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Predictors of Participation in a Fire Department Community Canvassing Program

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Abstract

Objective—An urban fire department has been distributing free smoke alarms for over 30 years. A community-academic partnership was developed to conduct a community intervention trial as part of the fire department's home visiting program. The trial comprised 170 canvassing events held across 12 census tracts; half of the census tracts were assigned to the treatment condition and received pre-promotion of the home visit events. The objectives of this analysis were to identify environmental and programmatic predictors of: 1) whether someone would be at home at the time of a visit, and 2) if at home, whether the resident would participate.

Methods—A separate multi-level analysis was conducted to address each objective. The canvassing event served as the first level to account for variation in implementation of the program, with the census tract as the second level. All environmental and program characteristics were included as fixed effects in both models.

Results—Throughout 170 events, 8080 eligible residential addresses were visited, of which 3216 had someone at home, and 2197 homes participated in the program. Canvassing events held on weekends and during the evening hours was associated with higher odds of a resident being at home. Canvassing events without rain and held in the treatment census tract areas was associated with higher odds of resident participation.

Conclusion—Environmental and programmatic factors can impact the reach of home visiting programs. These findings can contribute to emerging best practices for fire department home visiting programs.

Keywords

fire prevention and safety; home visiting programs; health education

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Introduction

In 2014, there were approximately 367 500 home fires in the United States, resulting in 13 425 civilian injuries and 2 745 civilian deaths.[1] In the event of a fire, smoke alarms reduce the risk of fatality by half.[2] Nevertheless, although a large majority of homes have at least one smoke alarm, only a minority are adequately protected by functioning alarms on every level.[3–4]

Community smoke alarm installation programs have contributed to greater coverage of homes by functioning smoke alarms,[5–6] and in turn reduced injuries,[7–8] and averted fatalities.[9–10] The Baltimore City Fire Department (BCFD) has been distributing free smoke alarms to Baltimore City, MD residents for over 30 years through their canvassing program. The Johns Hopkins Home Safety Study was a community-academic partnership developed to evaluate the impact of an enhanced fire department canvassing program on community participation, as well as the strategies to maximize participation. Detailed information about the study design, site selection, and study conditions has been published elsewhere.[11] Briefly, the evaluation was conducted in two sets of six census tracts that were matched on a summary statistic of 1) housing vacancy rate; 2) number of previously attempted BCFD home visits; 3) percentage of previously successful BCFD home visits; 4) residential fire rate; 5) percentage of dwellings built after 1984; and 6) percentage of dwellings that were owner-occupied properties. Each set of census tracts was randomized to receive the standard or enhanced (treatment area) canvassing program.

Homes in both study areas received a home visit from the BCFD. Firefighters were given a pre-determined set of addresses to canvass for each event; they recorded whether the resident was home (i.e., answered the door) and if so, whether they were allowed in to install free 10-year, lithium battery-operated smoke alarms on every level and provide home safety education. Canvassing events in the treatment area were enhanced with three additions: 1) community health workers promoted the event 3–4 days in advance by going door-to-door and speaking with residents in-person using scripted information (or leaving a hang tag on the door if no one was home); 2) a health educator accompanied the firefighters on event days and provided additional education about carbon monoxide poisoning and scald burns; and 3) a mobile safety center was brought into the canvassing area and residents were encourage to visit for additional injury prevention education and access to low-cost safety products to provide additional resources. Canvassing events were conducted between April 2010 and April 2011.

To the authors' knowledge, information about best practices for conducting home visiting programs has not been reported in the peer-reviewed literature, although costs of such programs have been studied and shown to have good economies of scale.[12] This highlights an important gap as knowing when to target resources for community canvassing could help improve efficiency of resources while also reaching a wider audience. Thus, the aims of this analysis are to: 1) describe how programmatic and environmental characteristics can predict if a fire department will make contact with a household as part of a canvassing program, and 2) describe how programmatic and environmental characteristics can predict participation.

This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Methods

The data for this analysis were derived from the records for 170 canvassing events and for 9737 addresses visited. Not captured in this count are residences that were ineligible for the program, including public housing or apartment complexes. Of the 9737 addresses visited, 1657 were deemed ineligible due to being vacant, unoccupied, commercial properties, or no longer in existence. Summary information was generated for each canvassing event by aggregating the total number of eligible households, total number of households where someone answered the door, and the total number of households that participated in the program.

Three environmental characteristics were documented: 1) the day of the week (categorized into weekday and weekend), 2) the time of day the canvassing event was conducted (categorized into daytime/before 5pm, and evening/after 5pm), and 3) whether it rained during the event. Weather data were not documented in each event record; it was collected retrospectively through searching an online database of archived data on precipitation on the day of each event.[13] We hypothesized that weekends, evenings, and precipitation would result in finding more people at home, but would have no effect on participation rates.

Two program characteristics were captured: 1) whether the canvassing event was in a census tract assigned to the treatment program area, and 2) if the battalion chief was present during the event. We hypothesized that the treatment area would result in finding more people at home and higher participation rates due to the early promotion of the program by community health workers. We hypothesized that having the battalion chief present would have no effect on finding people at home, but would increase participation rates because this person's high visibility (i.e., different uniform) could increase residents' perceptions about the importance of participating. This was informed by the theoretical construct of normative beliefs from the Theory of Reasoned Action,[14] which posits that beliefs about what certain key individuals think we should or should not do are associated with adopting a behavior – in this case, a battalion chief approving of a resident participating in a fire department home safety program. In addition, the study team had observed that the firefighters who were going door-to-door behaved differently in the presence of their superiors, and thus we elected to test whether these changes in behavior were reflected in different rates of participation.

Multilevel models for both aims were generated in Stata 12 (StataCorp; College Station, TX) using the generalized linear latent and mixed models feature, *gllamm*. Logistic outcomes were produced using 1) the total households with someone home per event, over the denominator of total eligible households for each respective event, and 2) the total participating households per event, over the denominator of total households with someone home for each respective event. Our results are subsequently interpreted as predicting 1) the odds of someone being home, and 2) the odds of a household participating in the program. All five programmatic and environmental characteristics were included in both models.

Canvassing events were clustered on census tracts due to non-randomized assignment of events across census tracts. Variation in program implementation arose from early impressions of area characteristics such as employment levels, which led to decisions to conduct events in the evening and on weekends in neighborhoods where more residents were employed, when more people might be expected to be at home. Additionally, census tracts had been selected based on matches for certain census-tract level variables, as described above.

Results

Demographic information about the targeted census tracts and Baltimore City is presented in Table 1.[15] Wide variation was experienced among canvassing events. The number of eligible addresses per canvassing event ranged from 0 to 163 (x=47.53, s=28.89). The number of households with someone home per event ranged from 0 to 78 (x=18.92, s=12.71), and the number of participating households per event ranged from 0 to 53 (x=12.92, s=9.15). Only one canvassing event had no eligible addresses (of 26 visited).

Final results are based on data from 157 canvassing events: 13 events were excluded from analysis because presence of battalion chief was not recorded (n=12) and another event (n=1) had no eligible addresses. A summary of characteristics of each canvassing event as well as all analytic results are presented in Table 2. Adjusted for all variables, the time of day of the event was significantly associated with increased odds of someone being home, with AOR=1.56 (95%CI: 1.96, 1.89; p<0.001) when conducting a canvassing event in the evening compared to during the daytime. An event that took place on the weekend had higher odds of someone being home, compared to an event during the week with AOR=1.41 (95%CI: 1.15, 1.71; p=0.001).

Canvassing while it was raining compared to when it was not raining resulted in an almost 50% reduction in the odds of participation (AOR=0.54, 95%CI: 0.39, 0.75; p<0.001). Lastly, the odds of participation were twice as large for households in the treatment area compared to those randomized to the standard canvassing program: AOR=2.06 (95%CI: 1.23, 3.45; p=.006).

Discussion

Findings from this analysis provide insight about how canvassing programs could be planned to maximize participation. Canvassing in the evenings and on weekends was associated with increased odds of someone being at home. Unexpectedly, canvassing when it was raining was associated with decreased odds of someone who was at home participating in the program. Presence of a battalion chief on site was not a significant predictor of participation, contrary to our hypothesis. The influence of a normative belief may instead have been satisfied by the firefighter and/or the study team members at the door, or alternately, all residents may not have been aware of the battalion chief's presence. The weather and having a battalion chief present may have had more of an impact on the firefighters than on the residents, or we had too few events held in the rain and in the absence of the chief to make inferences about these two variables.

Finally, having been randomized into the treatment area was also associated with increased odds of participation if someone answered the door. Previously reported results found a significant difference in aggregate counts of participation using chi-square tests favoring the treatment area,[11] but the analysis presented here confirms the impact of community health worker pre-canvassing promotion when analyzing proportion of participation, and controlling for characteristics of home visit events.

External validity is one limitation of this study, as the results in our city may not be generalizable to other cities or non-urban areas. Given the BCFD's extensive history of conducting door-to-door canvassing, other communities first embarking on such an initiative may experience different results. Finally, additional unrecorded environmental or programmatic variations as well as individual resident or household characteristics may have influenced our dependent variables and were not accounted for in these models. However, the nature of door-to-door canvassing limits the ability of fire department personnel to target households or individuals by specific characteristics, so we would contend that these factors are less critical to planning when the goal is to maximize the number of homes that are reached. Moreover, through clustering on census tract, the multilevel approach controls for community-level demographic variations between areas, which increases our confidence in our conclusions about the effects of environmental and programmatic characteristics. Nevertheless, future work should also explore how the individual residence or household characteristics of those who are home, and of those who participate, compare to characteristics of the census tract in which they reside, to identify whether there are subpopulations who are unintentionally excluded through a canvassing approach.

Taken together, our analyses suggest that the BCFD could recruit the most participants in a community canvassing program by scheduling events in the evenings and/or on the weekends, avoiding the rain, and providing residents with advance notice of their visit. Modifying program implementation based on our findings could result in a more effective use of the fire department's time and resources, while bringing life-saving injury prevention measures to more residents throughout the city.

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References

1. Haynes, HJG. Fire Loss in the United States During 2014. National Fire Protection Association. http://www.nfpa.org/research/reports-and-statistics/fires-in-the-us/overall-fire-problem/fire-loss-in-the-united-states. Published September 2015. Accessed January 4, 2016
2. Rohde D, Corcoran J, Sydes M, et al. The association between smoke alarm presence and injury and death rates: A systematic review and meta-analysis. Fire Saf J. 2016; 81:58–63. DOI: 10.1016/j.firesaf.2016.01.008
3. Douglas MR, Mallonee S, Istre GR. Estimating the proportion of homes with functioning smoke alarms: a comparison of telephone survey and household survey results. Am J Public Health. 1999; 89(7):1112–4. [PubMed: 10394329]

4. Peek-Asa C, Allareddy V, Yang J, et al. When one is not enough: prevalence and characteristics of homes not adequately protected by smoke alarms. Inj Prev. 2005; 11(6):364–8. [PubMed: 16326772]
5. Ballesteros MF, Jackson ML, Martin MW. Working toward the elimination of residential fire deaths: The Centers for Disease Control and Prevention's Smoke Alarm Installation and Fire Safety Education (SAIFE) program. J Burn Care Rehabil. 2005; 26(5):434–9. [PubMed: 16151290]
6. Kendrick D, Smith S, Sutton AJ, et al. The effect of education and home safety equipment on childhood thermal injury prevention: meta-analysis and meta-regression. Inj Prev. 2009; 15(3):197–204. [PubMed: 19494100]
7. DiGuiseppi C, Goss CW, Higgins JPT. Interventions for promoting smoke alarm ownership and function (Review). Cochrane Database of Systematic Reviews. 2001; (2):CD002246. [PubMed: 11406039]
8. Mallonnee S, Istre GR, Rosenberg M, et al. Surveillance and prevention of residential-fire injuries. N Engl J Med. 1996; 335(1):27–31. [PubMed: 8637539]
9. Dudley T, Creppage K, Shanahan M, et al. Using GIS to Evaluate a Fire Safety Program in North Carolina. J Community Health. 2013; 38(5):951–7. [PubMed: 23800955]
10. Istre GR, McCoy MA, Moore BJ, et al. Preventing deaths and injuries from house fires: an outcome evaluation of a community-based smoke alarm installation programme. Inj Prev. 2014; 20(2):97–102. [PubMed: 23873498]
11. Gielen AC, Shield W, Frattaroli S, et al. Enhancing fire department home visiting programs: results of a community intervention trial. J Burn Care Res. 2013; 34(4):e250–6. [PubMed: 23237821]
12. Parmer JE, Corse PS, Ballesteros MF. A cost analysis of a smoke alarm installation and fire safety education program. J Safety Res. 2006; 37(4):367–73. [PubMed: 17011582]
13. Historical Weather. Weather Underground. http://wunderground.com/history
14. Fishbein, M., Ajzen, I. Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley; 1975.
15. U.S. Census Bureau. ACS 2009 (5-Year Estimates). Retrieved from http://www.socialexplorer.com/tables/ACS2009_5yr. Accessed November 9, 2016

Table 1

Demographic characteristics of selected neighborhood census tracts and Baltimore City, MD.[15]

	Standard Study Area (%)	Enhanced Study Area (%)	Baltimore City (%)
Black or African American	52.4	54.8	63.4
Hispanic or Latino	12.6	6.3	2.7
Population Under 18 Years	24.9	21.7	23.1
Population Over 65 Years	8.8	8.8	11.8
Homes with a Resident Under 18 Years	33.5	26.6	28.7
High School Completion or Higher (Among 25 Years and Over)	63.5	70.0	76.9
Unemployment Rate	11.5	11.4	11.1
Families with Income Below Poverty Line	22.1	26.0	16.2
Owner Occupied Homes	52.2	46.5	51.1
Vacant Properties	23.1	21.7	19.3

Table 2

Canvassing Event Characteristics (n=170); and Multilevel, Multivariate Regression Predicting if Resident is Home, and Predicting Entering the Home (Level 1 units, n=157 events; Level 2 units, n=12 census tracts)

	Canvassing Characteristics		Predicting if Resident is Home		Predicting Entering the Home	
Characteristic	**n**	**%**	**AOR**	**z (p-value)**	**AOR**	**z (p-value)**
Program Area						
Standard	81	47.65	–	–	–	–
Enhanced	89	52.35	1.15	0.79 (0.43)	2.06	2.76 (**0.006**) *
Precipitation During Event						
No	155	91.18	–	–	–	–
Yes	15	8.82	0.88	−0.92 (0.36)	0.54	−3.72 (<**0.001**) *
Day of Week						
Weekday	86	50.59	–	–	–	–
Weekend	84	49.41	1.40	3.35 (**0.001**) *	0.82	−1.83 (0.07)
Time of Day						
Daytime (before 5pm)	135	79.41	–	–	–	–
Evening (after 5pm)	35	20.59	1.56	3.79 (<**0.001**) *	1.20	1.81 (0.07)
Battalion Chief on Site						
No	29	17.06	–	–	–	–
Yes	129	75.88	0.98	−0.24 (0.81)	1.30	1.42 (0.16)

* significant at p<.01