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Estimates of Smoking-Related Property Costs in California Multiunit Housing

Michael K. Ong, MD, PhD, Allison L. Diamant, MD, MSHS, Qiong Zhou, MA, Hye-Youn Park, PhD, and Robert M. Kaplan, PhD

We systematically evaluated smoking-related costs in multiunit housing. From 2008 to 2009, we surveyed California multiunit housing owners or managers on their past-year smoking-related costs and smoke-free policies. A total of 27.1% of respondents had incurred smoking-related costs (mean $4935), and 33.5% reported complete smoke-free policies, which lowered the likelihood of incurring smoking-related costs. Implementing statewide complete smoke-free policies may save multiunit housing property owners $18 094 254 annually. (*Am J Public Health.* 2012;102:490–493. doi:10.2105/AJPH.2011.300170)

Approximately 10.6 million Californians live in multiunit housing (MUH),[1] where units with smoke-free policies can be affected by environmental tobacco smoke morbidity and mortality effects through shared air spaces and ventilation or drifting from outside.[2,3] Lack of information on MUH smoking-related costs (e.g., cleaning, replacement) may contribute to MUH owners' and managers' reluctance to implement smoke-free policies.[4,5] We surveyed California MUH owners and managers to determine (1) the smoking-related costs borne by MUH owners, (2) the smoking-related costs prevented in MUH as the result of smoke-free policies, and (3) the economic benefits of all MUH implementing complete smoke-free policies.

METHODS

Between July 2008 and February 2009, we conducted a computer-assisted telephone interview survey among 343 California Apartment Association (CAA) members who owned or managed MUH, with an overall response rate of 22.4% and an overall cooperation rate of 40.5%.[6] CAA members were randomly selected and were sent presurvey notification letters proportionate to sizes of the 20 regional CAA chapters and to the small and large properties within each chapter (we defined "large" as ≥16 units, which requires an on-site property manager).

We used survey items and categories adapted from the Property Owners and Managers Survey[7] to ask respondents to estimate smoking-related costs beyond standard operations that were incurred during the preceding 12 months for the entire property with the most recently vacated unit. Categories included cleaning, repairs and maintenance, painting and decorating, trash collection, fire damage, property insurance, fire insurance, other insurance, legal costs, administrative costs, and other operating costs. We asked respondents whether the property had a complete smoke-free policy, which was defined as no smoking permitted anywhere on the property, including both in private units and in public (common) places. We then asked those who responded "no" whether any buildings, public places, or units on the property were smoke-free. If yes, we designated the property as having a partial smoke-free policy. If all responses were negative, we designated the property as having no smoke-free policy. Other domains of the survey included property, building, and unit characteristics and personal characteristics and beliefs of the respondent. Poststratification weights for the final sample reflected the overall statewide CAA member sampling frame.

We used Stata version 10.0 (StataCorp LP, College Station, TX) to perform all statistical analyses, using 2-tailed significance levels. We analyzed a zero-inflated negative binomial model[8,9] of property smoking-related costs predicted by

1. smoke-free policy status,
2. the number of units,
3. an on-site owner or manager,
4. rent regulation,
5. shared ventilation,
6. shared furnaces, and
7. respondent smoking status.

We used recycled predictions[10] to estimate the base case and smoke-free scenarios for all California MUH by multiplying the predicted prevalence and amount of smoking-related costs with the total units in structures with ≥2 units in California from the American Community Survey from 2005 to 2007.[1]

RESULTS

One third of properties had a complete smoke-free policy, but nearly half had no smoke-free policy. Small properties had more than a threefold higher rate of having a complete smoke-free policy compared with large properties (Table 1). More than one quarter of properties (27.1%) experienced smoking-related costs; large properties had nearly a threefold higher rate of smoking-related costs compared with small properties.

Among all properties experiencing smoking-related costs (Table 2), the mean cost was $4935. Even after accounting for withheld deposits, the mean cost was $4252. The mean per unit cost was $282, with small properties having higher per unit costs than large

TABLE 1—Predictors of Smoking-Related Costs of Multiunit Housing Property With Most Recently Vacated Unit: California, 2008–2009

Characteristics	Descriptive Analysis			Zero-Inflated Negative Binomial Model	
	Small (<16 Units), No. (%)	Large (≥16 Units), No. (%)	Total, No. (%)	Logistic Model, Coefficient (*P*)	Negative Binomial, Coefficient (*P*)
Total	196 (65.0)	147 (35.0)	343 (100.0)		
Smoking status*					
Never smoker (Ref)	62.7	55.0	60.0	1.0	1.0
Former smoker	33.0	29.0	31.6	–0.138 (.717)	0.562 (.128)
Current smoker	4.3	16.0	8.4	–0.353 (.522)	0.754 (.232)
Number of units at property***				0.004 (.181)	0.004 (.001)
Average (SD)	5.8 (3.5)	100.2 (153.5)	38.8 (93.8)		
Median	5.0	48.0	11.0		
Has units with rent regulation					
Yes	36.2	34.6	35.6	0.212 (.479)	–0.093 (.786)
No (Ref)	63.8	65.4	64.4	1.0	1.0
Building with last vacated unit has central ventilation**					
Yes	20.5	37.8	26.6	0.291 (.584)	0.724 (.021)
No (Ref)	79.5	62.2	73.4	1.0	1.0
Building with last vacated unit has individual furnaces***					
Yes	88.2	70.5	82.0	0.149 (.718)	0.338 (.574)
No (Ref)	11.8	29.5	18.0	1.0	1.0
On-site owner or manager lives at the property***				0.610 (.052)	0.239 (.454)
Owner only	9.6	0.4	6.4		
On-site manager only	10.2	80.4	34.8		
Both owner and manager	5.1	2.3	4.1		
Neither (Ref)	75.1	17.0	54.7	1.0	1.0
Smoke-free policy***					
Complete smoke-free policy (Ref)	44.4	13.4	33.5	1.0	1.0
Partial smoke-free policy	12.0	35.7	20.3	0.857 (.049)	1.015 (.108)
No smoke-free policy	43.7	50.9	46.2	0.722 (.079)	0.252 (.639)
Smoking-related costs***					
Yes	16.6	46.7	27.1		
No	83.4	53.3	72.9		

Note. Weighted analyses only. Significance tests for descriptive analyses compare small and large categories. Reported rates exclude responses coded as missing, don't know, or refused. Regression analyses examined a binary variable for on-site owner or manager. Zero-inflated negative binomial model statistics: $\ln(\alpha) = 0.454$; $P < .001$; $A = 1.575$.
*$P < .05$; **$P < .01$; ***$P < .001$.

properties ($578 vs $87). Properties with complete smoke-free policies experienced smoking-related costs, but less frequently and with lower mean amounts (16.3%, $1866) than did those of properties with partial smoke-free policies (39.7%, $9573) or no smoke-free policies (29.5%, $3425).

Our multivariable analysis showed that the likelihood of incurring smoking-related costs at a MUH property with a complete smoke-free policy was less than half that of those with a partial smoke-free policy (odds ratio [OR]=0.42) or without a smoke-free policy (OR=0.48), although the latter finding was marginally significant at P=.08 (Table 1). Having an on-site owner or manager was also significantly associated with incurring smoking-related costs. We found that smoke-free policy status was not associated with the amount of smoking-related costs; property size and central ventilation were the only significant associations.

We estimate that there are 104 237 California MUH properties, on the basis of 4 044 387 California MUH units[1] divided by our survey's mean MUH units per property (38.8). Eliminating all smoking-related costs from the 27.1% of MUH that experience them would save each of the 28 248 properties $1339, for a total amount of averted smoking-related costs in 1 year of $37 824 296. MUH with complete smoke-free policies incur smoking-related costs, but at a lower prevalence rate (19.1% vs 27.1%) and overall amount ($991 vs $1339) than do MUH properties without complete smoke-free policies. If all MUH properties had complete smoke-free policies, 8339 properties would not experience smoking-related costs, and 19 909 properties would each save $348, resulting in

TABLE 2—Past-Year Operation Costs for Multiunit Housing Property With Most Recently Vacated Unit, by Smoking Policy: California, 2008–2009

Property by Smoking Policy	Median, $	Min, $	Max, $	Weighted, $, Mean (SD)
All properties				
Overall cost	64 400	90	2 262 500	167 655 (320 836)
Smoking-related cost	2000	50	84 000	4935 (11 334)
Withheld deposit	200	0	13 000	683 (1508)
Smoking-related cost minus withheld deposit	1000	−2600	83 200	4252 (10 945)
Completely smoke-free				
Overall cost	48 600	3805	1 441 000	182 159 (437 521)
Smoking-related cost	2400	100	8500	1866 (2706)
Withheld deposit	0	0	2400	244 (568)
Smoking-related cost minus withheld deposit	800	0	8000	1623 (2560)
Partially smoke-free				
Overall cost	147 333	300	765 000	245 203 (233 226)
Smoking-related cost	3400	225	84 000	9573 (18 914)
Withheld deposit	288	0	13 000	914 (2206)
Smoking-related cost minus withheld deposit	1998	0	83 200	8659 (18 204)
Never smoke-free				
Overall cost	54 051	90	2 262 500	116 129 (308 434)
Smoking-related cost	2000	50	27 000	3425 (5273)
Withheld deposit	200	0	5400	723 (1224)
Smoking-related cost minus withheld deposit	1000	−2600	25 500	2703 (5311)

total averted smoking-related costs in 1 year of $18 094 254.

DISCUSSION

To our knowledge, our study is the first systematic estimate of MUH smoking-related costs that are not fully compensated for by withheld deposits. Our findings suggest that MUH owners should expect significant savings from implementing complete, but not partial, smoke-free policies. However, we cannot determine from this cross-sectional survey whether MUH incurs smoking-related costs despite complete or partial smoke-free policies owing to recent transitions to smoke-free policies or as the result of enforcement problems. As far as we know, this study provides the first representative perspective on MUH by evaluating both small MUH (overlooked in previous studies[4,5]) and large MUH. Small MUH has a higher prevalence of complete smoke-free policies, which may be a secondary response to their higher per unit smoking-related costs compared with those of large MUH.

Our response rate (22.4%) is similar to internal CAA survey response rates. This survey was also suspended while in the field by the governor's executive order S-09–08 as a result of the state's budget crisis, which may have affected response rates, although findings were similar for those who responded before and after the survey suspension. Our study's self-reported costs may be subject to recall bias, but respondents were notified before the survey that they would be asked about property costs, and they provided reasonable responses to the detailed financial questions. We focused on the costs generated by smoking MUH renters and not condominium MUH because many smoking-generated costs may not become apparent until turnover or vacancy of the unit.

MUH smoking-related cost savings, combined with averted health care utilization, morbidity, and mortality from reduced environmental tobacco smoke exposure, suggest substantial benefits from the implementation of complete smoke-free policies in MUH. ■

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Contributors

M. K. Ong conceptualized and supervised the study and led the writing of the article. Q. Zhou conducted the analyses and assisted with the writing. A. L. Diamant, H.-Y. Park, and R. M. Kaplan assisted with the study, analyses, and writing.

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Human Participant Protection

This study was approved by the institutional review board at the University of California, Los Angeles, and complied with the Principles of Ethical Practice of Public Health of the American Public Health Association.

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Adolescent Health and Harassment Based on Discriminatory Bias

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Is harassment based on personal characteristics such as race/ethnicity, sexual orientation, religion, or disability more detrimental than general harassment? In 2 large population-based studies of adolescents, more than one third of those harassed reported bias-based school harassment. Both studies show that bias-based harassment is more strongly associated with compromised health than general harassment. Research on harassment among youths rarely examines the underlying cause. Attention to bias or prejudice in harassment and bullying should be incorporated into programs and policies for young people. (*Am J Public Health.* 2012;102:493–495. doi:10.2105/AJPH.2011.300430)

In adolescence, discrimination often takes the form of school harassment or bullying, but studies rarely consider prejudice as a motive underlying bullying.[1] Racial/ethnic discrimination is associated with distress and compromised academic performance.[2–4] Similarly, anti-gay, anti-lesbian, and anti-bisexual harassment is linked to health risks,[5–7] and youths with disabilities report frequent victimization.[8] Previous studies have highlighted the health-compromising effects of discriminatory harassment. They have not, however, compared bias-based harassment with general harassment or examined multiple forms of bias. We addressed these issues in 2 population-based studies and compared the health implications of bias-based harassment and general harassment.

METHODS

We analyzed data from the 2008–2009 Dane County (Wisconsin) Youth Assessment (DCYA) and the 2007–2008 California Healthy Kids Survey (CHKS). Participants and measures are described fully on the DCYA (http://www.danecountyhumanservices.org/Family/Youth/youth_assessment_2009.aspx) and CHKS (http://chks.wested.org) Web sites. Using logistic regression, we estimated and compared the odds of reported dichotomized health risk indicators separately for youths who reported no harassment, general harassment in the absence of bias, and bias-based harassment. Odds were adjusted for basic demographic characteristics.

Harassment

The DCYA asked youths how often they had been bullied, threatened, or harassed at school in the preceding 12 months because they were perceived as gay, lesbian, or bisexual (GLB) or because of their race/ethnicity. The CHKS asked about these issues and gathered data on harassment based on religion, gender, and physical or mental disability (past 12 months). These data were recoded into binary indicators of bias-based harassment.

With respect to general harassment, the DCYA asked how frequently youths had been verbally and physically harassed at school in the preceding 30 days and how frequently they had been harassed "about how [they] look" or harassed via the Internet or text messages in the preceding 12 months ($\alpha=0.85$). The CHKS asked young people questions regarding rumor spreading, physical and sexual harassment at school, and harassment related to their appearance, how they talked, or "any other reason" in the preceding 12 months ($\alpha=0.77$). Those who reported these types of harassment but not bias-based harassment were the non-bias-based harassment group.

Outcomes

The DCYA and CHKS assessed substance use in the preceding 12 months and the preceding 30 days, respectively. Youths were asked about smoking and alcohol, marijuana, and inhalant use; CHKS youths were also asked whether they had ever used methamphetamines (0=never, 1=ever). In both surveys, youths were asked whether they had driven while they were drunk or had been a passenger in a car driven by an intoxicated adult or teenager in the preceding 12 months. Youths reported whether a boyfriend or girlfriend had ever purposefully hit, slapped, or physically hurt them (in the DCYA) or had done so in the preceding 12 months (in the CHKS).

In both surveys, youths were asked whether, in the preceding 12 months, they felt "so sad or hopeless almost every day for 2 weeks or more that [they] stopped doing usual activities." The DCYA asked youths whether they had thought seriously about killing themselves in the preceding 30 days and whether they had attempted to kill themselves in the preceding 12 months.

Youths were asked about their grades (0=mostly Bs and Cs or above, 1=mostly Cs or below) and how often they had been truant in the preceding year (CHKS) or 4 weeks (DCYA; 0=never, 1=ever). The CHKS asked how often on school property youths had been threatened or injured with a weapon and had had property stolen or deliberately damaged in the preceding 12 months (0=never, 1=ever).

RESULTS

Among youths reporting harassment, 35.8% (DCYA) and 40.3% (CHKS) reported bias-related harassment. In the DCYA, 15.5% of the sample reported GLB-based harassment, and