



Home Fire Risk Map Evaluation Findings

Prepared by NORC at the University of Chicago (Megan Heffernan, MPH, Katherine Gelfand, MPH, Victoria Hallman)

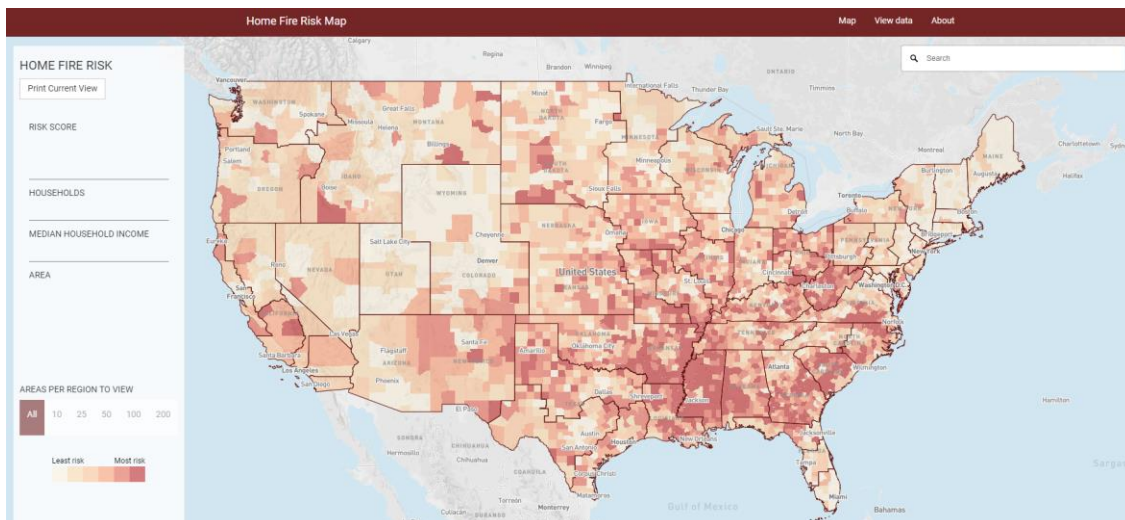
STUDY SUMMARY

NORC at the University of Chicago (NORC) conducted a study to explore differences between households in the United States that are classified by the American Red Cross as “high-risk” or “low-risk” for experiencing a home fire or suffering more severe consequences following a home fire. The purpose of this study was to understand how effective the Red Cross Home Fire Risk Map is at identifying census tracts that should be prioritized for receiving Red Cross services. The study included a survey that respondents could complete by either mail or web. For each of the 9 census divisions, NORC selected a random sample of households within the top 10% and bottom 10% for risk map scores to create the “high-risk” and “low-risk” groups.

Background

WHAT IS THE HOME FIRE RISK MAP?

The [Home Fire Risk Map](#) is a visualization that aims to identify and highlight, “high-risk” neighborhoods to target for in-home fire safety education and the installation of free smoke alarms by the American Red Cross and its partners.



This project uses machine learning techniques that leverage data from the U.S. Census, the American Red Cross and the National Fire Incident Reporting System to predict aggregate neighborhood home fire risk based on the following criteria:



The increased likelihood that homes within a census tract **lack functioning smoke alarms.**



The **prevalence of home fires** in a census tract over a 5-year period.



The increased likelihood that a home fire could **result in an injury or death.**

METHODOLOGY

NORC fielded a survey in Spring 2022 to understand the effectiveness of the Home Fire Risk Map in identifying high-risk areas. NORC selected a random sample of 4,875 households within the top 10% of risk map scores and 4,875 households within the bottom 10% of risk map scores to create “high-risk” and “low-risk” groups. Presented below are the findings of the survey.

Findings

COMPARING DEMOGRAPHICS OF HIGH-RISK AND LOW-RISK HOUSEHOLDS

Significant differences between high-risk and low-risk households in terms of demographics were noted. Key takeaways include:

- The high-risk households were more likely to identify as Black or Hispanic, live in a mobile home or apartment, have a household income of under \$50,000, and receive governmental benefits, including Medicaid, SNAP/EBT/Food assistance, and Social Security Disability Insurance.
- The high-risk and low-risk households were similar in their age breakdown and the percentage of households with a person who is deaf or hard of hearing.

TABLE 1. DEMOGRAPHICS FOR HIGH-RISK AND LOW-RISK HOUSEHOLDS

	High Risk (N=242)	Low Risk (N=413)
Race/Ethnicity		
White	50%	87%
Black/African American	22%	2%
Hispanic	16%	4%
House Structure Type		
Stand-alone house	60%	82%
Duplex/Townhouse	5%	6%
Mobile home	15%	5%
Apartment	20%	7%
Annual Household Income		
Under \$50,000	67%	18%
\$50,000-\$100,000	20%	29%
\$100,000	13%	52%
Household Benefits		
Medicaid	23%	7%
SNAP/EBT/Food assistance	22%	3%
Social Security Disability Insurance	18%	2%

RISK FACTORS FOR HOME FIRES

Lacking Home Fire Equipment

Equipment like smoke alarms and fire extinguishers help households be alerted to and quickly respond to home fires. Smoke alarms are especially critical for home fire prevention. According to [data](#) from the National Fire Protection Association (NFPA), the risk of dying in a home fire is 55 percent lower in a home with functional smoke alarms than in a home without functional smoke alarms.

The following survey findings showed that high-risk households are more likely to lack home fire equipment.

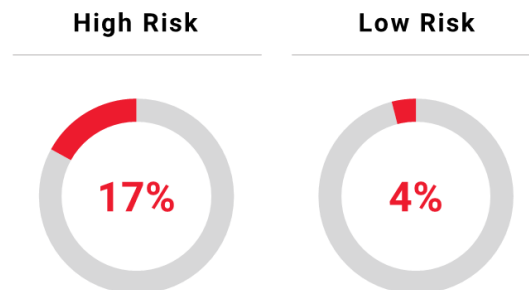
- **High-risk households more frequently reported having zero alarms.** Overall, 6 percent of high-risk households reported zero alarms, compared to 1 percent of low-risk households. Among respondents who live in stand-alone homes, 5 percent of high-risk households had zero alarms, while all low-risk households had at least one alarm.
- **High-risk households were less likely to report having accessible equipment for Deaf or Hard of Hearing individuals, like strobe light or bed shaker alarms.** Only 6 percent of high-risk households with a Deaf or hard of hearing individual reporting having accessible equipment, compared to 27 percent of low-risk households.
- **High-risk households were less likely to report having a fire extinguisher in their home.** 78 percent of the low-risk group reported having a fire extinguisher, compared to 65 percent of the high-risk group.

Fire-prone Behaviors

One key behavior that frequently contributes to home fires is smoking, and specifically smoking in bed. According to [NFPA data](#), from 2012-2016, 5 percent of home fires in the United States were caused by smoking materials but account for 23 percent of home fire deaths. Additionally, 34 percent of these home fire deaths were caused by fires that started in a bedroom.

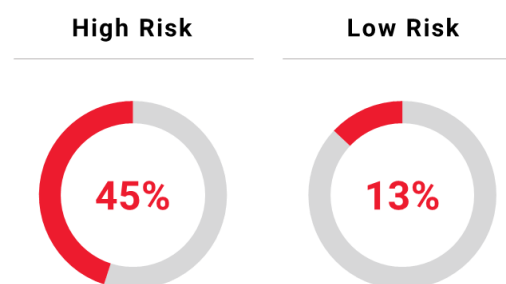
- **High-risk households were more likely to report that someone in their household smokes in the home.** 17 percent of the high-risk group reported that someone in their household smokes in their home, compared to 4 percent of the low-risk group.

Households with someone who smokes in the home



- **High-risk households were more likely to have someone in their household smoke in bed.** Among respondents who reported that someone in their household smokes, 45 percent of high-risk households reported that someone has smoked in bed in the past year, compared to 13 percent of low-risk households.

Households where someone has smoked in bed



Experience with a Home Fire

High-risk households also have had more frequent and more severe experiences with home fires.

- For example, 32 percent of high-risk group respondents reported having experienced a home fire, compared to 23 percent of the low-risk group.
- Additionally, 10 percent of high-risk households reported having experienced a fire that spread to multiple rooms or destroyed their home, compared to 4 percent of low-risk households.

HOME VISIT SERVICES MAKE AN IMPACT

Since 2014, the Red Cross has been making homes safer through the [Home Fire Campaign](#), installing smoke alarms and teaching individuals about fire safety and preparedness. The Red Cross and its partners have installed over 2.4 million smoke alarms and have made over 1 million homes safer.

In this study, we learned about the impact of home visits (Note: these were not home visits conducted as a part of the Home Fire Campaign). The survey asked if anyone has ever visited respondents' homes to talk about fire safety and prevention or install smoke alarms—29 percent of the high-risk group said that someone came to their home, compared to 20 percent of the low-risk group. Respondents in both groups most frequently reported that firefighters visited their home. Other respondents in both the high-risk and low-risk groups reported that security alarm companies, electricians, and landlords installed smoke alarms in their homes.

Home visits are an effective intervention to increase the number of smoke alarms in homes and improve household awareness and preparedness for a home fire. Among survey respondents that reported someone had visited their home, we observed the following outcomes.

- **Home visits increase the number of smoke alarms in homes.** 8 percent of high-risk households that did not receive a home visit had no smoke alarms in their home. Every high-risk household that received a visit had at least 1 smoke alarm.
- **Home visits are cost-saving to households.** 55 percent of high-risk households said they could not afford to replace smoke alarms in their home if it cost \$100, compared to 13 percent of low-risk households.
- **Home visits improve household fire safety practices.** Among the high-risk group, 73 percent of households that received a home visit reported having a home fire escape plan compared to 48 percent of households that had not received a visit.
- **Home visits improve household preparedness for a home fire.** Among the high-risk group, 89 percent of households that had received a visit said they felt prepared to respond to a home fire compared to 76 percent of households that had not received a visit.

Implications



The Red Cross Home Fire Risk Map successfully identifies high-risk areas.



Focusing home visits on the high-risk areas identified through the Home Fire Risk Map has great potential to mitigate significant risk factors for home fires and resulting injury and death.



Home visits are an effective intervention, particularly for high-risk communities.



The Red Cross can coordinate and partner with local fire departments providing home fire prevention services.