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Cohort study of smoke-free homes in economically disadvantaged communities in the Dominican Republic

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Abstract

Objective—To analyze household smoking bans over time and predictors of bans among communities in the Dominican Republic, historically a significant tobacco-growing country with few tobacco control regulations.

Methods—Baseline (2004) and follow-up surveillance surveys (2006, 2007) (each $n > 1\ 000$ randomly selected households) conducted in six economically disadvantaged communities (three tobacco-growing and two each urban, peri-urban, and rural) assessed household members' demographics, health status, and household characteristics, including smoking restrictions.

Results—Between 2004 and 2007, household smoking-ban prevalence increased in all communities (24%–45%). Households with smokers (versus those without) adopted bans at lower rates (6%–17%; 35%–58%). Logistic regression models demonstrated that allowing smoking in nonsmoking households was more likely in tobacco-growing communities, Catholic households, and those with a member with a cardiovascular problem. Having a child under age 5 or a member with a respiratory condition was not significantly related to establishing smoking bans.

Conclusions—Prevalence of households banning smoking increased in all communities but remained well below rates in industrialized countries. For low- and middle-income countries or those early in tobacco control, small awareness-raising measures (including surveillance activities) may lead to significant increases in household-ban adoption, particularly among nonsmoking households. Increasing household-ban prevalence may affect community norms that can lead to greater adoption. Having household members who smoke and being in a tobacco-growing community may mitigate the establishment of household bans. Increasing individuals' knowledge

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about the far-reaching health effects of secondhand smoke exposure on children and nonsmoking adults (healthy or unhealthy) may help overcome these obstacles.

Keywords

Tobacco smoke pollution; Dominican Republic

Rates of smoking and associated secondhand smoke (SHS) exposure are increasing globally, with the greatest increases occurring in low- and middle-income countries (LMICs) (1). Further reducing SHS exposure is a basic tenet of tobacco control to reduce the prevalence of smoking, establish regulations restricting tobacco use in workplaces and public areas, and promote smoke-free homes (2–6). SHS exposure affects morbidity and mortality among nonsmoking adults (development of lung cancer and cardiovascular problems) and children (increased risk of Sudden Infant Death Syndrome (SIDS), acute and chronic respiratory problems, and ear problems) (3–7). The U.S. Surgeon General's report cites the home as the primary site of major SHS exposure (7–9). Home smoking bans are directly associated with better health status (9–11) and represent another mechanism to reduce the differential exposure and increased vulnerability experienced by disadvantaged populations (12).

While regulations can limit or eliminate SHS exposure outside the home, regulating exposure inside homes is the household's purview. U.S. tobacco control efforts promoting smoke-free homes have led to increases in household bans. The Tobacco Use Supplement to the Current Population Survey compared data on household smoke free rules between 1992 and 2003 (4). This continuous monthly household survey conducted by the U.S. Census Bureau for the Bureau of Labor Statistics of the U.S. civilian, noninstitutionalized population queries respondents (> 14 years old) about smoking inside the home. By 2003, 72.2% of households surveyed ($n = 127\ 332$) across the 50 states and the District of Columbia reported being smoke-free (not allowing smoking anywhere inside the home); an increase of 67.1% from the 1992–1993 rate of 43.2% (4). In addition, the 2008 Behavioral Risk Factor Surveillance Survey, a state-based, random-digit-dialed telephone survey conducted among a similarly defined group of adults older than 17 years, reported household smoke-free bans across 11 participating states. Nonsmokers were more likely to report a complete household ban (median: 87.7%) compared to smokers (45.0%) (13).

This trend is not unique (14); the International Tobacco Control (ITC) Four Country Survey found similar trends in other English-speaking countries (15). Among the more than 9 000 randomly selected smokers, household bans increased between 2002 and 2003 to 19.0%, 31.5%, and 43.1% in Canada, United Kingdom, and Australia respectively. The presence of children and nonsmoking adults increased the likelihood of a home being designated as smoke-free. Subsequent studies reconfirmed these findings (16–20).

The Dominican Republic (DR) is historically a significant tobacco-growing LMIC and remains the only Latin American or Caribbean country that has not signed onto the Framework Convention on Tobacco Control (2). This lack of national action on tobacco control is consistent with the limited national or local tobacco control regulations despite increasing tobacco-related morbidity and mortality rates (21). Although DR regulations limiting SHS exposure in public or work areas were enacted in 2000, awareness of any

restrictions was virtually absent (21–22). No awareness campaigns about the deleterious effects of tobacco use on the smoker or of SHS on the nonsmoker have been conducted. In 2003, during the initial (qualitative) phase of the study reported herein, community members across six economically disadvantaged communities described places where smoking was not allowed (e.g., local businesses (manager decision), selected public places (e.g., churches), and public transportation) out of “*respeto*” (respect) for others. These actions represented community self-regulation rather than adherence to governmental regulations (21). Few community members mentioned passive smoking (SHS) or household restrictions during the 2003 interviews. Individuals choosing to smoke outside did so to hide their smoking, not to reduce other’s SHS exposure. This lack of knowledge is consistent with elevated risk exposure (12).

Despite the above history, there are no published studies of household smoking bans in the DR or Caribbean. This report provides the first analysis of household ban prevalence over time and associated factors among economically disadvantaged DR communities.

MATERIALS AND METHODS

These analyses used data drawn from a larger study of tobacco cessation in the DR known as “Proyecto Doble T” (Project Double T; with “T” standing for technology and tobacco). It began with formative research about tobacco attitudes and practices in six economically disadvantaged DR communities, followed by household and smoker surveillance surveys (21–23). Post-survey, the U.S.-DR research team deployed a multifaceted intervention in the three intervention communities to raise awareness about the health effects of smoking (posters, fairs, community *charlas* (talks)) and to provide cessation resources (e.g., training local intervention specialists and both para/professional health care workers) (23, 24). The intervention was replicated in control communities following a one-year comparison period. The cessation intervention was not specifically designed to promote household smoking bans.

Household surveillance data were collected systematically in six communities (two small urban, two peri-urban,⁶ and two rural; within each pair, one was tobacco-growing and one was not, and one was a control and the other an intervention site). Data collection occurred in 2004 (Year 1) and was repeated in 2006 (Year 2) post-intervention, and again after the control communities received the intervention (2007; Year 3). Initial analyses of household smoking bans included all periods, with subsequent analyses limited to Year 1 and Year 3 (SAS/STAT software, version 9.1.3, SAS System for Windows, SAS Institute, Cary, NC, USA).

As described in Ossip-Klein et al. (2008) (23), the surveillance survey included 170–175 households per community (Year 1, 1 052 homes; Year 2, 1 040 homes; Year 3, 1 048 homes). All three waves used the same procedures (randomly selected households approached by trained, DR-paid data collectors). In Year 1, 207–241 households per community were approached for a completion rate of 73%–85%; Year 2 covered 201–250

⁶A peri-urban community is one with an urban structure but in a remote location.

households per community (71%–87%) and Year 3 covered 183–222 households per community (78%–96%).

First-wave households (2004) were not systematically included or excluded from subsequent waves. As each wave represented less than 10% of available households, inclusion in subsequent surveys was unlikely. Interviews were conducted with the first available adult member (≥ 18 years old) who could respond to questions regarding basic household demographics, tobacco use, and health conditions of all adult household members.

Measures

The survey item to assess smoke-free home practices was adapted from the ITC policy survey (24). Modifications were implemented for the current project based on pretesting to ensure that the item would be readily understood by the population. The question used to assess household smoking restrictions (English translation) was “Which of the following best describes smoking in your household?” (possible responses: “Smoking is allowed in your home”; “Smoking is never allowed in your home”; “Smoking is allowed in your home for some people”; “Smoking is allowed in your home just in some places”; and “Other”). Additional survey items were drawn from multiple standard questionnaires and translated into Spanish using a back-translation method (25).

Analyses

Descriptive analyses of sample characteristics included test for trend. Subsequent bivariate analyses (chi-square and Student *t*-tests) of changes in household bans and multivariate analyses (logistic regressions) were undertaken to identify factors associated with household bans. Model fit was assessed using the Pearson method. To protect respondent anonymity the analyses used only de-identified household data. Verbal consent and survey administration procedures, developed and approved by institutional review boards/independent ethics committees in the United States and the DR, were used (26).

RESULTS

Household characteristics from the three survey periods varied (Table 1). The prevalence of households with at least one household member who smoked declined significantly over time between Years 1 and 3 (38.6%–30.6%; $P < 0.0001$) but still accounted for more than 30% of households surveyed. More than 20% of households had a member with a respiratory illness at each time period (23.3% to 27.8% to 23.8%; NS) while those with a member with a cardiovascular problem increased significantly (32.7% to 40.5% to 40.9%; $P < 0.0001$). More than 80% of the households were Catholic, with a decline over the three periods from 89.2% to 85.6% to 83.4% ($P < 0.001$). No other significant differences were found.

For analytical purposes, and to focus on the target behavior of household smoking ban, responses to the question “Which of the following best describes smoking in your household?” were dichotomized into “No smoking allowed” and “Any smoking allowed.” Aggregating households across all communities, those reporting a total smoking ban increased from 23.9% at Year 1 (baseline) to 35.9% at Year 2 and to 45.3% at Year 3. As

depicted in Table 2, these differences were significant ($P < 0.0001$; test for trend) comparing across the three years.

Comparisons by community type (urban, peri-urban, and rural) at Year 1 revealed smoking bans in place among 21.9%–27.5% of households, with significant increases in household-ban uptake in all communities by Year 3 ($P < 0.001$). While this increase was lowest among rural communities (36.6%), ban prevalence in urban and peri-urban communities at least doubled (48.4% and 53.6% respectively). Between-community differences were not significant (data not shown), so subsequent analyses used data aggregated across community type.

Statistically significant increases ($P < 0.0001$) were found for both intervention and control community households (data not shown). As expected, a difference of differences analysis was not significant comparing intervention and control conditions between Years 1 and 2 because the intervention did not focus on passive smoking or smoke-free homes. Therefore, subsequent analyses used data aggregated across intervention conditions.

Additional chi-square analyses compared the presence of household smoking bans based on being in a tobacco-growing community or not. Initially, only 19.6% of households in a tobacco-growing community had bans, compared to 28.2% in non-tobacco-growing communities. Both groups increased significantly by Year 3, with larger increases occurring in non-tobacco-growing communities (Year 3: 59.8% versus 30.8% in tobacco-growing).

Comparisons between households with or without a smoker (irrespective of community) demonstrated significant differences in allowing smoking (Table 2). While statistically significant increases in the presence of a household ban were found in both groups ($P < 0.0001$) including in high-risk (smoker) homes, the actual difference in proportion of households with such a ban was striking. For example, by Year 3, 57.7% of households without a smoker had smoking bans, compared to only 16.7% among households with a smoker ($P < 0.0001$). A difference of differences analysis confirmed the absence of any intervention effect within the smoker households or the nonsmoker households (data not shown). Subsequent analyses were undertaken separately for households with and without a smoker.

The final analyses focused on factors associated with households allowing any smoking (under any circumstance) versus households with complete smoking bans. Five household and one community variable were examined based on prior research (16–18) and the qualitative findings (19). These variables included: religion (“Catholic” versus “not Catholic,” with the latter group including those who did not answer the question and those who provided the following responses: “Adventist,” “Evangelist,” “voodoo,” “don’t know,” and “none”); presence of at least one household member < 5 years old or > 64 years old; household member with a respiratory condition (aggregate variable included asthma, cough, and pulmonary or respiratory problem); and member with a cardiovascular problem (heart disease and/or hypertension). The one community characteristic was: “tobacco-growing.”

Table 3 depicts the distribution of these characteristics stratified by households with and without a smoker for both Years 1 and 3, comparing those with and without household

smoking bans. Among households without a smoker, those that allowed smoking were more likely to be in tobacco-growing communities (48.4%) relative to those with a ban at Year 1 (39.5%; $P < 0.05$). This significant difference increased in Year 3, when nearly two-thirds of households that allowed smoking were in tobacco-growing communities (61.8%) compared to only 29.3% of those that had bans ($P < 0.001$). At Year 3, households without a smoker but allowing smoking were also more likely to have a member with a cardiovascular problem (44.9% versus 32.2%; $P < 0.001$) and were more likely to be Catholic (87.3% versus 77.5%; $P < 0.001$).

For the households with a smoker the only significant difference found in Year 1 was that 27.5% of households without a ban had a household member with a respiratory condition, compared to only 8.0% among households with bans ($P = 0.032$) (Table 3). No significant differences were found at Year 3.

All six variables were entered into full logistic regression models to identify factors associated with allowing household smoking. For households without a smoker, both Year 1 and Year 3 models demonstrated good model fit (based on the Pearson chi-square test) and significant associations (Table 4). At Year 1, being in a tobacco-growing community was the only variable significantly associated with allowing household smoking (odds ratio (OR): 1.46; 95% confidence interval (CI): 1.04, 2.07).

The OR increased at Year 3, when being in a tobacco-growing community made it more than three times more likely that a household would allow smoking (OR: 3.75; 95% CI: 2.71, 5.20). Also, at Year 3, Catholic households and the presence of someone with a cardiovascular problem were both associated with increased likelihood that smoking would be allowed (1.87, 95% CI: 1.20, 2.90; 1.77; 95% CI: 1.24, 2.53; respectively).

Among households with a smoker, no significant associations and poor model fit were found for both Year 1 and Year 3 (data not shown). This may be due to the relatively small number of households in this subgroup that banned smoking.

DISCUSSION

The prevalence of household smoking bans among six economically disadvantaged communities in the DR increased from 23.9% in Year 1 to 45.3% two years later. While promising, there remains considerable room for improvement across all communities, as more than half of the participating households continued to allow smoking with some or no restriction, well below rates in industrialized countries (5, 6).

The observed increase in bans occurred in the absence of any national or local tobacco control activities outside of the study project. Since the project did not focus on household smoking bans or passive smoke exposure, the uptake of bans was, as expected, non-differential between intervention and control communities. Given the absence of prior community interventions related to passive smoke, asking the question in the surveillance survey about having a household ban (along with multiple other questions regarding tobacco and health risks) may have itself raised awareness about the option of banning household smoking. This phenomenon has been described by others (27–28). Increases also differed by

type of community and by whether any household member smoked. Over time, while households with and without a smoker increased in the prevalence of household bans, after two years prevalence of bans was dramatically higher among households without a smoker.

In households with a smoker, despite small but significant increases in smoking bans, no factor had any consistent association whether predictive or protective on allowing household smoking. This finding, consistent with previous studies (29–32) reaffirms that having a smoker in the house may mitigate the establishment of these bans. In contrast, Binns et al. (18) found that a ban was more likely if the smoker lived with a nonsmoker or with a child under age 5.

In examining only households without a smoker, being located in a tobacco-growing community was strongly associated with allowing smoking at Year 1. While being in a tobacco-growing area likely detracts from tobacco control efforts (15, this study demonstrates its specific mitigating influence on home smoking bans.

While not significant at Year 1, several findings have implications for future interventions at the community and national levels, particularly in relation to the general population's awareness of the broad impact of smoking on both healthy and unhealthy adults. Having a household member with a cardiovascular problem was strongly associated with allowing household smoking even when controlling for the presence of an older household member. While it may seem counterintuitive that smoking would be allowed in a nonsmoking household, even in the presence of someone with a cardiovascular problem, individuals with a cardiovascular problem may be former smokers, so the household may simply be continuing its previous practice of allowing smoking. Community members' general lack of awareness of smoking's impact on cardiovascular health is consistent with this view (20, 22). Alternatively, those household members may have friends who smoke. Several authors noted that external factors (e.g., prevalence of friends or visitors who smoke or have cravings) may decrease the establishment of complete home smoking bans (19–20, 29–32). Finally, increased cardiovascular disease prevalence disease may have been a consequence of SHS exposure in homes with no ban (19). Understanding the far-reaching health impacts of SHS exposure is an important missed intervention opportunity that could lead to greater prevalence of household ban implementation.

Contrary to previous studies (11, 17, 19–20), in this study, having children or someone with a respiratory problem in the home did not influence household bans. This result, which was similar to Ji et al.'s finding among urbanized Chinese households (30), underscores the need for awareness-raising on the harms of SHS to increase the prevalence of home-smoking bans and reduce SHS exposure among children and nonsmoking adults.

The relationship between religion and household smoking bans has not been previously identified. Being Catholic was associated with allowing household smoking even among households without a smoker. Based on the qualitative work conducted for this project, this may be attributable to the strong anti-smoking messages promulgated by the other prevalent religions in the DR (Adventist and Evangelical). Religion and religious beliefs do not feature prominently in findings from other research on home smoking bans (17–20, 29–32).

Study limitations and strengths

The major limitation of this study is reliance on self-report by the household member interviewed. Respondents may have provided socially acceptable responses. Given the prevalence of smoking, lack of tobacco control initiatives, and low awareness of smoking's health effects, it is not clear which responses would be considered socially acceptable in these communities. In addition, while it is likely that some of the findings are applicable to other disadvantaged DR or Caribbean communities, caution is warranted to not overgeneralize.

The major strength of this exploratory analysis is its surveillance in understudied disadvantaged communities in a historically tobacco-growing country with limited tobacco control initiatives. The focus on disadvantaged communities within an LMIC provides an opportunity to address health disparities within vulnerable populations who bear the greatest brunt of the tobacco epidemic (12). The finding that smoke-free homes increased in these communities demonstrates that this type of change is feasible and initial results can be achieved without significant effort. The use of local data collectors, rigorous sampling and surveillance techniques, and building local capacity for tobacco control provided for adequate numbers of participating households for analysis (23). The study results also documented key differences in household smoking bans between households with and without a smoker, and across community types, and demonstrated the potential ripple effect of a smoking cessation project on home smoking restrictions.

Conclusion

In communities with no prior tobacco control initiatives, the prevalence of households banning smoking increased to nearly 50% overall, possibly due to the surveillance process itself. While households with and without a member who smoked were more likely to report smoking bans over the course of the study, a more dramatic increase was found among those without smokers. This is encouraging for an LMIC such as the DR that devotes few national resources to tobacco control. For communities in an LMIC (and by extension LMICs) in the early stages of tobacco control initiatives, small measures may have large effects. Including a question about household bans on health surveys or providing information at health fairs or through other media may lead to significant increases in the prevalence of smoking bans, particularly among nonsmoking households. Given the newly discovered relationship between smoking bans and religion, partnering with or outreach through churches should also be considered.

This study also highlights the far-reaching effect of being in a tobacco-growing community, underscoring the challenge of implementing tobacco control interventions such as household smoking bans within that environment. Consistent with the role of social determinants on health among disadvantaged populations (12), across all households, lack of knowledge about the harmful health effects of smoking appeared to influence whether household bans were established. Programs specifically designed to encourage discussion of the detrimental health effects of SHS on children and adult nonsmokers (healthy and unhealthy) may be essential to increase further the prevalence of household smoking bans. These may need to be specifically tailored for tobacco-growing communities.

Establishing smoking bans in households with smokers represents a separate challenge. Where tobacco control initiatives are few, interventions specifically designed to target homes with smokers may be warranted.

Given these promising findings, the DR is encouraged to implement policies and programs to promote the establishment of household smoking bans. While different strategies may be needed for homes with smokers, increasing bans among households without a smoker may lead to changes in community norms, which in turn may influence ban establishment in households of smokers.

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Characteristics of households responding to survey before and after tobacco cessation intervention in six economically disadvantaged communities, Dominican Republic, 2004–2007

TABLE 1

Characteristic	Pre-intervention (Year 1; baseline) (n = 1 052)		Post-intervention I (Year 2) (n = 1 050)		Post-intervention II (Year 3) (n = 1 048)		P (test for trend)
	No.	%	No.	%	No.	%	
Has at least one member who:							
Smokes	406	38.6	346	33.0	321	30.6	0.0001
Has respiratory condition ^a	245	23.3	292	27.8	249	23.8	0.4005
Has cardiovascular problem ^b	344	32.7	425	40.5	429	40.9	<0.0001
Is < 5 years old	259	24.6	302	28.8	274	26.2	0.2174
Is > 64 years old	288	27.4	284	27.1	286	27.3	0.4822
Household religion is Catholic	938	89.2	899	85.6	874	83.4	0.0002
In tobacco-growing community	525	49.9	523	49.8	525	50.1	0.9479
Mean number of individuals (standard deviation)	3.7	(2.04)	3.8	(2.11)	3.6	(1.93)	0.3277

^a Asthma, cough, or pulmonary or respiratory problem.

^b Heart disease or hypertension.

Characteristics of households prohibiting all smoking (total smoking ban) in six economically disadvantaged communities based on three surveys for tobacco cessation research, Dominican Republic, 2004–2007^a

TABLE 2

Characteristic	Year 1 % (Total N) ^b	Year 2 % (Total N)	Year 3 % (Total N)	P (test for trend)
All households with ban	23.9 (1 037)	35.9 (1 040)	45.3 (1 026)	< 0.0001
Household bans by community type				
Rural	21.5 (349)	33.2 (350)	36.7 (343)	< 0.001
Peri-urban	22.8 (342)	32.0 (347)	45.9 (349)	< 0.0001
Urban	27.5 (346)	42.6 (343)	53.6 (334)	< 0.0001
Household bans by tobacco-growing community status				
Not tobacco growing	28.2 (521)	43.0 (519)	59.8 (513)	< 0.0001
Yes tobacco growing	19.6 (516)	28.8 (521)	30.8 (513)	< 0.0001
Household ban by whether any member smokes				
No one smokes	35.2 (634)	48.2 (695)	57.7 (711)	< 0.0001
Yes someone smokes	6.2 (403)	11.0 (345)	16.7 (312)	< 0.0001

^aYear 1 baseline survey conducted in 2004, Year 2 in 2006, and Year 3 in 2007.

^bTotal N = total households for that category (e.g. 23.9% of 1 037 total households; 21.9% of 342 Rural households)

TABLE 3
 Characteristics of households with and without a smoker in six economically disadvantaged communities based on two surveys (Year 1 (baseline) and Year 3) for tobacco cessation research, Dominican Republic, 2004–2007^a

Characteristic	Year 1 (n = 634 ^b)			Year 3 (n = 711 ^c)		
	No.	%	P	Smoking allowed (n = 223)	Smoking not allowed (n = 301)	Smoking not allowed (n = 410)
Among households without a smoker						
Has at least one member who:						
Has respiratory condition	88	21.4	0.818	66	21.9	17.3
Has cardiovascular condition	130	31.6	0.317	135	44.9	32.2
Is < 5 years old	102	24.9	0.356	84	27.9	27.6
Is > 64 years old	99	24.1	0.262	75	24.9	23.7
Household religion is Catholic	360	87.6	0.076	262	87.3	77.5
In tobacco-growing community	199	48.4	0.031	186	61.8	29.3
	(n = 378)			(n = 257)		(n = 52)
Among households with a smoker						
Has at least one member who:						
Has respiratory condition	104	27.5	0.032	81	31.2	36.5
Has cardiovascular condition	139	36.8	0.631	123	47.3	55.8
Is < 5 years old	86	22.8	0.750	58	22.3	23.1
Is > 64 years old	131	34.7	0.344	93	35.8	28.9
Household religions is Catholic	357	94.4	0.226	233	90.7	82.7
In tobacco-growing community	216	57.1	0.615	169	65.0	73.1
	(n = 403 ^d)			(n = 257)		(n = 52)

^aYear 1 survey conducted in 2004 and Year 3 in 2007.

^bHouseholds Missing values = 12; 1 additional household missing values for “Has at least one member who is < 5 years old” and “Household religion is Catholic.”

^cHouseholds Missing values = 14; 2 additional households missing value for “Household religion is Catholic.”

^dHouseholds Missing values = 3.

^eHouseholds Missing values = 9; 3 additional households missing value for “Household religion is Catholic.”

TABLE 4

Models for allowing smoking among households without a smoker in six economically disadvantaged communities, based on two surveys (Year 1 (baseline) and Year 3) for tobacco cessation research, Dominican Republic, 2004–2007^{a,b}

Characteristic ^c	No smoker in home Odds ratio (CI ^d)	
	Year 1 (n = 632)	Year 3 (n = 709)
Household member		
Has cardiovascular problem	1.14 (0.77, 1.67)	1.77 ^e (1.24, 2.53)
Has respiratory condition ^f	0.90 (0.59, 1.38)	0.88 (0.58, 1.34)
< 5 years old	0.90 (0.62, 1.31)	1.04 (0.72, 1.50)
> 64 years old	1.22 (0.80, 1.85)	0.89 (0.59, 1.33)
Household		
Catholic	1.50 (0.94, 2.37)	1.87 ^e (1.20, 2.90)
Community		
Tobacco-growing ^g	1.46 ^e (1.04, 2.07)	3.75 ^e (2.71, 5.20)

^aYear 1 survey conducted in 2004, Year 2 in 2006, and Year 3 in 2007.

^bMissing values: 15 for Year 1, 10 for Year 2, and 23 for Year 3.

^cCI: 95% confidence interval.

^dReference: absence of listed characteristic.

^eStatistically significant.

^fAsthma, cough, or pulmonary or respiratory problem.

^gEach pair of study communities included one that was tobacco-growing.