0.9, 3.4)

DISCUSSION

Summary

Compared with NL white smokers enrolled in Medi-Cal, Latinos were 40% less likely to receive provider smoking cessation advice and assistance, but this association was not statistically significant. Five or more visits to the doctor, having at least one chronic disease, and daily smoking was significantly associated with advice and assistance, suggesting that these factors help explain outcome differences among Latino and NL white Medi-Cal beneficiaries. This research contributes to the understanding of the outcome differences between two groups having Medi-Cal and who saw a provider in the last year.

Despite an increase in health insurance coverage, there was no change in the percent of smokers on Medi-Cal who received cessation advice or assistance from 2014 to 2018. This

finding is consistent with one national post-ACA study that compared Latino and NL white smoker's provider advice to quit noting there was no change over time (2000-2015).[22] While this national study did not account for any of the health care factors in our study, similarly, the findings from our study confirm there were no significant changes in provider advice or assistance to Latino smokers over time.

Our finding that daily smoking, compared with non-daily smoking, was associated with receiving provider smoking cessation assistance is consistent with a regional post-ACA study of newly enrolled Kaiser Permanente patients in Northern California[23] that adjusted for similar factors used in our study, including preferred language. They found that Spanish-speaking, nondaily smokers had significantly lower rates of advice (56%), compared with English-speaking smokers and Spanish-speaking daily smokers. Some research suggests there could be a patient-level misconception that infrequent tobacco, non-daily use, does not qualify one as a tobacco user and may not prompt a physician to provide advice.[32] However, non-daily, light use could present an elevated risk of tobacco-related illness long-term.[33] This meta-analysis found no safe level exists for cardiovascular disease and even one cigarette per day carries risk. Health care systems can implement screening protocols that ask about use in the past 30 days to capture in non-daily smokers.

We found that going to the doctor more often was associated with an increase in receiving provider cessation advice and assistance. For populations, such as Latinos, who are less likely to visit the doctor, Medicaid plans and health care systems might consider proactive outreach strategies[34] to expand help connect individuals to evidence-based state quit line services. Less than a fifth of Latinos (19.5%) are enrolled in quit line services, yet Latinos make up over a third (34.2%) of all smokers in California.[35]

Use of communication messages and channels that consider the Latino community and culture can help address Latino smoking behavior. Community-based messaging strategies that focus on how secondhand smoke harms the family are motivating messages. Messages should address smoking risk, ethnic differences, smoke-free home messages, and address situational triggers through brief interventions.[36] Leveraging community leaders and *promotoras* (lay health workers), can be effective channels for conveying health messages.[37]

Broader and simultaneous strategies to promote cessation services outside of the clinical encounter, which include written materials (e.g. in-home mailings) with information about nicotine replacement therapy are proven strategies[38] and necessary to address higher smoking rates among California's Medi-Cal population.[39] Spanish-speaking Latinx had a higher engagement with the California Smokers' Helpline (Helpline) through the in-home mailings (Spanish-speaking Latinx 30.6% vs whites 18.2%, $p<0.001$). More importantly, once engaged with the Helpline, Spanish-speaking Latinx had higher rates of completing counseling and receiving nicotine therapy than whites. Targeted Spanish-language designed media can increase calls to the Helpline and improve quit outcomes. Greater awareness and research are necessary to improve tobacco cessation advice and assistance in younger, healthier patients and non-daily smokers.

Limitations

The study has several limitations. First, the cross-sectional design precludes causal inferences. Second, the data relies on smokers' self-reports, which were not biochemically verified with cotinine levels, however, a meta-analysis comparing self-reported smoking status with results of biochemical validation suggests generally high levels of sensitivity and specificity for self-report[40]. Additionally, these responses regarding provider visits may be influenced by

recall bias. Third, this study does not examine cessation outcomes but provider advice and assistance are important process measures towards quitting. The use of odds ratios in our analysis may overestimate the strength of the association when the outcome of interest is not rare (>10%).[41]

CONCLUSIONS

This is the first study to examine factors associated with Latino vs. NL white smokers on Medicaid reporting less provider advice and assistance in the post-ACA era. Acculturation measures, English language proficiency or birthplace, did not mediate the association between identifying as Latino and provider advice or assistance, however, the number of office visits and smoking intensity are important factors. Health care systems, Medi-Cal managed care plans, and public health partners efforts to increase tobacco treatment support for the Latino community are needed to address this ongoing disparity around Latinos advised and assisted less, compared to white smokers. Future Latino tobacco interventions and population health strategies need to understand the unique smoking behaviors and healthcare utilization practices of low-income Latinos. Community-based engagement and population health proactive outreach strategies can help enhance the visit-based model and increase engagement with the state quitline. The findings may be useful in promoting awareness of these patient-level differences to health providers and in informing the design of more targeted studies that can examine the healthcare system, provider, and patient-level factors in more detail.

Table 1. Characteristics of Latino and Non-Latino White Smokers with California Medicaid, CHIS, 2014, 2016 – 2018

	Total	Latino, % (N=557)	NL White, % (N=1304)	p [a]
Overall		44.8	55.2	0.65
DEMOGRAPHIC				
Age, years				
18-29	22.5	26.2	19.4	0.18
30-39	23.7	26.1	21.7	
40-49	18.9	19.9	18.2	
50-64	34.9	27.8	40.7	
Male	54.1	59.1	50.0	0.33
Education				
≤ High School	59.9	67.7	53.6	0.04
Any Post High School Education	40.1	32.3	46.4	
TOBACCO BEHAVIOR				
Daily smoker	65.1	54.2	74.0	0.002
Stop smoking one day or longer to quit in the past year	59.4	62.3	57.0	0.39
Think about quit smoking in next 6 months	73.0	71.6	74.0	0.65
HEALTHCARE				
5+ office visits to doctor in past year	40.4	28.1	50.4	<.0001
At least one chronic disease	49.3	41.1	55.9	0.03
Experienced psychological distress[b]	29.3	22.7	34.7	0.008
ACCULTURATION				
English Language Proficiency[c]	78.4	74.9	99.4	<.0001
Born in the United States	88.4	62.6	91.3	<.0001

Abbreviation: CHIS, California Health Interview Survey

[a] p-value<0.05 for Chi-Square test of the difference between Latino and NL White

[b] Scored >= 13/24 on the Kessler Psychological Distress Scale (K6)

[c] Self-rated as English only, or speaking English well or very well

Table 2. Provider Advice or Assistance among Latino and Non-Latino white Smokers with California Medicaid, CHIS, 2014, 2016-2018

	Provider Advice		Provider Assistance	
	n=1861	*p*	n=1861	*p* [a]
Overall	47.7		29.5	
SURVEY YEAR				
2014	42.1	0.60	43.2	0.15
2016	45.1		23.1	
2017	51.0		30.4	
2018	51.0		25.4	
DEMOGRAPHIC				
Race/ethnicity		0.01		0.05
Latino	38.3		21.8	
Non-Latino white	55.3		35.7	
Age, years		0.001		0.08
18-29	32.7		23.5	
30-39	43.5		21.7	
40-49	43.5		29.9	
50-64	62.4		38.4	
Gender		0.55		0.32
Female	49.6		32.5	
Male	46.1		26.8	
Education		0.32		0.26
≤ High School	45.3		26.9	
Any Post High School Education	51.2		33.3	
TOBACCO BEHAVIOR				
Smoking Intensity		0.01		0.01
Daily	53.7		35.1	
Non-daily	36.6		19.0	
Stop smoking one day or longer to quit in the past year		0.46		0.51
Yes	49.5		30.9	
No	45.1		27.3	
Think about quit smoking in the next 6 months		0.08		0.64
Yes	51.1		30.3	
No	38.4		27.2	
HEALTHCARE				
Number of office visits to the doctor in the past year		<.0001		0.02

1-4 visits	36.0		23.0	
5 or more visits	64.9		39.0	
Chronic Disease[b]		<.0001		0.03
At least one chronic disease	60.7		36.1	
No chronic disease	35.0		23.0	
Experienced psychological distress[c]		0.20		0.80
Yes	53.9		30.5	
No	45.0		29.1	
ACCULTURATION				
English Language Proficiency[d]		0.46		0.93
Speak only English, very well or well	48.5		29.6	
Do not speak English well or not at all	41.3		28.5	
Born in the United States		0.23		0.90
Born in the U.S.	49.9		29.7	
Foreign Born	39.8		28.6	

[a] p-value<0.05 for Chi-Square test of difference.

[b] Reported heart disease, hypertension, diabetes, and current asthma

[c] Scored >= 13/24 on the Kessler Psychological Distress Scale (K6)

[d] Self-rated as English only, or speaking English well or very well

Table 3. Multivariable Logistic Regression of Factors Associated with Provider Advice to Quit by Smoker Characteristics; CHIS, 2014 and 2016-2018

	Model 1, OR (95% CI) (n= 1861)	p	Model 2, OR (95% CI) (n=1861)	p	Model 3, OR (95% CI) (n=1861)	p	Model 4, OR (95% CI) (n=1857)	p
Race								
Latino	0.5 (0.3, 0.9)	0.01	0.5 (0.2, 0.9)	0.03	0.54 (0.3, 1.1)	0.07	0.6 (0.3, 1.2)	0.2
NL White	Reference		Reference		Reference		Reference	
Smoking Intensity								
Daily							1.7 (0.9, 3.4)	0.1
Non-daily							Reference	
Number of Visits								
1 to 4					Reference	$p<.0001$	Reference	<.0001
5+					3.0 (2.0, 4.4)		2.3 (1.5, 3.6)	
Chronic disease								
No							Reference	
At least one							2.0 (1.2, 3.4)	0.01
English Language Proficiency								
English well/very well			0.9 (0.4, 1.8)	0.8	0.9 (0.4, 1.8)	0.8	0.7 (0.3, 1.9)	0.6
Not well/not at all			Reference		Reference		Reference	
Born in the U.S.								
U.S. Born			1.1 (0.5, 2.4)	0.8	1.1 (0.5, 2.4)	0.8	1.0 (0.4, 2.5)	1.0
Foreign-Born			Reference		Reference		Reference	

Model 1 - Unadjusted

Model 2 includes acculturation variables, English proficiency, and born in the United States.

Model 3 includes acculturation variables, English proficiency and born in the United States, and the number of office visits.

Model 4 - includes the year, age, sex, education, smoking intensity, stop smoking, thinking about quitting, number of office visits, chronic disease, distressed, and the acculturation variables.

*Year, age, sex, education, stop smoking one day or longer to quit in the past year, thinking about quitting, and distressed included in the final model and were not significant.

Table 4. Multivariable Logistic Regression of Factors Associated with Provider Assistance by Smoker Characteristic; CHIS, 2014 and 2016-2018

	Model 1, OR (95% CI) (n=1861)	p	Model 2, OR (95% CI) (n=1861)	p	Model 3, OR (95% CI) (n=1861)	p	Model 4, OR (95% CI) (n=1857)	p
Race								
Latino	0.5 (0.3, 1.0)	0.05	0.4 (0.2, 0.9)	0.02	0.47 (0.3, 1.0)	0.04	0.6 (.2, 1.3)	0.2
NL White	Reference		Reference		Reference		Reference	
Smoking Intensity								
Daily							2.3 (1.0, 5.0)	0.05
Non-daily							Reference	
Number of Visits								
1 to 4					Reference	P=0.007	Reference	0.07
5+					2.1 (1.2, 3.5)		1.7 (1.0, 3.1)	
English Language Proficiency								
English well/very well			1.02 (0.5, 2.2)	0.96	1.02 (0.5, 2.3)	0.96	1.0 (.4, 2.6)	1.0
Not well/not at all			Reference		Reference		Reference	
Born in the U.S.								
U.S. Born			0.6 (0.2, 1.6)	0.33	0.6 (0.2, 1.4)	0.21	0.6 (0.2, 1.9)	0.4
Foreign-Born			Reference		Reference		Reference	

Model 1 - Unadjusted

Model 2 includes acculturation variables, English proficiency, and born in the United States.

Model 3 includes acculturation variables, English proficiency and born in the United States, and the number of office visits.

Model 4 - includes the year, age, sex, education, smoking intensity, stop smoking, thinking about quitting, number of office visits, chronic disease, distressed, and the acculturation variables.

*Year, age, sex, education, stop smoking one day or longer to quit in the past year, thinking about quitting, chronic disease and distressed included in the final model and were not significant.

Chapter Two: A Proactive Outreach Strategy using a Local Area Code to Refer Unassisted Smokers in a Safety Net Health System to a Quitline: A Pragmatic Randomized Trial

ABSTRACT

Importance: Slower declines in tobacco use and underutilization of tobacco treatment among socioeconomically disadvantaged populations contribute to disparities in tobacco-related morbidity and mortality. Innovative approaches are needed to expand access and participation to free evidence-based cessation treatments such as a quitline. Electronic health records (EHR) can help identify unassisted smokers to proactively offer an electronic referral (e-referral) to tobacco treatment outside of the regular office visit.

Objective: To examine the association between area code (local 213 and generic 888) and obtaining a patient's consent to an e-referral to the California Smokers' Helpline (Helpline) through a proactive outreach strategy.

Design, Setting, and Participants: The study was a pragmatic randomized trial to contact unassisted patients who smoke, using data from the EHR of the Los Angeles Department of Health Services (LADHS). The study inclusion criteria were adult smokers who had a phone number, were seen in the past three months and whose preferred language was English or Spanish (n=685). Patients were randomly assigned to being contacted by the Helpline with an area code that was local (n=342) or generic (n=343). Both groups were offered an e-referral to the Helpline.

Main Outcome(s), Measures, and Analysis: The primary outcomes were the proportion of patients contacted and the proportion of these patients who consented to an e-referral. Secondary outcomes included subsequent Helpline engagement outcomes (i.e. contacted by Helpline,

completed an intake with Helpline) among the proportion of patients who consented to an e-referral. Log-binomial regression was used to examine the association between area code and patient consent to a Helpline e-referral among self-reported smokers, adjusted for age, gender, and preferred language (English and Spanish).

Results: The LADHS contact rate was higher (54.7%) for the 213 area code compared to the 888 area code contact rate (48.7%), although not statistically significant (p= 0.12). The local 213 area code group had a higher Helpline consent rate than the 888 number (66.3% vs 54.3%, Adjusted Prevalence Ratio 1.29, 95% CI 1.01-1.66, p=0.04). Also in the adjusted model, younger patients had a higher consent rate than patients in the oldest age quartile who were 61 years and older (Adjusted Prevalence Ratio 1.46, 95% CI 1.07-2.00, p=0.02), and Spanish-speaking patients had a higher consent rate than English-speaking patients (Adjusted Prevalence Ratio 1.4, 95% CI 1.07-1.71, p=0.02). Gender was not a statistically significant factor in the regression model. For secondary Helpline engagement outcomes among all patients who consented to an e-referral, 69.2% were contacted by the Helpline and 50.5% completed a Helpline intake.

Conclusions and Relevance: Population-based proactive outreach to unassisted smokers in a safety net health system with a local area code increases consent to an e-referral for quitline services. Among these socioeconomically disadvantaged patients who smoke, patients who were younger than 61 or Spanish-speaking were also more likely to consent to an e-referral than their older or English-speaking counterparts. Findings suggest that a population-based proactive outreach is an effective strategy to build on the visit-based model and offer services to tobacco users, regardless of the motivational levels to quit.

INTRODUCTION

California has about 3 million smokers and the largest concentration of smokers, an estimated 1 million smokers, reside in Los Angeles (LA) County. LA County is the most populous county in the United States with an estimated population of 10.1 million residents who account for approximately 27% of California's entire population. Latinos make up 47.5% of the general LA population. In addition, almost one-third of LA smokers are low-income and Medi-Cal members. Screening for tobacco use and delivering tobacco cessation services are effective strategies to help smokers quit; however, there is limited access to evidence-based cessation treatments among low-income, diverse populations.[42]

Health systems play an important role in tobacco treatment. The U.S. Preventative Services Task Force (USPSTF) guidelines recommend providers ask, advise and refer patients to tobacco cessation resources.[43] Providers cite time constraints and competing priorities as a primary barrier to referring patients to cessation services during a regular visit.[44,45] Further these services only reach the smokers who make a provider visit or may be more likely among patients with a greater number of visits. Referring patients to a tobacco cessation resource can help relieve the burden on time-constrained clinicians to offer counseling and increase a patient's odds of quitting.

The Los Angeles Department of Health Services (LADHS) is the nation's second-largest municipal health system of providers, clinics, and hospitals. LADHS serves a large Medi-Cal and uninsured population and has been working on improving its tobacco quality metrics in a Medicaid pay-for-performance quality improvement program, called Public Hospital Redesign and Incentives in Medi-Cal (PRIME). This PRIME program requires tracking the National Quality Forum "Tobacco Assessment and Counseling" 0028 metrics. This metric reflects the

number of non-smokers screened and smokers counseled divided by the total number of patients served over the past two years. Although not required for reporting in PRIME, the patient data collected from this metric helps to identify smokers who have no documented assistance ("unassisted" smokers) in the electronic health record (EHR). The public hospital systems participating in PRIME are expected to measure their tobacco quality metrics twice annually to receive payments based on their performance.[46]

To improve LADHS's PRIME tobacco screening metric, an existing research partnership with the California Smokers' Helpline (Helpline) created an opportunity to close care gaps in tobacco treatment. The Helpline has offered free evidence-based tobacco cessation counseling service, in English, Spanish, and three Asian languages for over 25 years. Research shows Helpline services alone can double long-term quit rates at one year.[47] There is growing momentum to integrate the Helpline with electronic health records (EHR) and improve clinic workflows, as safety net providers may have limited time and resources to address tobacco treatment.[48] Further, proactive outreach strategies can increase engagement in evidence-based tobacco cessation treatments among low-income smokers,[34,49] including with quitlines[50]. Increasing the reach and use of evidence-based cessation treatments is an important public health goal, especially among low-income diverse populations. Health systems, like LADHS, can identify unassisted smokers and proactively offer an e-referral to the Helpline.

This pragmatic randomized trial aims to test the feasibility and acceptability of a proactive outreach strategy using local vs. generic area codes among unassisted English and Spanish-speaking smokers to utilize evidence-based tobacco treatment with a quitline. Innovative approaches, such as examining the effect of area code on acceptability, are needed to encourage participation with evidence-based cessation treatments among socioeconomically

disadvantaged smokers. Using a population-based approach that leverages LADHS's existing PRIME tobacco metrics, this study describes the process and examines factors associated with obtaining a patient's consent to an e-referral to the Helpline through a proactive outreach strategy. I hypothesized that receiving a call from a local area code than a generic area code was associated with higher consent rates to an electronic e-referral to the Helpline.

METHODS

Design

The pragmatic randomized control trial was designed to compare patient consent to the Helpline e-referral through the process of calling patients with a local 213 area code or a generic 888 area code. Data from the LADHS EHR was extracted from the patient's tobacco history section of EHR meaningful use indicators to identify unassisted smokers. Unassisted smokers were defined as adult smokers who visited the doctor in the past two years and lacked any documentation of provider advice or assistance to quit smoking. The tobacco history section options included: 10 or more cigarettes (1/2 pack or more) per day in the last 30 days, 4 or less cigarettes (less than ¼ pack) per day in the last 30 days, 5-9 cigarettes (between ¼ to ½ pack) per day in the last 30 days, cigars or pipes but not daily within last 30 days, cigars or pipes daily within last 30 days, current everyday smoker, current some day smoker, heavy tobacco smoker, light tobacco smoker, smoker current status unknown and other. Three cohorts of patients (wave 1, wave 2, wave 3) were extracted from the EHR during three different periods: March 2019 (n=5824), September 2019 (n=2880), and June 2020 (n=2,704). The total combined sample size was 11,408 unassisted smokers.

Sample

The study inclusion criteria included adults ages 18 and older who made an office visit to any clinic provider in the past 3 months, had a history of tobacco use, had a preferred language of English or Spanish, and had a phone number (n=685). Patients were randomly assigned by a computer-generated algorithm to the local 213 (n=342) or generic 888 (n=343) area codes. Telephone calls to patients with these area codes by Helpline staff, calling on behalf of LADHS as an approved volunteer, utilized the Helpline's interactive voice response program and were conducted from June 2019 to July 2020. Both groups received the same script in their preferred language of English or Spanish. The script identified the patient as a smoker shared a brief overview about the LADHS partnership with the Helpline and asked for verbal consent to submit the Helpline e-referral (see Appendix 1). If the patient provided verbal consent, the Helpline staff entered the e-referral into the EHR system, and the e-referral was electronically sent to the Helpline. The Helpline counseling staff then contacted the patient within 1 to 2 days, conducted an intake questionnaire, and offered free counseling services. In addition, a six-month follow-up call was conducted with the Helpline's standard 20-question survey about self-reported smoking status, quit attempts, and cessation aids utilized. This study was funded by the California Tobacco-Related Disease Research Program (TRDRP) and approved as exempt from human subjects review by the UC Davis IRB.

Outcome and Measures

The primary outcomes were patient LADHS contact rates and consent to an e-referral to the Helpline. Patient LADHS contact rates were defined as the number of patients who answered the phone and remained on the line to confirm their current smoking status (n=354) divided by the total number of patients contacted (n=658). Consent to an e-referral was defined as the

number of patients contacted who self-identified as a smoker and consented to an e-referral to the Helpline (n=107) divided by the total number of self-identified smokers contacted (n=174). Patients were asked, "May I share your contact with them [Helpline] so they can contact you and enroll you?" Patient responses were categorized as "Yes" or "Not interested." Secondary outcomes for Helpline engagement rates from the e-referrals included: 1) Helpline contact rate and 2) Helpline intake rate. The Helpline contact rate was defined as the proportion of consented patients who were successfully contacted by the Helpline (n=74), among those referred (n=107). Patient responses were categorized as "Yes" or "Not interested" to the Helpline services. Helpline intake rate was defined as the proportion of patients who accepted the intake survey (n=54), among those referred (n=107).

The primary exposure was area code. The local area code (213) was selected by the research team as the most recognizable across LA County, which has numerous area codes, and the 888 area code reflects the Helpline's number that shows up on Caller ID. Only patients randomized into a 213 versus 888 area code were included in the analyses.

Patient demographic information from the EHR was only available for the subset of patients who answered the phone and self-identified as smokers (n=174). Sociodemographic variables included age (in quartiles 21-43, 44-55, 56-60, 61-76), gender (male, female), and preferred language spoken (English, Spanish).

Analysis

The prevalence of each covariate was estimated for the local 213 and generic 888 area code and differences were assessed using chi-square tests. The unadjusted and adjusted prevalence ratio for area code and patient consent to a Helpline e-referral was calculated using SAS PROC GENMOD's log-binomial regression[51] with SAS Version 9.4. The study estimated

the unadjusted association of area code and an adjusted model controlling for the following variables: age, sex, preferred language spoken. Prevalence ratios with 95% Confidence Limits (CL) were reported for each predictor to express the strength of association with consent to an e-referral to the Helpline. Secondary outcomes included Helpline engagement rates. All analyses were conducted using SAS 9.4 (SAS, Cary, North Carolina).

RESULTS

Helpline staff calling on behalf of LADHS attempted to contact 685 unassisted smokers (Figure 1), of whom 342 were called with a 213 local area code and 343 were called with an 888 area code. Altogether, a total of 331 were inaccessible (reasons included no answer, phone service problem, or other reasons). Of the 354 individuals reached, 187 were ineligible for the pilot study (63 reported they were not a smoker, 119 reported they already quit). Overall, 174 self-identified smokers were offered the e-referral (25.4% of the total cohort). A total of 107 e-referrals were placed, reflecting 61.5% of 174 proactive outreach calls of self-reported smokers.

Table 1 displays characteristics of self-confirmed smokers who were offered an e-referral to the Helpline. The median age was 56.5 years old for the 213 area code group and 54 years old for the 888 area code group. There were no significant differences by age, gender, or preferred language.

Results from the unadjusted log-binomial regression analysis revealed that area code was not associated with the outcome of consent to an e-referral. In the adjusted model, the association of area code with the outcome was significant after adding both age and language covariates. Gender was not a statistically significant factor in the model. The adjusted prevalence of agreeing to an e-referral in the 213 area code was 29% higher than agreeing to an e-referral in the 888 area code (Adjusted Prevalence Ratio 1.29, 95% CI 1.01-1.66, p=0.04). The adjusted

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prevalence of agreeing to an e-referral among younger patients was 46% higher compared to patients in the oldest age quartile who were 61 years and older (Adjusted Prevalence Ratio 1.46, 95% CI 1.07-2.00, p=0.02). Finally, the adjusted prevalence of agreeing to an e-referral was 40% higher in Spanish-speaking patients compared to English-speaking patients (Adjusted Prevalence Ratio 1.4, 95% CI 1.07-1.71, p=0.02).

Among the individuals who consented to the Helpline e-referral (n=107), 69.2% (n=77) were successfully contacted by the Helpline. Half (50.5%) of the individuals contacted by the Helpline accepted services (54 of the 107 e-referrals).

DISCUSSION

Summary

To our knowledge, this is the first study demonstrating that population-based proactive outreach to unassisted smokers in a safety net health system with a local area code increased consent to an e-referral for quitline services. Previous population health proactive outreach studies have also contacted smokers over the phone[34,52], however, it is unclear what telephone numbers were used, and none test for the effect of a local area code versus a generic toll-free area code (which reflects the usual practice for the Helpline) on the outcomes. Among these socioeconomically disadvantaged patients who smoke, patients who were younger than 61 or Spanish-speaking were also more likely to consent to an e-referral than their older or English-speaking counterparts. A proactive outreach strategy using a local area code, targeting Spanish speakers and patients under 61 years old may increase engagement with quitlines.

Use of a local, more familiar area code may increase smokers' acceptance of quitline e-referrals because of trust in seeing a local area code associated with a known clinic system rather than an 888 area code that can be associated as an unidentified, unsolicited call from phone

scammers. The LADHS contact rate was higher at 54.7% for the 213 area code compared to 48.7% in the 888 area code group, although not statistically significant. The fact this contact rate was not higher is not surprising due to the difficulties in reaching people by telephone (e.g. phone service problems or lack of interest in hearing about cessation). In addition, public health programs like quitlines can be negatively impacted by patient actions to avoid unsolicited calls, such as call blocking, caller identification or screening, and hanging up. Quitlines might consider learning from population health management businesses, such as TelAsk, who already use the phone number of a health system to contact patients.[53]

There are several other challenges to connect with safety-net patients. Despite only including patients with an office visit in the past three months, almost half (45.3%) of the 213 area code cohort and half (51.3%) of the 888 area code cohort were inaccessible. The top three reasons for inaccessibility included no answer (e.g. voicemail), no voicemail set-up or mailbox full, followed by a phone service problem (e.g. not accepting calls, disconnected, the wrong number). A study at two safety-net hospitals in New York City listed no phone as the number one challenge in connecting smokers to post-discharge cessation interventions.[54] Safety net patients may lack phones, consistent phone service and have limited voicemail access, which further highlights the importance of updating patient's phone numbers regularly and considering text messaging options to enhance a telephone-based strategy.

Despite these challenges to contact LADHS patients, this study demonstrates a relatively high Helpline contact rate for engagement in services. The Helpline contact rate (69.2%) in this study with LADHS patients was higher than the Helpline contact rate (52%) at the UC Davis health system reported in Hood-Medland et al[55]. One explanation for the difference is the study setting as our study targeted patients who had recently been in the clinic, whereas the Hood-

Medland et al[55] study not only had patients in the clinic but included patients who were discharged from the hospital and may be sicker.

While EHRs can provide a patient's tobacco history to identify unassisted smokers, the default opt-in model for health care providers to ask the patient for consent to an e-referral is a barrier for population health. Our study workflow also required obtaining consent involving a burdensome two-step process where Helpline staff had to call as an approved LADHS volunteer to obtain consent to the e-referral first, then enter the e-referral into the EHR system and finally the Helpline counseling staff called all consented patients from an 888 area code within 2-5 business days of the referral. This two-step process may be eliminated by establishing a data-sharing agreement where health care organizations may have the Helpline counseling staff call patients directly and offer services. Ethical considerations around opt-out strategies have determined that the benefits outweigh the risks for patients, and can enhance the medical community's obligation to treat tobacco dependence. [56]

As Medi-Cal members comprise a significant proportion of Helpline callers[39], Medi-cal managed care plans should also consider this population health strategy to create similar smokers' registries to link low-income populations to free tobacco treatment with the Helpline. The plans can establish data-sharing agreements with quitlines to not only scale up the proactive outreach strategy but also allow for the Helpline to offer services and enrolled members immediately into services upon consent during a single phone call. In California, one Medi-Cal managed care plan is working on obtaining approvals to implement this innovative model. The health plan will inform the members of the partnership with the quitline. When the Helpline calls the member, the member has the right to decline or accept services without any ramifications to the existing plan benefits. This proactive outreach strategy can help connect

low-income, diverse populations to quitline services. The Helpline has demonstrated in a previous randomized trial that their services are effective to help Medicaid smokers quit and additional financial and medication incentives (which managed care plans could sponsor) may help enhance the effect.[57]

Strategies that do not rely on smokers seeking out treatment or a busy provider[45] to make an e-referral can help address tobacco treatment gaps for Latinos. A higher percentage (77.8%) of Spanish-speakers agreed to the Helpline e-referral compared to English-speakers (58.5%), which could mean this approach may resonate well for Spanish-speakers. For populations, such as Latinos, who are less likely to visit the doctor, Medicaid plans and health care systems might consider proactive outreach telephone-based strategies to connect Spanish-speakers to the quitline. Less than a fifth of Latinos (19.5%) are enrolled in quit line services, yet Latinos make up over a third (34.2%) of all smokers in California.[35] Population outreach with household mailings promoting the Helpline directly to Latinos, including Spanish-speakers, has increased calls to the Helpline[38]. Further examination of the association between area code and consent to a quitline e-referral is necessary among diverse Medicaid populations.

Our study results also highlight several potential modifications to consider beyond area code to increase patient engagement in a larger proactive outreach study. The LADHS contact rates through the proactive outreach strategy may reflect issues related to the script used over the phone, patient readiness to quit, phone number accuracy, or acceptance of telephone services. Further, there may be an increase in reach rates with more up-to-date phone number records. For example, patients with more frequent use of health services may have more updated numbers in the EHR. Further research is necessary to scale up the proactive outreach engagement and to explore ways to strengthen acceptance of Helpline services.

LIMITATIONS

The study has several limitations. 1) We rely on the tobacco metric data based on the provider's data entry into the EHR. This information is based on a patient's self-reported answer about current smoker status and answers may vary on how the question is asked by the clinic staff. Latinos, especially low-level smokers, may not consider themselves smokers and may answer "no" to the question "are you a smoker" during a provider visit. 2) While smokers were identified in EHR documentation, due to the large volume of smokers without documented assistance, only a subset of the patients were included in the pilot study. 3) This was not a randomized controlled trial evaluating smoking cessation outcomes among smokers but the process to engage with evidence-based treatment. The study was not powered to detect a difference in quit rates. 4) The study only included one safety net clinic system in Los Angeles County (the second largest public health system in the nation) and the generalizability of the findings may be limited. 5) The study does not report quit rates and does not utilize biochemically validated smoking status; however, a future study may consider a randomized control trial to also test long-term abstinence.

CONCLUSIONS

The proactive outreach telephone-based strategy using a local area code to engage smokers outside of the clinic encounter was feasible and acceptable to connect smokers to the quitline. Measures of acceptability with verbal consent to an e-referral and high rates of quitline engagement show that this may be a viable option for health care systems, or Medi-Cal managed care plans, seeking to increase patient access to tobacco treatment. Further study is necessary to examine ways to reach more patients and assess long-term outcomes after the interventions. Our study was not powered to detect differences in long-term cessation rates, but the study focus was

on the initial recruitment and patient engagement. This proactive outreach strategy may be generalizable for other chronic disease management models and evidence-based treatment beyond those provided by quitlines.

Figure 1. Diagram of Proactive Outreach by Area Code and Outcomes with LADHS Patients Identified as Unassisted Smokers
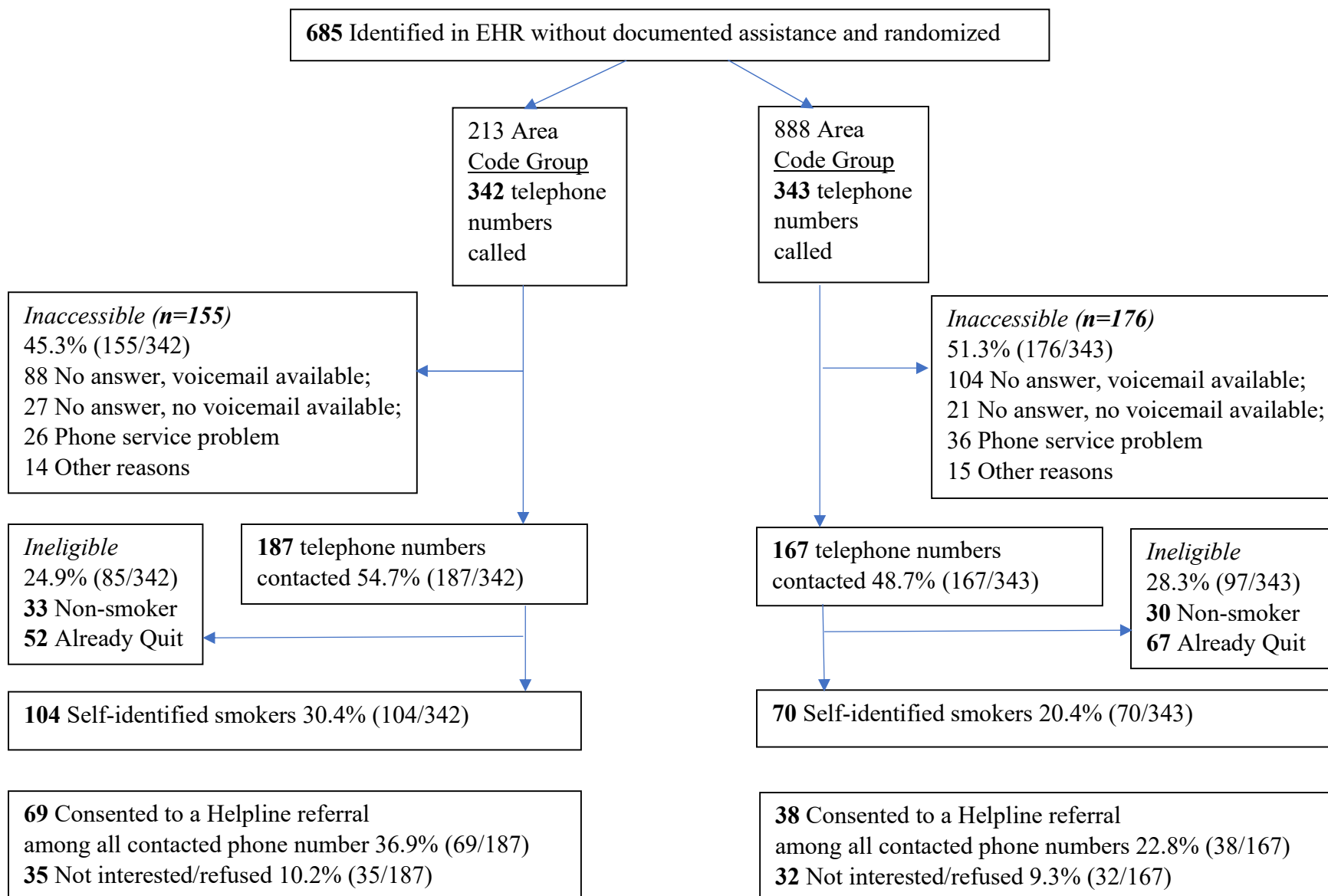
```
                    ┌────────────────────────────────────────────────────────────┐
                    │ 685 Identified in EHR without documented assistance and      │
                    │     randomized                                               │
                    └────────────────────────────────────────────────────────────┘
                              │                              │
                    ┌─────────────────┐            ┌─────────────────┐
                    │ 213 Area        │            │ 888 Area        │
                    │ Code Group      │            │ Code Group      │
                    │ 342 telephone   │            │ 343 telephone   │
                    │ numbers         │            │ numbers         │
                    │ called          │            │ called          │
                    └─────────────────┘            └─────────────────┘
```

Inaccessible (n=155)
45.3% (155/342)
88 No answer, voicemail available;
27 No answer, no voicemail available;
26 Phone service problem
14 Other reasons

Inaccessible (n=176)
51.3% (176/343)
104 No answer, voicemail available;
21 No answer, no voicemail available;
36 Phone service problem
15 Other reasons

Ineligible
24.9% (85/342)
33 Non-smoker
52 Already Quit

187 telephone numbers
contacted 54.7% (187/342)

167 telephone numbers
contacted 48.7% (167/343)

Ineligible
28.3% (97/343)
30 Non-smoker
67 Already Quit

104 Self-identified smokers 30.4% (104/342)

70 Self-identified smokers 20.4% (70/343)

69 Consented to a Helpline referral
among all contacted phone number 36.9% (69/187)
35 Not interested/refused 10.2% (35/187)

38 Consented to a Helpline referral
among all contacted phone numbers 22.8% (38/167)
32 Not interested/refused 9.3% (32/167)

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Table 1. Characteristics of LADHS patients who were self-identified smokers and randomized to area code

	213 Area Code (n=104)	888 Area Code (n=70)	P value
Age			
<61	67.3	80.0	0.07
>= 61	32.7	20.0	
Median y, (range)	56.5 (21-76)	54 (27-72)	
Gender			
Female	49.0	44.3	0.5
Male	51.0	55.7	
Preferred Language			
English	85.6	82.9	0.6
Spanish	14.4	17.1	

Table 2. Association between area code group and patient factors with consent to an e-referral among smokers contacted.

	Number that agreed to e-referral	Percent that agreed to e-referral	Unadjusted Prevalence Ratio (95% CI) n=174	P Value	Adjusted Prevalence Ratio (95% CI) n=174	P Value
Area Code						
213	69	66.3	1.20 (0.95-1.58)	0.12	1.29 (1.01-1.66)	0.04
888	38	54.3	ref		ref	
Age*						
<61	84	66.7	1.39 (1.01-1.92)	0.04	1.46 (1.07-2.00)	0.02
>=61	23	47.9	ref		ref	
Gender						
Male	57	62.0	1.02 (0.80-1.29)	0.89	1.04 (0.82-1.31)	0.75
Female	50	61.0	ref		ref	
Preferred Language						
Spanish	21	77.8	1.33 (1.04-1.70)	0.02	1.4 (1.07-1.71)	0.02
English	86	58.5	ref		ref	

*Prevalence ratio for age categories under 61 were similar and combined in the model.

Appendix 1: Telephone Script for Helpline Staff Contacting Unassisted Patients who Smoke on Behalf of LADHS

Live:

Can I please speak with (patient name)?

This is _____, I am calling from the Los Angeles Department of Health Services (LA DHS).

I see that you are a smoker, and we would like to help you quit.

We partner with the California Smokers' Helpline who provides free service – both help over the phone and reading materials.

May I share your contact with them so they can contact and enroll you?

Message:

Hello, this message is for (patient name).

I am calling from the Los Angeles Department of Health Services (LA DHS) and I would like to give you more information about how we can help you.

If you can please return my call, our number is 1-888-757-2699 or 1-213-222-4145. Again, the number is 1-888-757-2699 or 1-213-222-4145.

Hope to hear from you soon, thank you and have a great day.

Rationale (if questioned from a patient):

- Quitlines are very successful – double a smoker's chance of successfully quitting.
- Patient can tailor how he/she wants to quit.
- Supportive friendly people who really would like to help you quit and are there when you are ready.
- LA DHS looking to decrease smoking rates.
- Improve health, save lives and money.

Chapter Three: Factors associated with school staff observation of e-cigarettes in Public High Schools in California

ABSTRACT

Importance: Youth from rural areas have a higher prevalence of tobacco use compared with youth from urban areas, but there is limited research specific to e-cigarette use. There is also limited research available on e-cigarette use on school grounds and the presence of policies specific to e-cigarettes.

Objective: To examine the association between urbanicity and school staff observation of e-cigarettes on school grounds.

Design, Setting, and Participants: In 2019, the CDC, California Department of Public Health (CDPH), and California Department of Education (CDE) conducted an assessment of e-cigarette use on school grounds survey between March and May 2019. Online surveys were administered to school staff (n=1,927) in 39 high schools across the state using a convenience sample. Data were linked from the 2019/2020 CDE and 2017/2018-2019/2020 California Healthy Kids Survey (CHKS) to examine additional school-level factors, such as student demographics and student past 30-day e-cigarette use prevalence.

Main Outcome(s) and Measures: The primary outcome was high school staff observation of e-cigarettes on school grounds. Chi-square tests were used to test for differences between urban classification (urban, rural, and suburban). Logistic regression was performed to assess the association between urban location and school staff observation of e-cigarettes on school grounds, adjusted for both individual-level school staff and school-level characteristics.

Results: 40.2% of school staff reported observing high-school e-cigarettes on school grounds, mostly in bathrooms (33.2%), followed by parking lots (23.8%), classrooms (16.1%), and

hallways (14.6%). The majority (89.4%) reported knowledge of a school policy prohibiting the possession, use, and selling of e-cigarettes. No differences were detected between geographic location and the primary outcome in the unadjusted or adjusted model. Multivariable regression showed that schools with an e-cigarette prevalence >20% (adjusted OR=3.7, 95% CI 2.2-6.3) were more likely to observe e-cigarettes on school grounds. Additionally, principals/assistant principals and administrative staff, compared to teachers and other staff, (adjusted OR=4.6, 95% CI 3.1-6.8), males (adjusted OR=1.5, 95% CI 1.2-1.9) and staff who reported e-cigarettes as very/moderately harmful (adjusted OR=2.4, 95% CI 1.4-4.2) were more likely to observe e-cigarettes on school grounds.

Conclusions and Relevance: While the study did not yield statistically significant differences by urban location, the study provides new information on other factors associated with school staff observations of e-cigarette use on high school campuses. Despite most schools having e-cigarette policies, 40.2% of staff reported student e-cigarette use, and student e-cigarette prevalence varied widely from 3.1%-28.5%. Future efforts to curb the youth e-cigarette epidemic might consider strategies to 1) increase awareness about e-cigarette risk, 2) regulate e-cigarette flavors, as most youth report using flavored products, and 3) ensure youth are referred to cessation resources to quit vaping.

INTRODUCTION

The use of electronic cigarettes, which includes vaping products, (e-cigarettes) in youth increased dramatically since 2017 and are now the most commonly used tobacco product among youth.[58] E-cigarette use nationwide increased 135% in high schools and 218% in middle schools from 2017-2019.[58] In California, there was a 26.7% increase in e-cigarette use among high school students from 8.6% in 2016 to 10.9% 2018.[16] E-cigarette use is now considered an

"epidemic" among U.S. youth, and such rapid rise in youth use has raised fears of creating a new generation of nicotine and tobacco users.[4,59] Understanding trends in youth e-cigarette use is important because teens who vape are three times more likely to become daily smokers. [60]

The differences between tobacco use by urban-rural area classification have been well-established, however, differences in e-cigarette use may be less clear. Rural communities have some of the highest smoking rates in California, and rural residents start smoking at an earlier age compared to non-rural residents.[15,61] Rural communities also suffer from higher rates of lung cancer, and smoking causes the majority of these lung cancer cases.[62] In California, youth tobacco use is higher among rural communities compared to city or suburban areas, however, e-cigarette use does not differ by urban-rural classification.[16] The sampling design and sampling size in this California Student Tobacco Survey were not set up for regional analysis and these results need to be interpreted with caution.[16] In a different state, there was a larger increase in student e-cigarette use in rural areas (from 6.7% in 2018 to 13.4% in 2019), compared to urban areas (9.8% to 11.9%).[63] Further, there is little research on school staff observations of e-cigarettes in high schools and the characteristics that might be important for addressing the e-cigarette epidemic in schools.

Historically, schools have played a key role in addressing tobacco use, however, the discreet appearance of e-cigarettes presents an added challenge to tobacco prevention and policy implementation.[64] The discreet appearance of e-cigarettes is a known barrier to identify the origin of vapor or scent from an e-cigarette on school grounds.[64] Research shows schools are the main source where adolescents acquire e-cigarettes and school staff can help in monitoring and influencing student behavior around substance use.[5,65,66] Social norms around tobacco and e-cigarette use are developed from interpersonal relationships that students form at school with

peers.[67] Several researchers have suggested that having a school policy that specifically includes guidelines for e-cigarettes use, paired with a concerned school administrator aware of e-cigarette use as a problem, can impact e-cigarette use on school grounds.[68,69] Little is known about the multi-level factors associated with high school staff observations of e-cigarettes on school grounds and whether there are differences across urban, rural, and suburban areas.

To address these gaps in knowledge, this study examined multi-level factors associated with school staff observation of e-cigarettes on school grounds in urban, suburban, and rural locations. I hypothesize that staff from rural schools are more likely to report e-cigarette use on school grounds compared to urban and suburban schools. The study will also examine the specific locations within the school where school staff saw students using e-cigarettes. California provides a unique setting to examine e-cigarette use in public high schools as a national leader in combating the tobacco industry and limiting youth access.[70] California was the second state to pass a T21 policy in 2016. Further, this information can help develop strategies to curb e-cigarette use.

METHODS

Design

This study was a subset of a broader mixed-methods assessment conducted by the CDPH and the CDE, with assistance from the CDC Office on Smoking to understand the types of e-cigarettes, current school policies, and school staff's awareness, knowledge, and attitudes towards e-cigarette use on school grounds in March and May 2019. The broader study included the collection of surveys, semi-structured interviews, and the collection of confiscated and discarded e-cigarette products. Data from e-cigarette use on school grounds survey were analyzed. Surveys were administered using a convenience, nonrandom sample of high schools

in California. The sampling frame included all public California high schools (n=1,478) defined as traditional, charter, and magnet schools that serve high school students (grade levels K-12, 7-12, 9-12), and 39 public high schools (3%) agreed to participate. Out of 3,767 school staff that were sent the online survey, 2,018 responded (response rate=54%). However, a total of 91 responses were excluded because of incomplete information (n=42), student participant (n=39), or consent was not provided (n=13). A sample of 1,927 school staff surveys (51% of the surveys) from 39 high schools were used in the analysis.

This data was linked to data from the 2019/2020 CDE[71] and the 2017/2018-2019/2020 CDE CHKS[72] by CDS school code, a unique code given to each high school in California, to examine school-level factors. All 39 high schools linked to the CDE data, but 3 schools were missing from the CHKS because they were not included in the survey.

Outcome

To assess school staff observation of e-cigarettes on school grounds, high school staff were asked: "During the past 12 months, have you seen any of the pictured e-cigarette and vaping device products on school grounds?" This question included a generic picture of various e-cigarette products. This question was administered to all staff. E-cigarettes use observed on school grounds by specific location was assessed through the question "Where on school grounds have you seen students use e-cigarettes and vaping devices?" School staff could check all that apply including classrooms, bathrooms, hallways, cafeteria, locker rooms, sports fields, school vehicles, parking lots (may include inside a personal vehicle), or I have not seen a student use e-cigarettes or vaping devices on school grounds.

Covariates

Covariates reflect both individual-level (school staff) and school-level factors that may influence observed e-cigarette use on school grounds.

School staff demographic measures included: gender (male, female), race (coded as white, all other), and school staff position (coded as office staff=principal/assistant principal and administrative staff, classroom staff=teacher, all other). The all other race category combines American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, Filipino, African American, two or more races, and some other race due to small sample size within each of these categories. The all other school staff position category includes school counselor, school nurse, janitorial staff, facilities or maintenance staff, bus driver, or other to create a position category that primarily works outside of the classroom or administrative office setting.

Knowledge of the school's policy regarding e-cigarettes on school grounds was assessed with the following question: "Does your school's policy prohibit the following activities or behaviors regarding e-cigarettes or vaping devices on school grounds? Possession, use, and selling of e-cigarette or vaping devices?" Responses were dichotomized into 1) prohibits the possession of, use of, *and* selling of e-cigarettes or 2) does *not* prohibit the possession of, use of and selling of e-cigarettes, don't know/not sure, and/or prohibits only one or two of the three categories. Knowledge of e-cigarette harm was assessed with the question: "How harmful do you think the use of e-cigarettes and vaping devices are?" Staff were classified as believing e-cigarettes were moderately/very harmful vs. not harmful, don't know or not sure.

School-level measures included school urban classification (rural, urban, and suburban as defined by the National Center for Education Statistics), student enrollment (0-999, 1000+), percentage of students eligible for free and reduced-price meals (FRPM), percentage of students

who were English learners (EL), percentage of students who were Latino, and student past 30 day e-cigarette prevalence (categorized in units of 5: 0-5, 6-10, 11-15, 16-20, 21+). Schools classified as 'city' were categorized as urban, schools classified as 'suburb' were categorized as 'suburban', and schools classified as 'Towns' or 'Rural' were classified as rural. School regions included northern, central, and southern. This information was obtained from the California Department of Education based on the school's county code.

Analysis

The prevalence of reported e-cigarette use on school grounds was estimated by urban-rural location using a chi-square test. Regression models were conducted to assess the differences in urban-rural location (urban, rural, suburban) and observed e-cigarette use on school grounds. Regression models were run unadjusted to get the crude odds ratio (model 1). The individual-level staff variables (position, race, gender, knowledge of e-cigarette policy, attitude about e-cigarette harms) were included in the adjusted model as covariates. The adjusted model also included the school-level variables: region, student enrollment, percentage of students enrolled who are eligible for free or reduced-price lunch, students learning English as a second language, percentage of students who are Latino, and student e-cigarette prevalence. Combined these data assessed whether urban-rural location, individual-level school staff factors, school-level demographics, and/or student e-cigarette prevalence was associated with reported e-cigarette use on school grounds. Clustering of staff from the same school was adjusted using SAS survey procedures to account for the assumption that staff from the same school may be more likely to respond in the same way. All analyses were conducted using SAS 9.4 (SAS, Cary, North Carolina), with statistical significance defined at $p<0.05$.

RESULTS

Less than half (40.2%) of school staff observed e-cigarettes on school grounds in the past year. Figure 1, highlights the most common locations that students were seen using e-cigarettes were in the bathroom (33.2%), followed by parking lots (23.8%), classrooms (16.1%), and hallways (14.6%).

Table 1 displays the individual-level and school-level characteristics of school staff participants. Most respondents were female (64.9%), white (77.9%), and teachers (68.8%). Almost half (45.9%) of schools were in suburban areas, followed by rural (34.1%) and urban areas (20.0%). There was a lower representation of schools from Southern California (19.4%) versus Northern California (37.0%) and Central (43.6%) regions. Most school staff (89.4%) reported that their school had a policy prohibiting the possession, use, and selling of e-cigarettes. Most (92.5%) school staff agreed that e-cigarettes were moderately or very harmful. The student e-cigarette prevalence varied widely from 3.1%-28.5% throughout California high schools, but most schools (93.9%) had a prevalence >20%. The median was 10.1%.

Results from the unadjusted and adjusted logistic regression analysis show that urban-rural location was not associated with the outcome (Table 2). The adjusted model showed that schools with a student e-cigarette prevalence >20% (adjusted OR=3.7, 95% CI 2.2-6.3) were more likely to report school staff observation of e-cigarettes on school grounds. Additionally, principals/assistant principals and administrative staff (adjusted OR=4.6, 95% CI 3.1-6.8), males (adjusted OR=1.5, 95% CI 1.2-1.9) and staff who reported e-cigarettes as very/moderately harmful (adjusted OR=2.4, 95% CI 1.4-4.2) were more likely to observe e-cigarettes on school grounds.

DISCUSSION

Summary

There were no differences in the reported e-cigarette use on school premises by urbanicity, however, other factors were associated with school staff observations of e-cigarettes on high school campuses. A school e-cigarette prevalence greater than 20%, having an administrative position, being male, and considering e-cigarettes harmful were significant predictors of school staff observations of e-cigarettes on campus. Our study shows the majority of the school staff (89.4%) were aware of the school's e-cigarette policy, however, knowledge of a policy was not a significant factor in observing use on school grounds. A national study examining Juul use on school grounds also found that most of the school staff (82.9%) reported an e-cigarette policy in place.[64] This indicates that further efforts are necessary, which may be informed by school staff observations, to then intervene more effectively on the youth vaping epidemic.

It is concerning that 40.2% of the high school staff observed e-cigarettes on school grounds, which coincides with over a third (34.9%) of students who reported observing e-cigarette use by other students on campus.[16] School staff survey observations might help confirm self-reported student e-cigarette observation data on school grounds. On the contrary, there may be some underreporting happening at the student level, given only 3% of California high school students self-reported using e-cigarettes on school grounds.[16] E-cigarettes waste scans in and around the school perimeter can help confirm the use of these products.[73] Another study characterized products confiscated from students to identify top brands in California and North Carolina.[74] These studies identified large proportions of flavored e-cigarette products used on school grounds.[73,74] Garbology projects can be used to engage students and raise awareness about the hazardous health and environmental impacts of e-cigarettes.[73]

Reasons why we did not find a difference in school staff reported e-cigarette use between rural, suburban, and urban schools may include the continuation of the rural use of traditional tobacco products, whereas urban youth are more likely to use emerging products, such as e-cigarettes. Our findings are similar to a national study that found e-cigarettes surged among middle and high school students regardless of the place of residence (rural vs urban).[75] There may also be structural school differences (e.g. parking lot access, bathrooms access during class, open campus lunch policies) between urban and rural schools which make it either easier or harder to observe e-cigarette products at school.

A recent national study suggests e-cigarettes may be breaking down historical patterns of tobacco use by urbanicity.[76] In this study, e-cigarette use by adolescents in urban areas showed a fourfold increase between 2013 (2.42%) and 2014 (8.62%), while use in rural areas increased much more slowly during the entire 2011 (1.92%) to 2014 (4.26%) data period. Strategies used by the tobacco industry marketing may use social marketing approaches that cut across the place of residence. This is especially concerning as teens who vape are three times more likely to become daily smokers.[60, 77]

Most youth who use e-cigarettes use flavors and greater awareness is necessary to protect youth from initiating tobacco use. Community-level and state-level policies that ban the sale of flavored e-cigarettes and limit youth marketing are necessary. California was the 2nd state to pass a T21 policy which changed the sales age to 21 in 2016 and there was still a 26.7% increase in e-cigarette use among high school students from 8.6% in 2016 to 10.9% 2018.[16] In 2020, California's Governor passed a law to prohibit the sale of most flavored tobacco products.[78] Groups affiliated with the tobacco industry filed a referendum on the California flavor ban law. [78] The law is on hold until the 2022 general election referendum vote.[78] In California, youth

tobacco and cannabis use remain high, and it is critical to prevent a new generation of youth from both the tobacco and cannabis industries.[78]

E-cigarettes can be easily concealed and kept from administrators, teachers, and parents making it difficult for school staff to enforce policies.[64] Clearly, knowledge of a policy is not enough and greater emphasis is necessary around school-level policy implementation to ensure youth are connected to quit resources, such as the California Smokers' Helpline. Most (92.5%) school staff agreed that e-cigarettes were moderately or very harmful, however, there may be a need to ensure that parents and students are aware of the harms of e-cigarettes use (e.g. clear, consistent messaging in various modalities, utilization of the Stanford Tobacco Prevention Toolkit[79]). Administrators may want to stress the importance of referring students caught using e-cigarettes to evidenced-based cessation services (e.g. California Smokers' Helpline No Vapes text, chat, or telephone-based services for teens without parental consent). Efforts are needed regardless of rural, suburban, or urban location to help youth quit.

While a higher percentage of school staff observed e-cigarettes on campus if the school-level student e-cigarette prevalence was greater than 20%, the fact that e-cigarette prevalence varied widely from 3.1%-28.5% throughout California high schools highlights a problem. School staff, students, and parents should all be aware of the school's e-cigarette policies and receive education that there is no safe level of e-cigarette use among adolescents.

Limitations

This study had several limitations. 1) The assessment of school staff observation of e-cigarettes on school grounds was a convenience sample of California schools, leading to non-response bias. Schools that participated may be different than schools that chose not to participate (e.g. percentage of English learners, percentage of students on free or reduced-priced

meals). 2) This was not a probabilistic sample and may not be representative of all high schools in California given this study only includes 3% of schools, however, there is geographic representation throughout California. In our study, there was a lower percentage of students on FRPM (39.8% compared to 60.8%), who were EL (7.4% vs. 18.6%) and Latino (43.0% vs. 54.9%) compared to other California schools. The average student enrollment numbers by the school were higher (1,746 vs. 582). In addition, the student past 30-day use student prevalence was higher (11.5% vs. 10.9%) compared to other California schools. 3) We do not include other factors that may influence use on school grounds (e.g., local tobacco control policies, retailer density and proximity to schools, tobacco use norms, and community perceptions). The use of odds ratios in our analysis may overestimate the strength of the association when the outcome of interest is not rare (>10%).[41]

The study used a novel approach to link data sets by CDE school code to account for school-level factors associated with e-cigarette use on school grounds. Research on e-cigarette use on school grounds is scarce, few surveys focus on staff observations of e-cigarette use, and large population health surveys (e.g. California Health Interview Survey) are limited by small sample sizes in rural areas. Understanding factors associated with school staff observations is important to intervene more effectively on the youth vaping epidemic.

CONCLUSIONS

Our study found that 40% of staff reported observing e-cigarettes on school grounds and that student e-cigarette prevalence varied widely from 3.1%-28.5%, despite 89.4% of school staff reporting that their school had a policy prohibiting the possession, use, and selling of e-cigarettes. In addition to school-level policies, stronger regulation of e-cigarettes availability in local communities, youth marketing, and around the product design that makes it appealing such

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as banning flavors are necessary. Future efforts to curb the youth e-cigarette epidemic might

consider strategies to 1) increase awareness about e-cigarette risk, 2) regulate e-cigarette flavors,

as most youth report using flavored products, and 3) ensure youth are referred to cessation

resources to quit vaping.

Figure 1. Percentage of school staff who observed students using e-cigarettes on school grounds, by location.
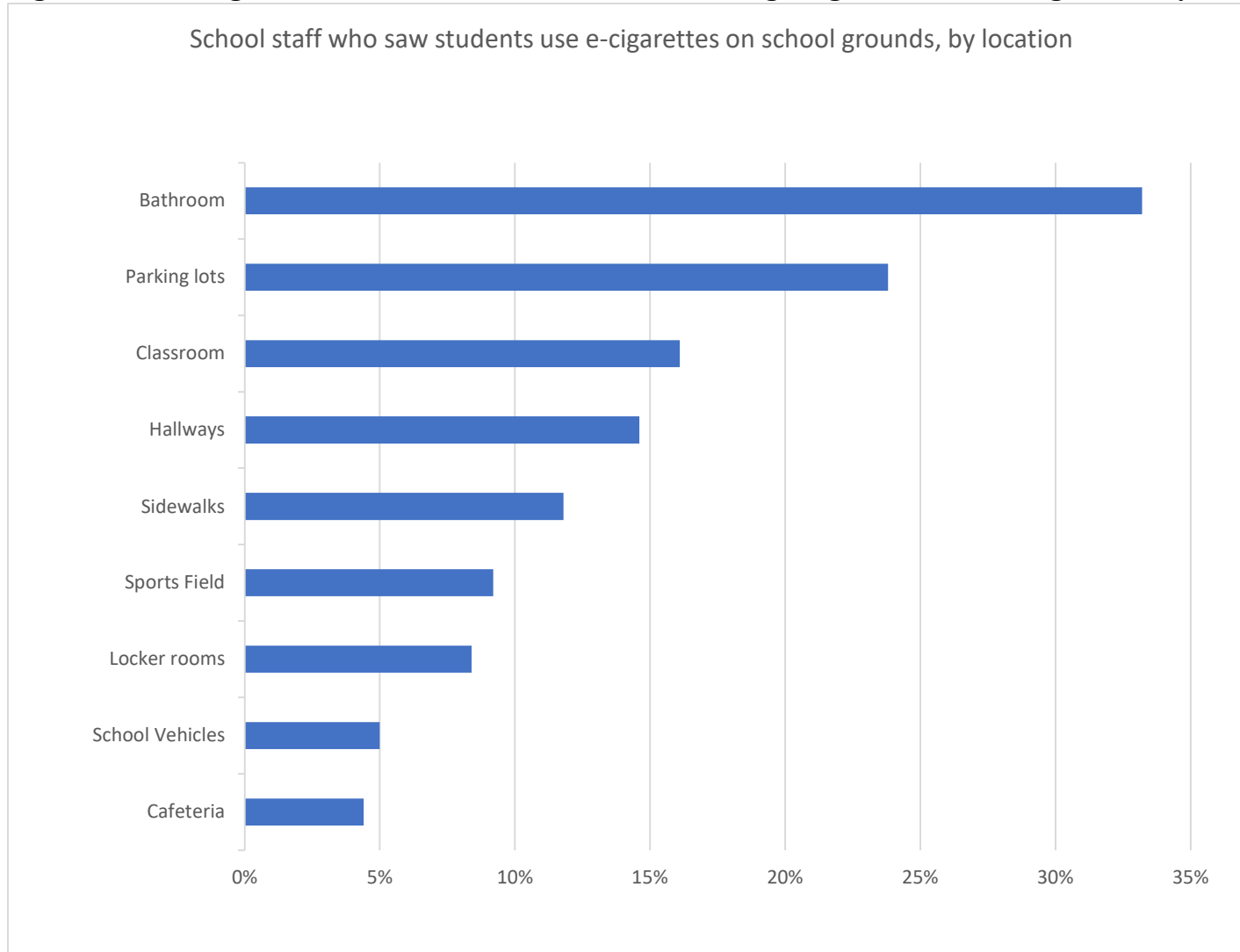

School staff who saw students use e-cigarettes on school grounds, by location

Table 1. Individual-level (school staff n=1,927) and school-level (n=39) characteristics

	n (%)
Individual-level	
Position	
Principal, assistant principal and administrative staff	177 (9.2)
Teachers	1317 (68.8)
All other positions	420 (21.9)
Gender	
Male	649 (35.1)
Female	1199 (64.9)
Race	
White	1271 (77.9)
All other	361 (22.1)
Knowledge of school e-cigarettes or vaping device policy	
Yes	1663 (89.4)
No	197 (10.59)
E-cigarette harm belief	
Moderately/very harmful	1608 (92.5)
Not at all harmful, don't know or not sure	130 (7.5)
School-level	
Urban Status	
Urban	386 (20.0)
Suburban	884 (45.9)
Rural	657 (34.1)
Region	
Northern California	712 (37.0)
Central California	841 (43.6)
Southern California	374 (19.4)
Student Enrollment	
>1,000 students	403 (20.9)
≤1,000 students	1527 (79.1)
Range, Median	37-3259 (1637)
Percent of students eligible for free or reduced-price lunch	
Range, Median	3.5-91.6 (33.6)
Percent of students learning English as a second language	
Range, Median	0.5-27.0 (5.0)
Percent of Latino students	
Range, Median	9.7-99.1 (35.7)
Percent of high school students who currently use e-cigarettes	

≤20%	1688 (93.9)
>20%	110 (6.1)
Range, Median	3.1-28.8 (10.1)

Table 2. Factors associated with observing e-cigarettes on school grounds.

	Percent observing e-cigarettes	Unadjusted OR (95% CI) n=1914	P Value	Adjusted OR[1] (95% CI) n=1367	P Value
Urban Status					
Urban	39.8	ref		ref	
Suburban	40.0	1.01 (0.7-1.4)	0.99	0.9 (0.5-1.7)	0.6
Rural	40.6	1.03 (0.6-1.7)		0.7 (0.5-1.4)	
Position					
Principal, assistant principal, and administrative staff		4.28 (2.92-6.39)	<.0001	4.6 (3.1-6.8)	<.0001
Teachers		ref		ref	
All other positions		1.23 (0.93-1.63)		1.2 (0.9-1.7)	
Gender					
Male		1.45 (1.23-1.71)	<.0001	1.5 (1.2-1.9)	0.0004
Female		ref		ref	
E-cigarette harm belief					
Moderately/very harmful		2.31 (1.60-3.34)	<.0001	2.4 (1.4-4.2)	0.0021
Not at all harmful, don't know or not sure		Ref		ref	
Percent of high school students who currently use e-cigarettes[2]					
≤20%		ref	<.0001	ref	<.0001
>20%		3.01 (2.19-4.14)		3.7 (2.2-6.3)	

[1]Adjusted for position, gender, e-cigarette harm belief, percent of school using e-cigarettes, participant race/ethnicity, school region, school student enrollment size, percentage of students eligible for free or reduced-price lunch, percentage of students learning English as a second language and students who were Latino, and knowledge of a school e-cigarette or vaping device policy.

[2]The student e-cigarette prevalence was assessed in units of 5, however, combined due to similar odds ratios for the other categories.

CONCLUSION

This research contributes to the overall goal of understanding underlying factors contributing to tobacco-related health disparities and identifies strategies to address these disparities by (1) Examining factors associated with Latino and Non-Latino White smokers with Medi-Cal receiving provider advice and assistance in the post-ACA period; (2) Identifying whether a new population-based strategy that leverages existing LADHS tobacco-related metric data can help address disparities in accessing tobacco treatment by the quitline; and (3) Examining differences by urbanicity in observed e-cigarettes on school grounds.

Chapter one was the first study to examine factors associated with Latino vs. NL white smokers on Medicaid reporting less provider advice and assistance in the post-ACA era. Acculturation measures, English language proficiency or birthplace, did not mediate the association between identifying as Latino and provider advice or assistance, however, the number of office visits and smoking intensity are important factors. Health care systems, Medi-Cal managed care plans, and public health partners efforts to increase tobacco treatment support for the Latino community are needed to address this ongoing disparity around Latinos advised and assisted less, compared to white smokers. Future Latino tobacco interventions and population health strategies need to understand the unique smoking behaviors and healthcare utilization practices of low-income Latinos. Community-based engagement and population health proactive outreach strategies can help enhance the visit-based model and increase engagement with the state quitline. The findings may be useful in promoting awareness of these patient-level differences to health providers and in informing the design of more targeted studies that can examine the healthcare system, provider, and patient-level factors in more detail.

In Chapter 2, the proactive outreach telephone-based strategy using a local area code to engage smokers outside of the clinic encounter was feasible and acceptable to connect smokers

to the quitline. Measures of acceptability with verbal consent to an e-referral and high rates of quitline engagement show that this may be a viable option for health care systems, or Medi-Cal managed care plans, seeking to increase patient access to tobacco treatment. Further study is necessary to examine ways to reach more patients and assess long-term outcomes after the interventions. Our study was not powered to detect differences in long-term cessation rates, but the study focus was on the initial recruitment and patient engagement. This proactive outreach strategy may be generalizable for other chronic disease management models and evidence-based treatment beyond those provided by quitlines.

In Chapter 3, our study found that 40% of staff reported observing students e-cigarettes on school grounds and that student e-cigarette prevalence varied widely from 3.1%-28.5%, despite 89.4% of school staff reporting that their school had a policy prohibiting the possession, use, and selling of e-cigarettes. In addition to school-level policies, stronger regulation of e-cigarettes availability in local communities, youth marketing, and around the product design that makes it appealing such as banning flavors are necessary. Future efforts to curb the youth e-cigarette epidemic might consider strategies to 1) increase awareness about e-cigarette risk, 2) regulate e-cigarette flavors, as most youth report using flavored products, and 3) ensure youth are referred to cessation resources to quit vaping.

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