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Model Performance in Fire Prevention

**SYMPOSIUM 2016**

# Outcome Evaluation of Operation Installation: Reducing Deaths and Injuries from House Fires

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# GOALS AND OBJECTIVES

# Objectives

- Examine the impact of a community-based smoke alarm installation program
- Determine if injury rates differed between program and non-program houses
- Determine the functionality of smoke alarms installed through a community-based smoke alarm installation program

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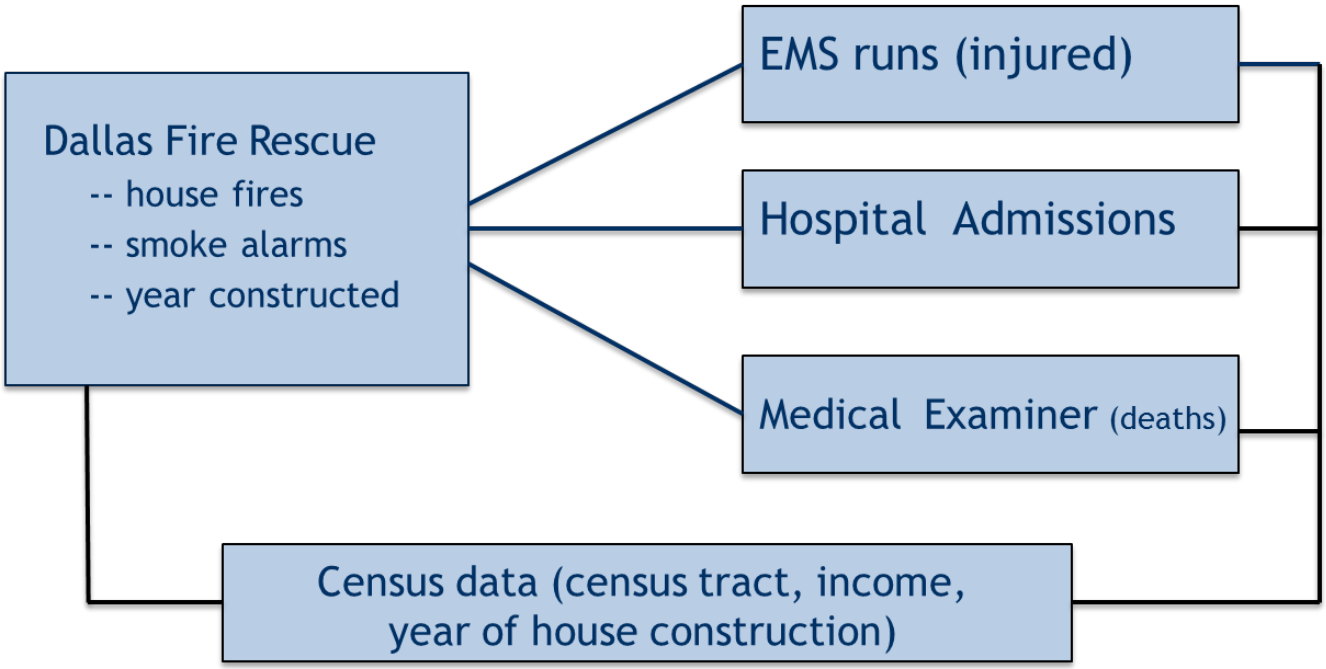
# FORMATIVE EVALUATION

# Formative Evaluation

## Data Collection: Linked House Fire Database



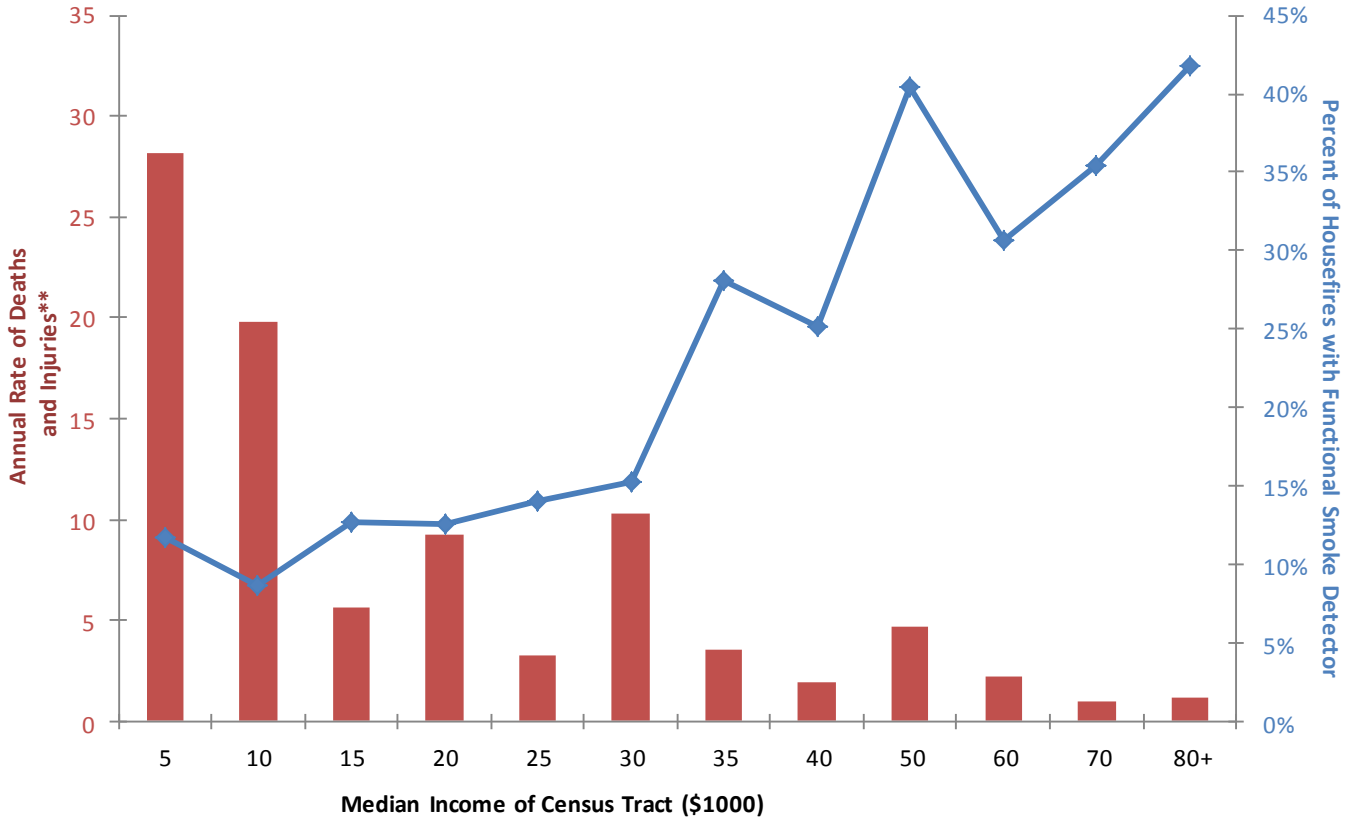
# Formative Evaluation
## Death and Injuries from House Fires

- 7,190 house fires (-1027/year)
- 91 deaths
- 132 non-fatal injuries
- Rate: death – 2.1/100,000 year

  Total injury rate 5.2/100,000 year

# Formative Evaluation

## Injury Rate vs Prevalence of Functional Smoke Alarms In Houses Which Burned* by Income of Census Tract




* Houses only
** Rate per 100,000 per year

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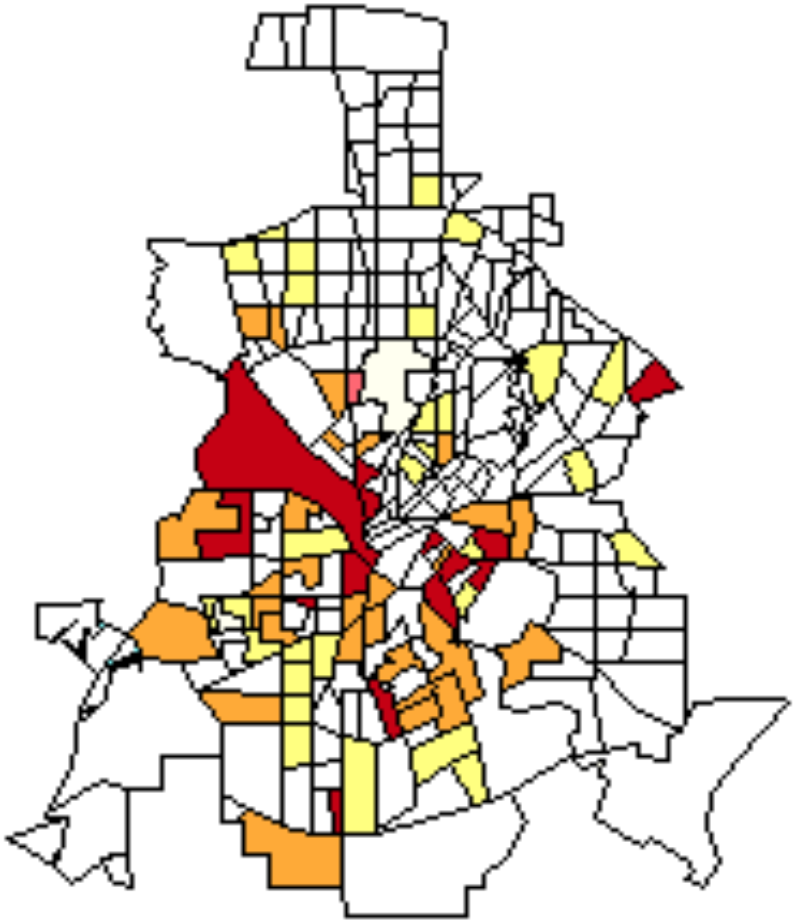
# Formative Evaluation

## House Fire-Related Injury Rates by Census Tracts



= More than 20 per 100,000 population

= 10-19 per 100,000 population

= 5-9 per 100,000 population

= less than 5 per 100,000 population

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# PROCESS EVALUATION

# Intervention:
## Smoke Alarm Installation Project

- Operation Installation
  - Joint venture with Dallas Fire-Rescue and the Injury Prevention Center
  - Installed lithium-powered smoke alarms
  - Census tracts identified as high risk for house fire deaths and injuries.

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# IMPACT EVALUATION

# Results

- 36 census tracts
- 20,127 smoke alarms
- 8,134 houses
- 28,570 people

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# OUTCOME EVALUATION

# Definitions

- Program House
  - Installed SA through OI
- Non-Program House
  - No SA through OI
- Outcome measure – death and injury rates
- Linked deaths and injuries to addresses in target census tracts
- Study period – April 2001 to April 2011

# Program and Non-Program Houses after Operation Installation: Deaths and Injuries

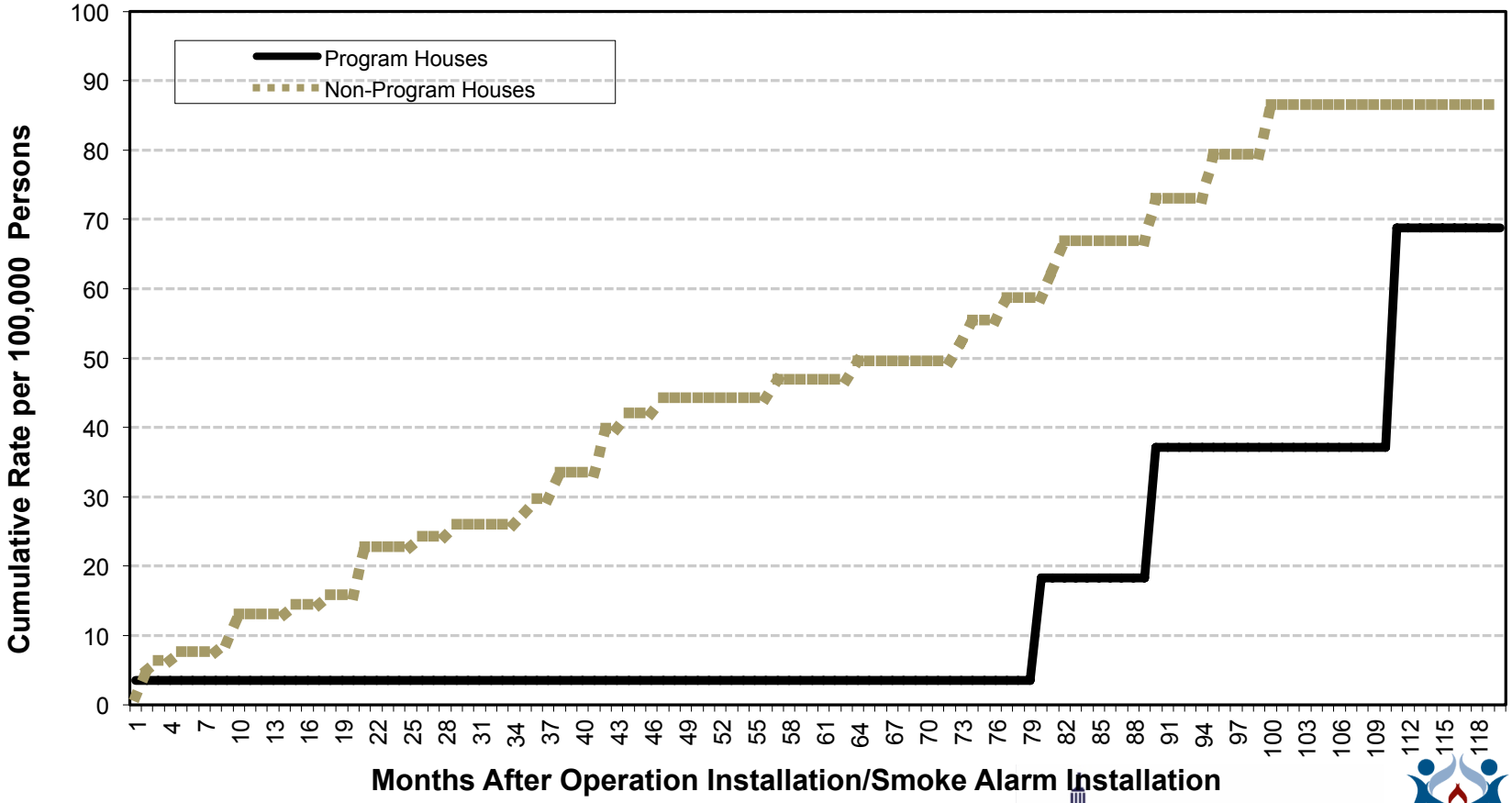
Total: 26 deaths
16 injuries (non-fatal)

Program Houses
2 deaths + 2 injuries = 4 total
**Rate: 3.1 per 100,000 population per year**

Non-Program Houses
24 deaths + 14 injuries = 38 total
**Rate: 9.6 per 100,000 population per year**

Rate Ratio = .32 (95% CI 0.10 to 0.84)

# Cumulative Incidence Rate
# House Fire Related Deaths and Injuries

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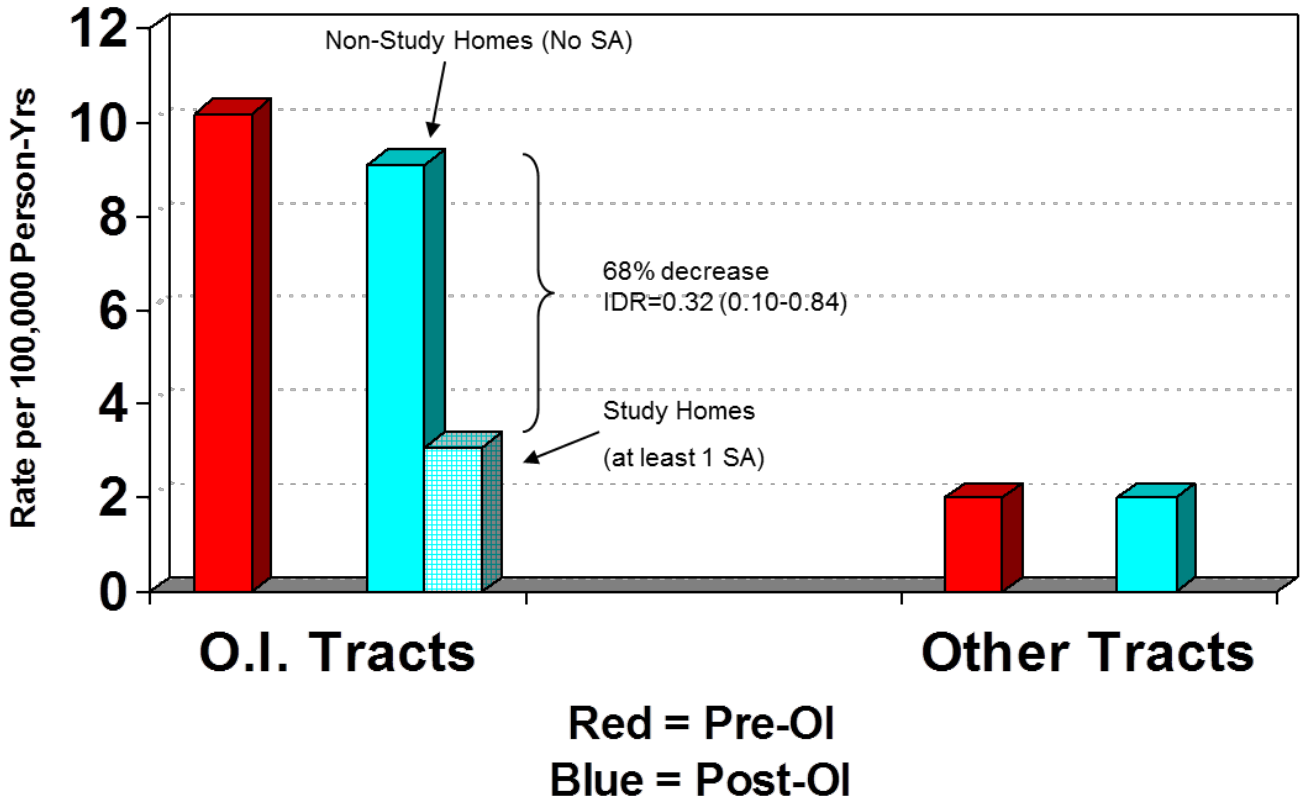
# Rates of House Fire-Related Deaths and Injuries for Census Tracts, before and after Operation Installation, by Program Homes vs Non-Program Homes



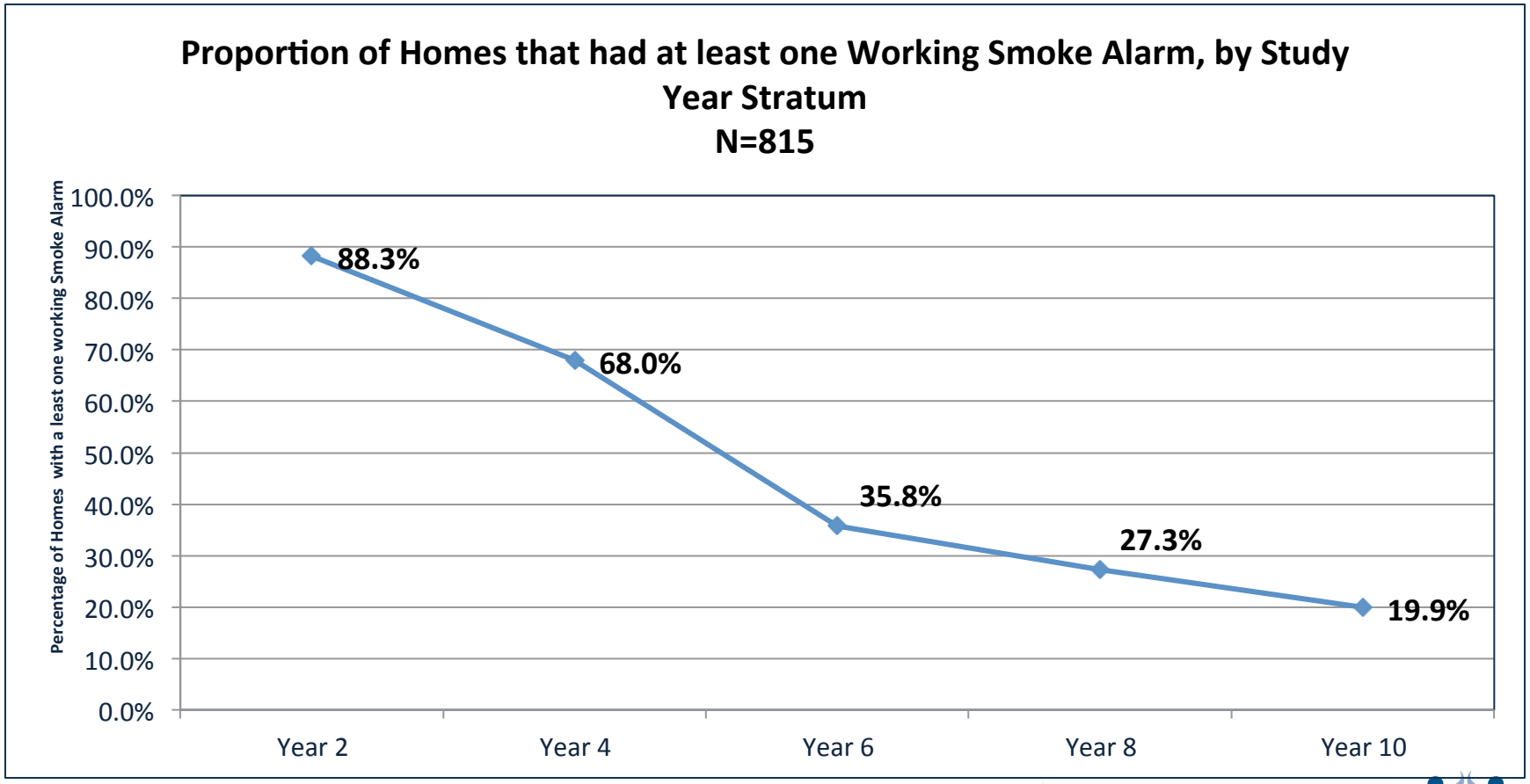
# Multivariate Analysis

## Comparison of Death and Injury Rates for Program and Non-Program Population

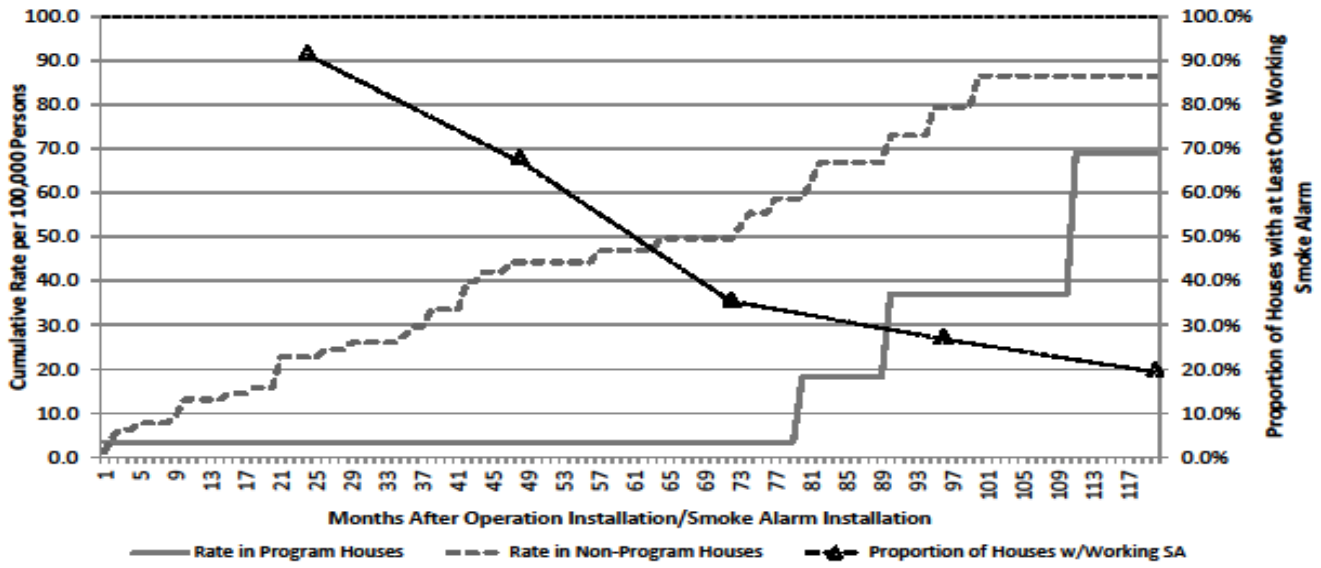
| | Rate* in Program Houses | Rate* in Non-Program Houses | Rate Difference | Rate Ratio | Prevention Fraction | P value |
|---|---|---|---|---|---|---|
| **Unadjusted (95% C.I.)** | 3.1 (0.8-8.0) | 9.6 (6.8-13.3) | 6.5 (2.2-10.8) | 0.32 (0.10-0.84) | **68% (9.2-88.4%)** | **<0.02** |
| **Adjusted** (95% C.I.)** | 3.5 (0-8.2) | 9.5 (7.3-11.7) | 6.0 (0.8-11.1) | 0.37 (0.00-0.86) | **63% (16-100%)** | **<0.01** |

*per 100,000 person-years
** Multivariate regression analysis

# Functionality of Smoke Alarms



## Cumulative Incidence Rate of House Fire-Related Cases, and Proportion of Houses with at least 1 Working OI Smoke Alarm, by Years Since Installation by Target Census Tracts




For rate calculations, cases were defined as a death or non-fatal injury related to a house fire. Program houses had received a smoke alarm through Operation Installation between 2001 and 2011. Non-Program houses were all other houses in the same census tracts that did not receive a smoke alarm through Operation Installation. Adapted from References 8 and 17.

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# RECOMMENDATIONS

- Main Findings: Operation Installation
  - Collaboration between DFRD and IPC to target high risk census tracts
  - The program was effective at preventing deaths and injuries from house fires
  - Smoke alarms did not last 10 years

- Modifications we have made
  - Use tampered-resistant smoke alarms
  - Working on how to better reach into high risk census tracts

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# RESOURCES

# Injury Prevention Center of Greater Dallas

- Website www.injurypreventioncenter.org
- Articles
  - Istre G, McCoy MA, Osborn L, *et al.* Deaths and injuries from house fires. *N Engl J Med* 2001;344:1911-16
  - McCoy MA, Roper C, Campa E, *et al*. How long do smoke alarms functions? A follow-up survey of a smoke alarm installation program. *Injury Prevention*. 2014 Apr;20(2):97-102.
  - 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 program. *Injury Prevention*. 2014 Apr;20(2):103-7.

# Questions

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