

WINTER SPARE THE AIR STUDY
2013-2014 WINTER WOOD SMOKE SEASON



CONDUCTED FOR THE



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

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INTRODUCTION

The Bay Area Air Quality Management District (BAAQMD) was established in 1955 by the California State Legislature as the first multi-county agency in the State to address the problem of air pollution on a regular basis. The BAAQMD's primary regulatory authority covers stationary sources of air pollution such as factories, industrial facilities, manufacturing operations, gasoline stations and dry cleaners. The BAAQMD is also responsible for transportation control measures to reduce emissions from mobile sources of air pollution in its Clean Air Plan.

Serving the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and the western half of Solano and southern half of Sonoma, one of the BAAQMD's primary charges is to increase public awareness of positive air quality choices. To facilitate this effort, the Spare the Air Program was established by the BAAQMD in 1991 to educate residents about air pollution and to encourage them to modify their behavior to reduce and prevent it. During the summer ozone season (May to October), the BAAQMD conducts episodic public education campaigns designed to encourage the public to reduce their driving and use of certain household products on days that are expected to violate ozone air quality standards. During the winter season (November to February), the focus of the Program shifts to reducing the impact of wood burning on air quality by encouraging the public to *not* burn wood and to replace their wood-burning fireplaces and stoves with cleaner alternatives, such as natural gas fireplaces.

Although today many air quality management districts throughout the country administer similar programs, the Spare the Air Program in the Bay Area was the first of its kind.

MOTIVATION FOR STUDY The primary motivation for this study was to better understand the public's attitudes and behavior with respect to burning wood, their awareness of the Winter Spare the Air Alert Program, as well as the impact it has had on awareness, opinions and behavior relevant to burning wood and air quality. In this respect, this study is quite similar to past surveys conducted for the BAAQMD every year since 2001.

The passage of California Senate Bill 656 to reduce public exposure to particulate matter (PM10 and PM2.5) was another key motivation for the study.¹ SB 656 requires the California Air Resources Board (ARB), in consultation with local air districts, to develop and adopt a list of the most readily available, feasible and cost-effective control measures that could be used to reduce PM10 and PM2.5—with the goal of making progress in the near-term toward attainment of State and Federal PM10 and PM2.5 standards. Although the Bay Area is currently in attainment for the Federal PM10 and PM2.5 standards, like almost every other area in California it does not meet the stricter State standards.

1. Particulate matter (PM) consists of very small liquid and solid particles suspended in the air, and includes particles smaller than 10 microns (PM10) as well as finer particles smaller than 2.5 microns (PM2.5). Ambient PM is made up of particles that are emitted directly—such as soot and fugitive dust—as well as secondary particles that are formed in the atmosphere from reactions involving precursor pollutants such as oxides of nitrogen, sulfur oxides, volatile organic compounds, and ammonia. Exposure to PM is linked to increased frequency and severity of asthma attacks and even premature death in people with pre-existing cardiac or respiratory disease. Infants and children, the elderly, and persons with heart and lung disease are the most sensitive to PM pollution.

OVERVIEW OF METHODOLOGY A full description of the methodology used for this study is included later in this report (see *Methodology* on page 63). A total of 1,300 randomly selected residents within the District’s boundaries participated in the survey between November 22, 2013 and January 31, 2014. Interviews were conducted on randomly selected dates throughout the season (subsample = 525), as well as 27 targeted for evenings following Winter Spare the Air Alert episodes (subsample = 775). Sampled respondents were offered the option of participating by telephone or online at a secure, password-protected website hosted by True North. Probability-based sampling techniques and monitoring of the demographics resulted in a sample that is representative of the adult population within the District.

When compared with past surveys conducted for the District on wood burning and the Winter Spare the Air Alert Program, there are several methodological changes worth noting at the outset of this report. In the interest of improving the *validity* and *reliability* of select opinion and behavior measures, the 2013-2014 study continued several questionnaire changes that were first implemented in the 2004 season. The most notable of these changes addressed how the questionnaire measured the impacts of the Winter Spare the Air Alert Program. The changes were made so that the impacts of the winter program on wood burning behavior would be measured using the same basic methodology employed by the BAAQMD—and recommended by CARB and EPA²—to measure the impacts of the summer Spare the Air Program on driving behavior.³

Based on the 2005 results, additional refinements were made to the 2006 questionnaire with respect to measuring ownership of wood-burning heating devices and the practice off-season burning. Because these improvements occasionally involved changing the wording, format and/or response options for a particular question, in some cases it is not possible to statistically compare the results of the post-2006 surveys with previous surveys for select measures. Where such comparisons are possible, however, this report presents the results from past surveys.

STATISTICAL SIGNIFICANCE Many of the figures and tables in this report present the results of questions asked in 2013 alongside results found in prior years for identical questions. In such cases, True North conducted the appropriate tests of statistical significance to identify changes that likely reflect actual changes in public opinion or behavior over time—as opposed to being due to chance associated with selecting two cross-sectional samples independently and at random. Differences between studies are identified as *statistically significant* if we can be 95% confident that the differences reflect an actual change in public opinion or behavior between the two studies. Statistically significant differences within response categories over time are denoted by the † symbol which appears in the figure next to the appropriate response value for 2013.

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2. The CARB/EPA Method is summarized in the Transportation Research Board’s (TRB) journal—*Transportation Research Record*—for 2004 in an article entitled *Development of a Quantification Method for Measuring the Travel and Emissions Impacts of Episodic Ozone Alert Programs* (pages 153-159). It is described in detail in the following air resources guidance report: CARB, “Quantification Method Reference Manual: A Method to Measure Travel and Emissions Impacts of Ozone Action Public Education Programs,” April 2003. In addition to Eric Schreffler, Dr. Timothy McLarney and Richard Sarles, the TRB paper and report were co-authored by Joann Lu and Jeff Weir of CARB, as well as Thomas Higgins and Dr. Will Johnson of K.T. Analytics.
 3. For a detailed description of the updated CARB/EPA Method and its application to the BAAQMD’s summer Spare the Air Program, see the *Spare the Air Study: 2011 Summer Ozone Season* report prepared for the BAAQMD by True North.

ORGANIZATION OF REPORT This report is designed to meet the needs of readers who prefer a summary of the findings, as well as those who are interested in the details of the results. For those who seek an overview of the findings, the sections titled *Just the Facts* and *Conclusions* are for you. They provide a summary of the most important factual findings of the survey in bullet-point format and a discussion of their implications. For the interested reader, this section is followed by a more detailed question-by-question discussion of the results from the survey by topic area (see *Table of Contents*), as well as a description of the methodology employed for collecting and analyzing the data. And, for the truly ambitious reader, the questionnaire used for the interviews is contained at the back of this report (see *Questionnaire & Toplines* on page 67).

ACKNOWLEDGEMENTS True North thanks the BAAQMD and O’Rorke for their valuable input during the design stages of this study. Their expertise and insight improved the overall quality of the research presented here.

DISCLAIMER The statements and conclusions in this report are those of the authors, Dr. Timothy McLarney and Richard Sarles at True North Research, Inc. (True North), and not necessarily those of the BAAQMD. Any errors or omissions are the responsibility of the authors.

ABOUT TRUE NORTH True North is a full-service survey research firm that is dedicated to providing public agencies with a clear understanding of the values, perceptions, opinions and behaviors of their residents and customers. Through designing and implementing scientific surveys, focus groups and one-on-one interviews, as well as expert interpretation of the findings, True North helps its clients to move with confidence when making strategic decisions in a variety of areas—such as planning, policy evaluation, performance management, and developing effective public information campaigns.

During their careers, Dr. McLarney (President) and Mr. Sarles (Principal Researcher) have designed and conducted over 800 survey research studies for public agencies—including dozens of studies related to air quality and Spare the Air public education programs.



JUST THE FACTS

The following is an outline of the main factual findings from the 2013 study. For the reader's convenience, we have organized the findings according to the section titles used in the body of this report. Thus, to learn more about a particular finding and how it may compare to findings from prior surveys (where applicable), simply turn to the appropriate report section.

WINTER WOOD BURNING BEHAVIOR

- Forty-three percent (43%) of respondents reported that their household contained at least one *wood-burning* fireplace, pellet stove, or wood stove.
- Twenty-two percent (22%) of households in the District contain at least one fireplace that burns natural gas or propane.
- Among households with a wood-burning fireplace or wood stove, the most common types of wood primarily burned were natural wood logs (49%) and manufactured logs (18%). Twenty-five percent (25%) said that they never use their wood-burning fireplace or wood stove.
- When considering primary *and* secondary types of wood burned, the most commonly used wood was natural wood logs (66%), followed by manufactured logs (43%), and scrap wood (20%).
- Twenty-four percent (24%) of respondents in households that primarily burn natural wood logs were unable to identify the type of wood that they burn. Among those who knew the type of wood, oak was the most common (59%), followed by hardwood in general (19%), and pine (7%).
- When households that primarily burn natural wood logs were asked how they typically acquire their wood, respondents were split between those who gather their own (52%), those who purchase the wood from a local store (23%), and those who rely on a wood supplier (19%). Six percent (6%) mentioned an alternative source.
- Almost three-quarters (73%) of respondents who primarily burn natural logs stated that their wood is already dry and seasoned at the time they acquire it, whereas 18% reported that they typically acquire wood that is fresh-cut and 9% said that it depends or is a mixture.
- Households that burn wood were divided between those who primarily burn for heat (41%) and those who primarily burn for ambiance (59%).
- Approximately two-thirds of households that contain a gas fireplace (63%) and/or a pellet stove (63%) indicated that they would use the device this winter. The rate of use was lower for wood stoves (51%) and wood-burning fireplaces (49%).
- Overall, 11% of District households that own a wood-burning fireplace, wood stove, or pellet stove reported that they would not use their wood-burning heating device *at all* during the winter due to the Winter Spare the Air Alert Program.⁴
- Forty-eight percent (48%) of respondents who plan to burn wood this winter indicated that they expected to burn wood on a weekly basis, although most (32%) stated that they would burn wood three or fewer days per week. Overall, 13% indicated that they expected to burn wood two to three times per month, 21% once per month, and 14% expected to burn wood less often than once per month.

4. That is, they mentioned air quality and/or health-related reasons for not using the wood-burning device this winter *and* they were aware of the Spare the Air Alert Program. Note that this figure does not include households that intend to use their wood-burning device, but did refrain from burning wood on at least one occasion due to the Program (see Figure 37 on page 32 for figure on full program impacts).

- Among *all* households with at least one wood-burning device, 25% expect to burn wood at least once per week this winter.
- Thirty-two percent (32%) of respondents whose household includes at least one wood-burning device *and* expected to burn wood during the winter months indicated that they had burned wood during the week prior to the interview. Moreover, 14% had burned wood the day prior to the interview.
- On a typical burn day, wood-burning households averaged 4.47 hours of burning time.
- On a typical burn day, wood-burning households consumed an average 5.53 logs.
- More than half (58%) of respondents indicated that they started their most recent fire between 6PM and 8:59PM, and an additional 20% started their fire a bit earlier between 3PM and 5:59PM.

CHANGES IN WOOD BURNING BEHAVIOR

- Overall, 52% of households that own a wood-burning heating device and expected to burn wood this season reported that they anticipated burning wood at about the same frequency this season as last, and 27% said they would burn less often.
- Fifty-one percent (51%) of respondents who have a wood-burning fireplace, wood stove and/or pellet stove *and* expected to burn wood during the 2013-2014 winter season indicated that, on at least one occasion, they refrained from burning wood.
- When asked *why* they chose not to burn wood on these occasions, 31% specifically mentioned the Winter Spare the Air Alert Program and an additional 8% offered an air quality or health-related reason.
- Among households with a wood-burning fireplace, pellet stove, or wood stove, 11% chose not to burn *at all* during the winter season because of the Winter Spare the Air Alert Program, and 20% refrained from burning on at least one occasion for the same reason.
- Among households that burned during the week prior to a Spare the Air alert (and thus had demonstrated an inclination to burn), 12% chose not to burn on the episode in response to the Program. An additional 49% refrained from burning on the Spare the Air day, but for reasons not related to the Program.

RECALL AND AWARENESS OF WINTER SPARE THE AIR MESSAGING

- Sixty-five percent (65%) of adults in the Bay Area recalled being exposed to news stories, advertisements, or public service announcements related to the Winter Spare the Air Alert Program during the winter months.
- Almost half (46%) of respondents encountered Bay Area Air Quality Management District or Winter Spare the Air Alert Program information via television during the winter season, and more than one-third (37%) via radio. Twenty-two percent (22%) encountered information via newspaper, 14% on a website, 9% through social media, and 8% on a billboard.
- Just over one-fifth (22%) of adults in the Bay Area said they encountered Winter Spare the Air information on television in *an advertisement or public information announcement that talks about fires, wood smoke, air quality and the Winter Spare the Air Program*.
- Thirty-nine percent (39%) of all respondents encountered Winter Spare the Air information on television in a news program, 28% said they encountered the information on a weather report, and 8% saw a televised interview with an air quality expert or representative.
- Of those respondents surveyed on the day after a Winter Spare the Air episode, 45% were aware that a Winter Spare the Air advisory had been issued the day before.

ATTITUDES ABOUT WOOD SMOKE

- Approximately 70% of adults in the Bay Area perceive that there are negative health effects associated with breathing wood smoke.
- When asked to identify some of the specific negative health effects associated with breathing wood smoke, most respondents focused on lung disease in general (44%), followed by a specific reference to asthma (35%) and cancer (12%).
- Nineteen percent (19%) of Bay Area adults perceive that their neighborhood periodically experiences air pollution from wood smoke. Eleven percent (11%) stated that the problem was a small one, 4% indicated it was a moderate or medium problem, and 3% felt that air pollution due to wood smoke was a big problem in their neighborhood.

POLICY ATTITUDES

- Two-thirds (66%) of respondents indicated that they were aware of the BAAQMD's policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels.
- Twenty-nine percent (29%) of respondents felt well-informed about the rules that are part of the policy, 29% felt somewhat informed, 21% slightly informed, and 19% felt not at all informed about the rules that are part of the policy.
- Three-quarters (75%) of Bay Area residents indicated that they support the no-burn policy on nights when air pollution is expected to reach unhealthy levels. Approximately 17% opposed the policy, 4% said it depends, and 5% offered no opinion.
- The majority (61%) of respondents felt that households should *not* be allowed to burn on holidays like Christmas and New Year's when pollution levels are high, 34% felt households should be able to burn on holidays regardless of pollution levels, and 5% were unsure.
- Thirty-three percent (33%) of households with a wood-burning device typically burn wood on holidays, and 9% would continue to burn on a holiday, regardless of a Spare the Air episode. Most households (90%) with a wood-burning device do not typically burn on holidays or would *not* burn on holidays if a Spare the Air episode were called.
- Roughly three-quarters or more of the public appear correctly informed regarding the fact that violators of the 'no burn' policy will receive a warning prior to citations (87%), that residents are required to check the status of air quality prior to burning wood between November and February (76%), and that households with natural gas/propane fireplaces are still allowed to burn on designated 'no burn' days (73%).
- At least two-thirds of respondents also held the correct opinion that households for which wood burning is their only source of heat are still allowed to burn wood on 'no burn' days (71%), and that they can be cited at any time of the year if there is a lot of visible smoke coming from their chimney (71%).
- Public knowledge regarding other aspects of the wood burning rule was far more mixed. More than half (58%) incorrectly assumed that *no* households are allowed to burn wood on no burn days, just 54% agreed that wood burning is a major source of pollution in the Bay Area contributing up to one-third or more of the airborne particle pollution on many winter days, 51% of respondents felt that households with EPA certified stoves would still be allowed to burn on 'no burn' days, and 38% believed that it's okay to burn different types of wood—including driftwood, treated wood, moist wood, and used pallets—as long as it is a clean air day.
- About half (51%) of respondents indicated that they know how to find out whether today is a 'no burn' day.

- When asked what sources they would turn to for this information, the most commonly mentioned sources were a website in general (62%), newspaper (22%), radio (21%), telephone hotline (12%), and the District's website (12%).

FIREPLACE & POLLUTION KNOWLEDGE

- A clear majority (83%) of respondents correctly labeled as false the statement, *It is okay to burn materials other than firewood in my fireplace.*
- The percentage who correctly identified as false the other three statements was lower, with almost two-thirds (64%) disagreeing that *A fireplace is an efficient source of heat*, 52% disagreeing that *All fires in my fireplace should produce visible smoke from the chimney*, and 43% disagreeing that *Manufactured logs burn cleaner than seasoned firewood.*

PERCEPTIONS OF ENTITIES

- Prior to taking the survey, 64% of respondents had heard of the Bay Area Air Quality Management District and 62% had heard of the Winter Spare the Air Alert Program.
- Among respondents who had heard of the BAAQMD, 48% held a favorable opinion of the agency, whereas 42% held a neutral opinion, and just 9% held an unfavorable opinion.
- Among respondents who had heard of the Winter Spare the Air Alert Program, 64% held a favorable opinion of the Program, whereas 26% held a neutral opinion, and 89% held an unfavorable opinion.
- Thirty-three percent (33%) of all respondents recalled hearing, reading, or seeing a news story, advertisement, or public service announcement in the six months prior to taking the interview that pertained to the District. The corresponding figure for the Winter Spare the Air Alert Program specifically was 41%.



CONCLUSIONS

As noted in the *Introduction*, this study was designed to provide a better understanding of the public's attitudes and behavior with respect to burning wood, their awareness of the Winter Spare the Air Alert Program, as well as the impact that the Program has had on awareness, opinions and behavior relevant to wood burning and air quality. Whereas subsequent sections of this report are devoted to conveying the detailed results of the study, in this section we attempt to 'see the forest through the trees' and note how the collective results answer some of the key questions that motivated the research.

What is the profile of wood burning behavior in the Bay Area?

Approximately 43% of households in the Bay Area own at least one *wood-burning* fireplace, wood stove, or pellet stove, and 23% burned wood in the 2013-2014 winter months. Among households with a wood-burning device, 25% expected to burn wood on a weekly basis, 27% expected to burn less often than once per week, and 48% did not expect to burn this season. Over the past decade, the propensity to burn wood among households with a wood-burning device has slowly declined.

Natural wood logs continue to be the most commonly-cited type of wood burned by Bay Area households, used by 66% of households as a primary or secondary choice. Manufactured logs, the second most popular option, were used by 43% of Bay Area households this winter. Three-quarters (73%) of households that burn natural wood reported that it is already dry and seasoned at the time it is acquired.

Wood burning behavior varies considerably depending on how frequently a household burns. Wood-burning households can easily be divided between the 48% that burn at least once per week (frequent burners) and the 52% that burn less often (infrequent burners). Not only do frequent burners build fires more often, they tend to burn significantly more hours per burn day (an average of 5.47 hours) and consume more wood per burn day (an average of 6.64 logs) when compared with infrequent burners (averages of 3.47 hours and 4.21 logs). Their reasons for burning wood are also different. Whereas frequent burners primarily build fires for heat (58%), infrequent burners primarily build fires for ambiance (73%). For more information about wood burning behavior in the Bay Area, see *Winter Wood Burning Behavior* on page 11.

How effective was the Winter Spare the Air Campaign during the 2013-2014 winter?

The Winter Spare the Air campaign seeks to shape public awareness and opinions about the District and air quality issues, as well as change behavior with respect to burning wood. Accordingly, the survey sought to measure the impacts that the campaign had on each of these dimensions.

By virtually every measure, the BAAQMD followed a successful 2012-2013 Winter Spare the Air campaign with an even more impressive 2013-2014 effort. From a messaging standpoint, the campaign matched and

often exceeded previous high-water marks regarding awareness of and exposure to the Spare the Air Alert Program. For example, the percentage of residents who were aware that a Spare the Air episode had been called on the prior day was at an all-time high of 45%, twice the percentage (22%) found in 2010 and significantly higher than the levels found in 2012 (37%). General exposure to news stories, advertisements, or public service announcements about the Program during the winter season also saw a significant gain, up from 61% in 2012 to 65% in the current study. General awareness of the District's no-burn policy on Spare the Air nights also jumped significantly in the past year, reaching an all-time high of 66% this season.

With respect to the public's attitudes about wood smoke, the Program has succeeded in raising recognition of the negative health impacts of breathing wood smoke by 21 percentage points since 2002. This increased awareness of the health-related problems caused by wood smoke arguably underpins what is broad support for the BAAQMD's adoption of the *Regulation 6, Rule 3: Wood-burning Devices* policy designed to improve air quality in the region. Despite having a record number of Spare the Air events this season and concerns about the fatigue this pattern could cause among residents, 75% of Bay Area residents remain supportive of the policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels. Moreover, on popular wood-burning holidays such as Christmas and New Year's, the overwhelming majority (91%) of households with a wood-burning device either do not typically burn or *would not* burn on holidays if a Spare the Air Alert episode were called.

So how did these positive patterns in attitudes and awareness translate to actual changes in wood-burning behavior? Based on the survey data, the Program motivated 11% of households with a wood-burning fireplace, pellet stove, or wood stove not to burn *at all* during the winter season, and another 20% not to burn on at least one occasion. In other words, nearly one-third (31%) of households with a wood burning device (340,909 households) reduced their wood burning during the 2013-2014 winter season because of the Winter Spare the Air campaign. This percentage is the highest ever recorded over the previous eight studies, during which the percentage of eligible households that reduced wood burning in response to the Program ranged from a low of 18% in 2006 to a high of 30% this season.

Does it make sense to target Spare the Air communications?

If the goal is to reduce wood burning, it makes sense to focus the campaign's efforts on households that contain wood-burning fireplaces, wood stoves and pellet stoves *and* intend to use them. By this criteria, Marin, Napa, Contra Costa, Solano and Sonoma counties are natural targets given the high rate of wood-burning devices in households and their tendency to use the devices. With the exception of Solano County, at least half of all households in these counties with a wood-burning device reported that they intended to use them during the 2013-2014 winter season, which is high when compared to the remaining counties in the District. Depending on the communication channel being used, further refinements could be made on a subregional level by targeting communities by home type, as older homes (20+ years) and single family homes are much more likely than their respective counterparts to contain a wood-burning device.

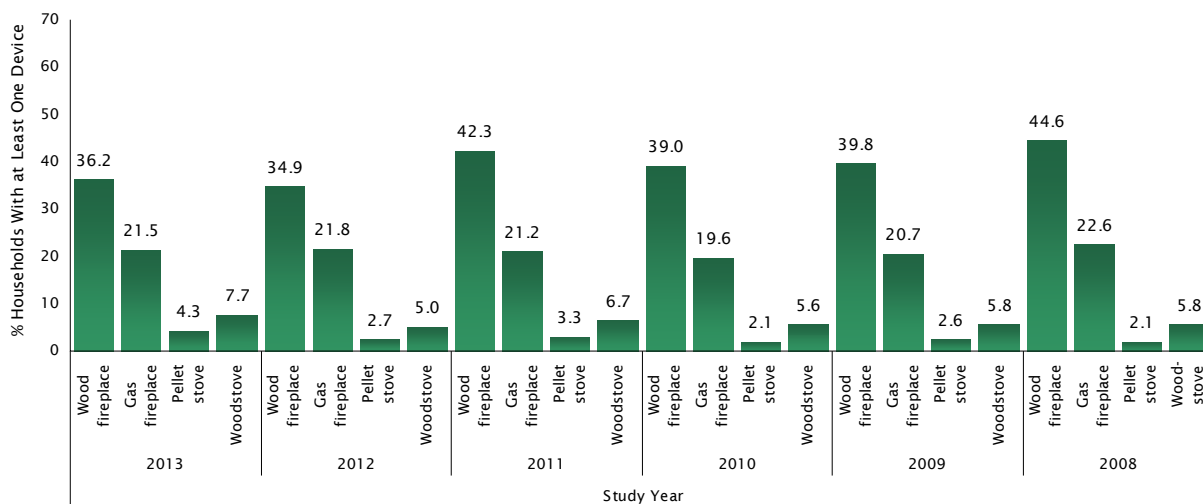
WINTER WOOD BURNING BEHAVIOR

One of the key objectives of the survey was to profile respondents' use of wood-burning heating devices, including fireplaces, pellet stoves, and wood stoves. Accordingly, the first series of questions in the survey asked respondents about the types of wood-burning heating devices they have in their home, as well as their use of these devices during the 2013-2014 winter months of November through February.

HEATING DEVICES The first question in this series asked respondents to identify how many wood-burning fireplaces, natural gas/propane burning fireplaces, wood stoves, and pellet stoves their household contains. As shown in Figure 1 for 2013, 36% of households reported that they contain at least one wood-burning fireplace, 22% contain at least one fireplace that burns natural gas or propane, 4% contain at least one pellet stove, and 8% contain at least one wood stove. Collectively, 43% of respondents reported that their household contained at least one *wood-burning* fireplace, pellet stove, or wood stove, whereas 57% of respondents indicated that their household does not contain a wood-burning heating device (see Figure 2 on page 12).⁵

Question 1 *Do you have a _____ in your home? If yes, ask: How many: _____s do you have in your home?*

FIGURE 1 HEATING DEVICES IN HOME BY STUDY YEAR (N = 1,300)⁶



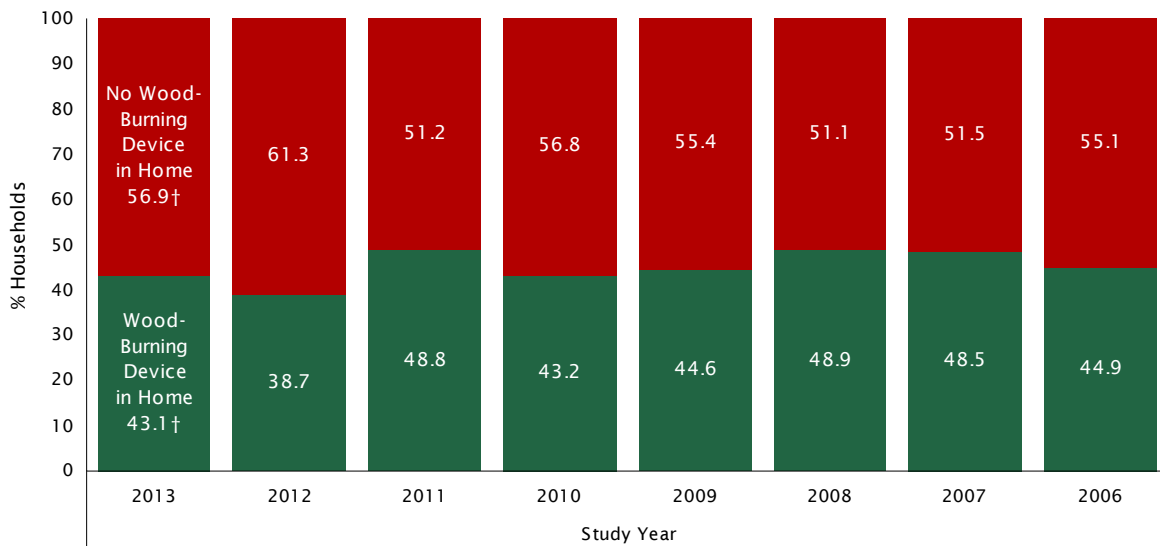
† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

- Because some households contained more than one type of heating device—e.g., a fireplace *and* a wood stove—one can not simply add the percentages shown in Figure 1 to determine the percentage of households that have at least one type of heating device.
- The $n = 1,300$ refers to the number of respondents who received this question. This convention continues throughout the report to allow the reader to identify how many respondents are included in each figure.

TABLE 1 NUMBER OF HEATING DEVICES IN HOME BY STUDY YEAR (N = 1,300)

		Number of Devices		
		One	Two	Three or more
2013	Wood-burning fireplace	32.1	3.0	1.2
	Gas / Propane fireplace	16.0	4.7	0.8
	Pellet stove	3.0	0.5	0.8
	Woods tove	6.3	1.3	0.1
2012	Wood-burning fireplace	31.8	2.8	0.4
	Gas / Propane fireplace	17.6	3.1	1.1
	Pellet stove	2.1	0.0	0.5
	Woods tove	4.7	0.3	0.0
2011	Wood-burning fireplace	37.1	4.7	0.6
	Gas / Propane fireplace	17.8	2.8	0.5
	Pellet stove	2.5	0.1	0.7
	Woods tove	5.0	0.8	0.9
2010	Wood-burning fireplace	33.2	5.7	0.2
	Gas / Propane fireplace	15.8	3.0	0.8
	Pellet stove	1.5	0.6	0.0
	Woods tove	5.2	0.4	0.0
2009	Wood-burning fireplace	35.1	4.0	0.7
	Gas / Propane fireplace	16.1	3.8	0.9
	Pellet stove	2.1	0.3	0.2
	Woods tove	5.2	0.6	0.0
2008	Wood-burning fireplace	39.6	4.0	1.0
	Gas / Propane fireplace	19.7	1.6	1.2
	Pellet stove	1.8	0.3	0.0
	Woods tove	5.2	0.5	0.2
2007	Wood-burning fireplace	38.0	4.7	0.6
	Gas / Propane fireplace	18.6	3.0	0.5
	Pellet stove	3.8	0.1	0.0
	Woods tove	4.0	0.3	0.0
2006	Wood-burning fireplace	35.2	4.8	1.2
	Gas / Propane fireplace	15.0	3.3	0.6
	Pellet stove	2.8	0.0	0.4
	Woods tove	3.9	0.1	0.0

FIGURE 2 WOOD-BURNING DEVICE IN HOME BY STUDY YEAR (N = 1,300)



† Statistically significant change (p < 0.05) between the 2012 and 2013 studies.

For the interested reader, the next two figures show how the presence of wood-burning fireplaces, wood stoves, and pellet stoves varied by county of residence (see Figure 3), home type, and age of home (see Figure 4).

FIGURE 3 WOOD-BURNING DEVICE IN HOME BY COUNTY OF RESIDENCE (N = 1,300)

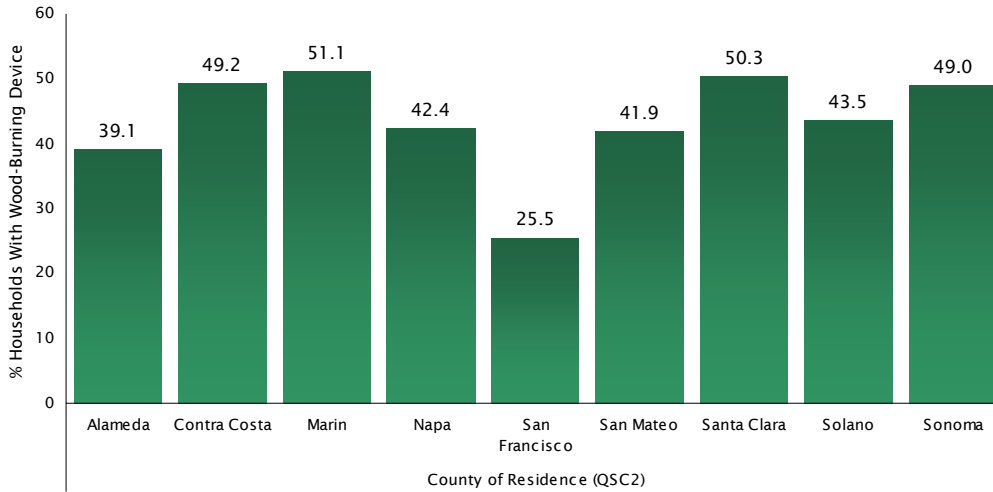
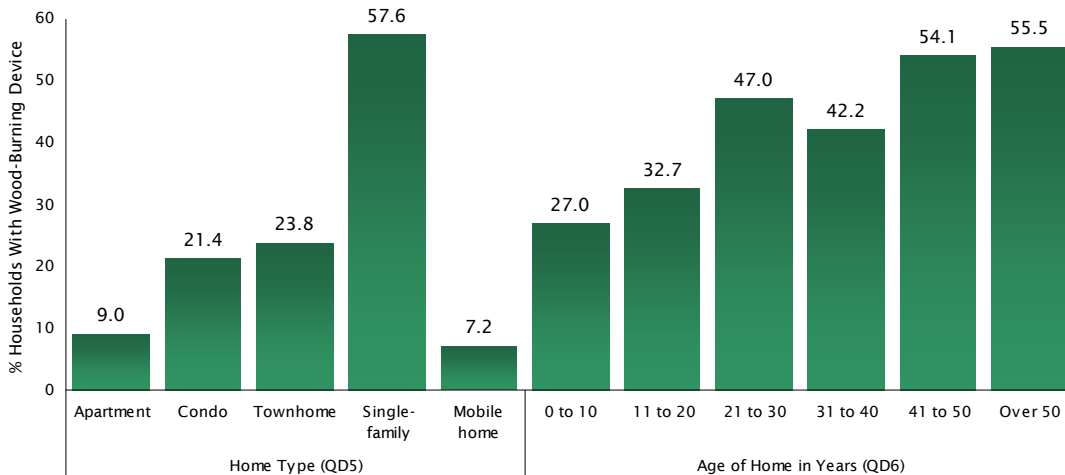


FIGURE 4 WOOD-BURNING DEVICE IN HOME BY HOME TYPE & AGE OF HOME IN YEARS (N = 1,300)



FUEL TYPE & SOURCE For the 43% of respondents who reported that their household contains a wood-burning fireplace or wood stove, the survey next inquired about the type of wood they *primarily* use in the fireplace or stove (see Figure 5). The most commonly used wood was natural wood logs (49%), followed by manufactured logs (18%). Twenty-five percent (25%) volunteered that they never use their wood-burning fireplace or wood stove. Compared with 2012, there were no statistically significant changes in fuel type. Figure 6 displays how the proportional use of natural wood versus manufactured logs as a primary type of wood burned varied by county among all households with a wood-burning fireplace or wood stove.

Question 2 What type of wood do you primarily use in your wood-burning fireplace or wood stove: natural wood logs, manufactured logs such as Duraflame or Presto, scrap wood, pallets, or some other fuel?

FIGURE 5 PRIMARY TYPE OF WOOD BURNED BY STUDY YEAR (N = 522)

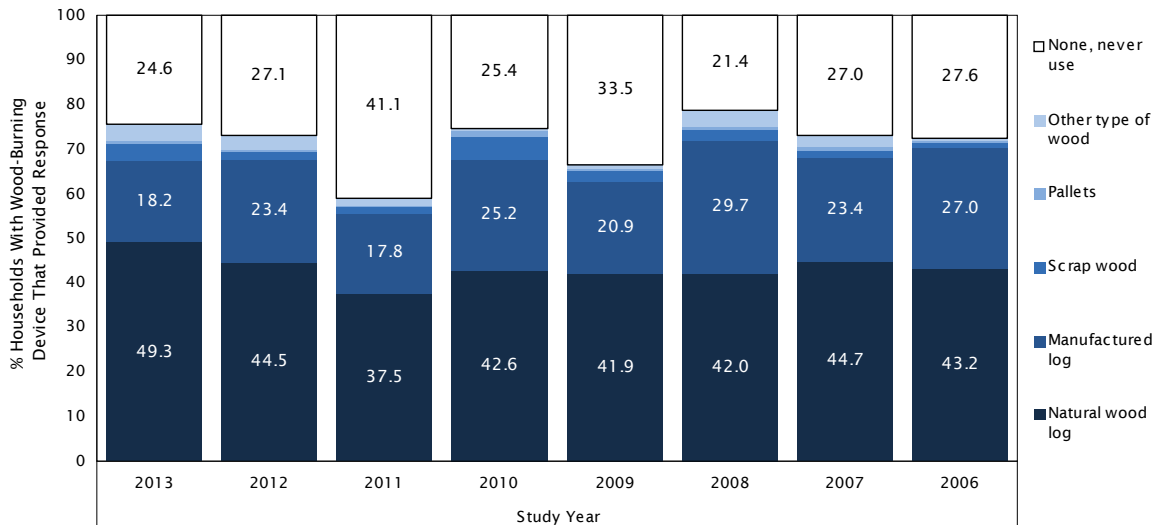
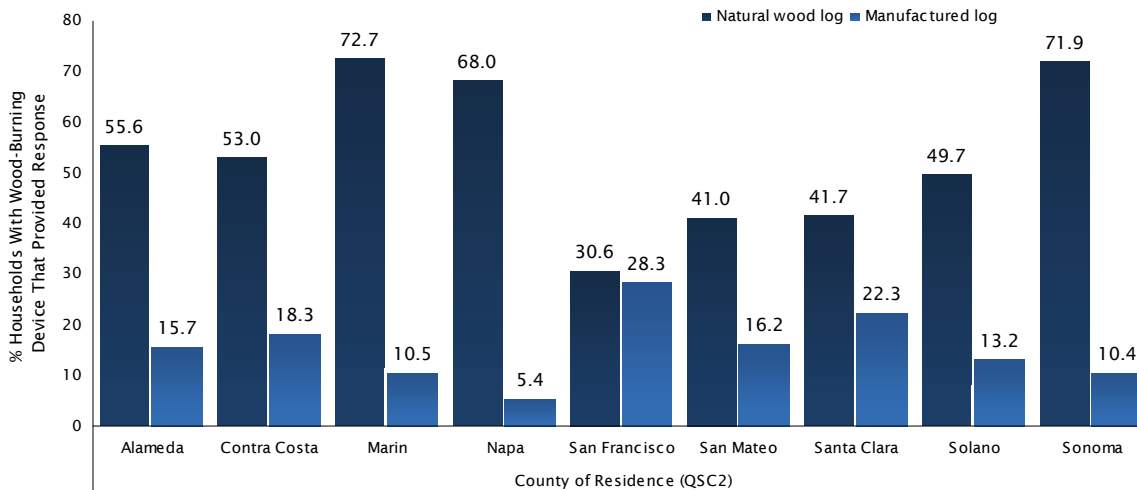


FIGURE 6 PRIMARY TYPE OF WOOD BURNED BY COUNTY OF RESIDENCE (N = 522)



First asked in the 2010-2011 survey, Question 3 asked respondents in households with a wood-burning fireplace or wood stove about any other types of wood burned, listing each of the wood types not mentioned as the *primary* type cited by the respondent in response to the previous question. Figure 7 combines responses to questions 2 and 3 to display the percentage of primary and secondary wood types burned among households with a wood-burning fireplace or wood stove. When considering primary *and* secondary options, the most commonly used wood was natural wood logs (66%), followed by manufactured logs (43%), and scrap wood (20%). Approximately 4% of respondents indicated that they use pallets, and 4% mentioned some other type of wood. Figure 8 displays how the use of natural wood versus manufactured logs as a primary or secondary type of wood burned varied by county among all households with a wood-burning fireplace or wood stove.

Question 3 *Do you also ever burn: _____?*

FIGURE 7 PRIMARY OR SECONDARY TYPE OF WOOD BURNED (N = 522)

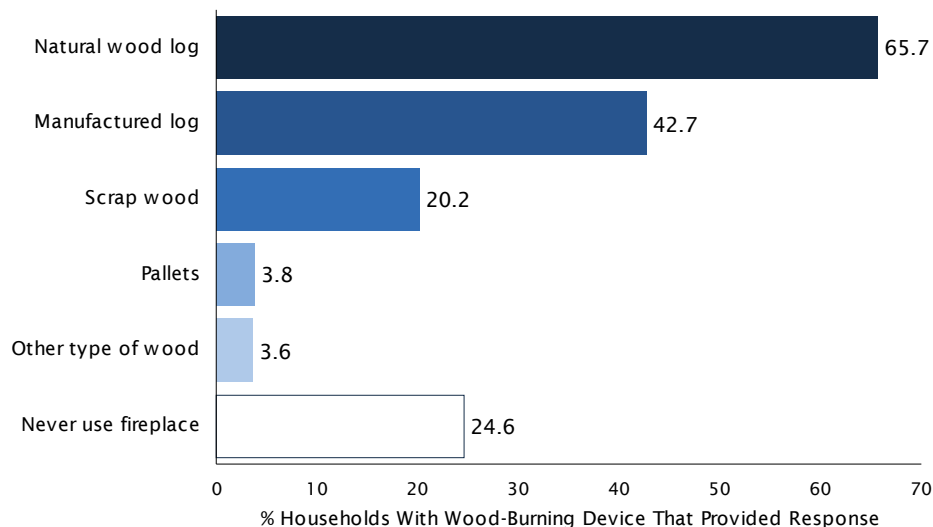


FIGURE 8 PRIMARY OR SECONDARY TYPE OF WOOD BURNED BY COUNTY OF RESIDENCE (N = 522)

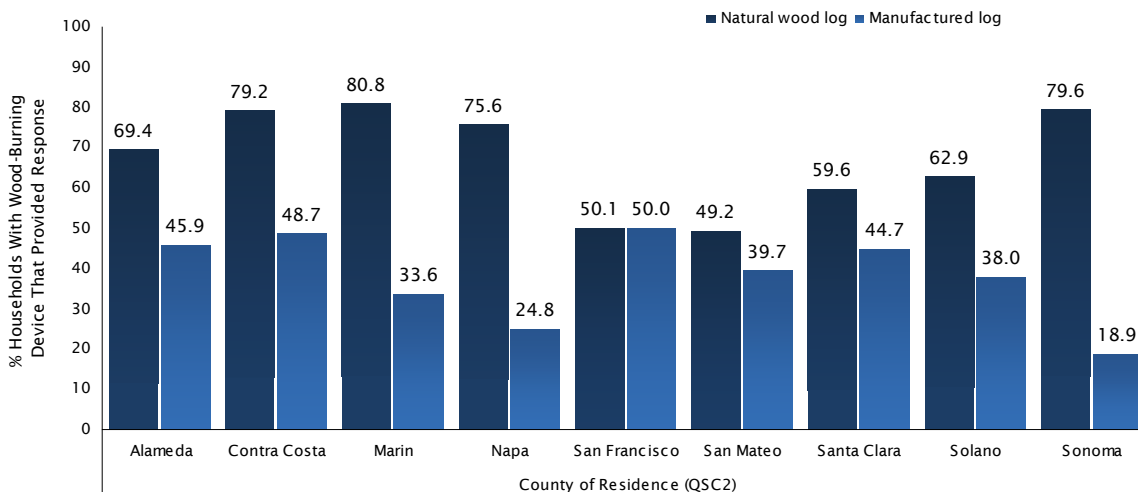
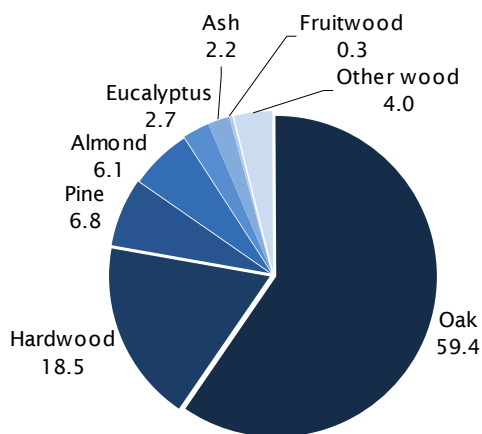


FIGURE 9 TYPE OF NATURAL WOOD BURNED (N = 295)



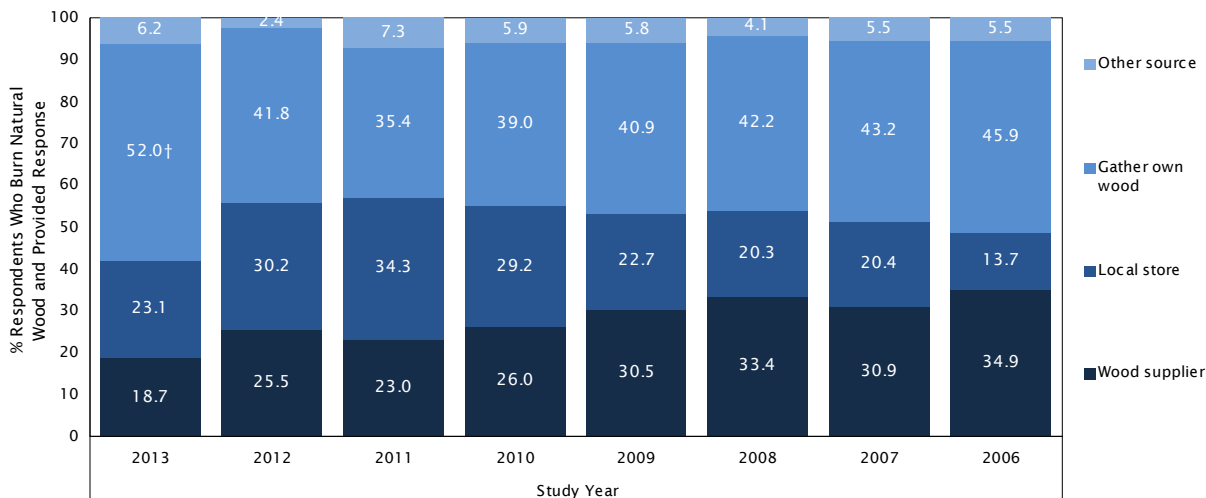
Question 4 *What type of natural wood do you typically burn?*

Households that reported they *primarily* burn natural wood were next asked a series of questions about the *type* of natural wood they burn (Question 4), from where they purchase their wood (Question 5), and the state of the wood they burn (Question 6). Approximately 24% of respondents in 2013 were unsure of the type of natural wood they burn. Figure 9 shows that among those who knew the type of wood, oak was the most common (59%), followed by hardwood in general (19%), and pine (7%).

When asked how they typically acquire their wood, respondents were split between those who gather their own (52%), those who purchase the wood from a local store (23%), and those who rely on a wood supplier (19%). Six percent (6%) mentioned an alternative source. When compared with 2012, there was a statistically significant increase in the percentage who indicated that they gather their own wood (see Figure 10).

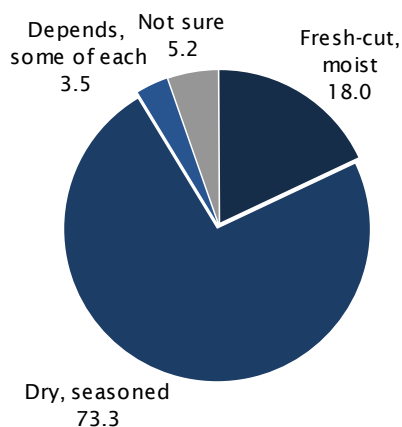
Question 5 *Do you typically purchase your wood from a wood supplier, the local store, or do you gather your own wood?*

FIGURE 10 SOURCE FOR NATURAL WOOD BY STUDY YEAR (N = 295)



Question 6 *At the point that you acquire your wood, is it fresh-cut and somewhat moist or is it already dry and seasoned?*

FIGURE 11 CONDITION OF WOOD AT POINT OF ACQUISITION (N = 295)

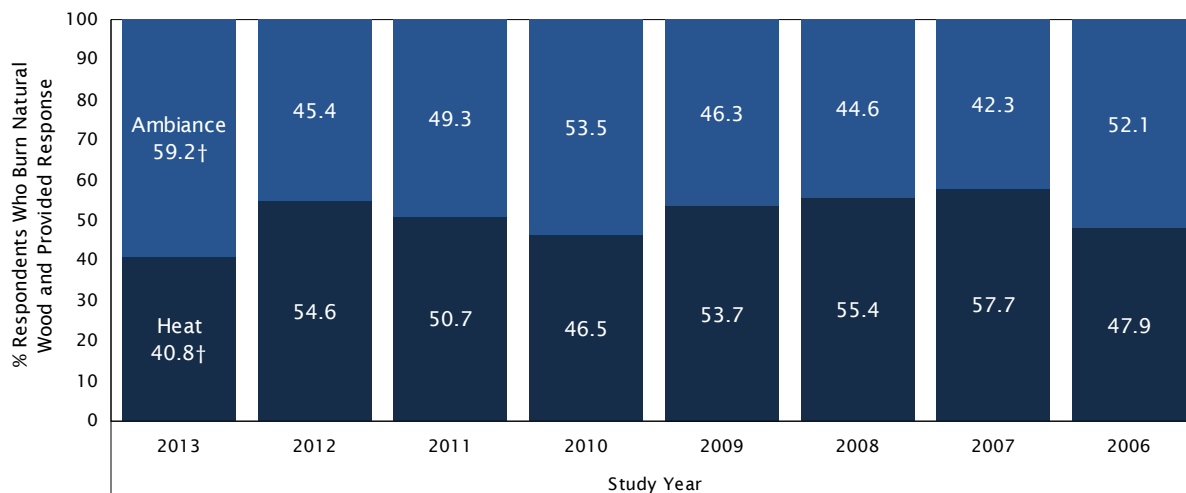


For those who primarily burn natural wood, the survey next inquired if, at the point the respondent acquires the wood, the wood is fresh-cut and somewhat moist, or if it is already dry and seasoned. As shown in Figure 11, three-quarters (73%) of respondents in 2013 said their wood is already dry and seasoned at the time they acquire it, whereas 18% reported that they typically acquire wood that is fresh-cut, 4% said that it depends or is a mixture, and 5% were unsure.

PRIMARY REASON FOR BURNING WOOD Households that have a wood-burning fireplace or wood stove and expected to use it during the winter were next asked to indicate the *primary* reason for why they use the device: to heat their home, or for the ambiance of having a fire? Figure 12 shows that 59% of respondents indicated that they primarily burn wood in their fireplace or wood stove for ambiance, and 41% do so for heat. These findings represent a statistically significant change from the 2012 study.

Question 7 *When you use your fireplace or wood stove, which of the following would you say is the primary reason you do so? For heating your home or for the ambiance of having a fire?*

FIGURE 12 PRIMARY PURPOSE OF WOOD BURNING BY STUDY YEAR (N = 295)



USE OF FIREPLACE, WOOD STOVE OR PELLET STOVE Respondents whose household contained at least one wood-burning fireplace, natural gas/propane fireplace, pellet stove, or wood stove were next asked, for each device they own, whether they have used or intend to use the device this winter from November to February. As shown in Figure 13, approximately two-thirds of households in 2013 that contain a gas fireplace (63%) and/or a pellet stove (63%) indicated that they would use the device this winter. The rate of use was lower for wood stoves (51%) and wood-burning fireplaces (49%). The results for the 2013 through 2008 studies are presented for comparison.

Question 8 Will you use your _____ this winter?

FIGURE 13 HEATING DEVICE USAGE THIS WINTER BY STUDY YEAR (WOOD-BURNING FIREPLACE N = 471 GAS FIREPLACE N = 286; PELLET STOVE N = 56; WOOD STOVE N = 103)

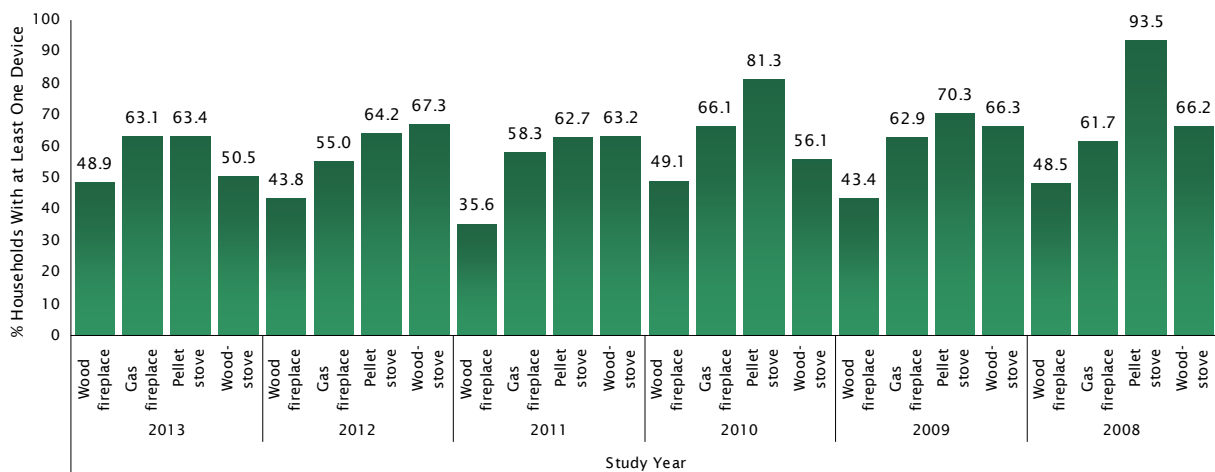


FIGURE 14 OVERALL WOOD-BURNING DEVICE USAGE THIS WINTER BY COUNTY OF RESIDENCE (N = 502)

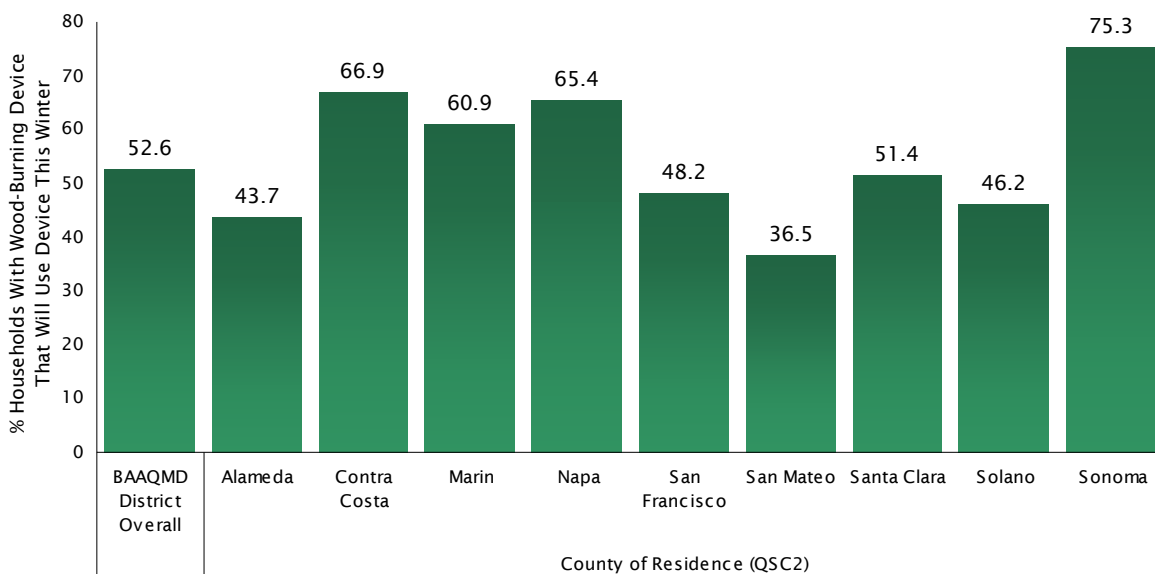
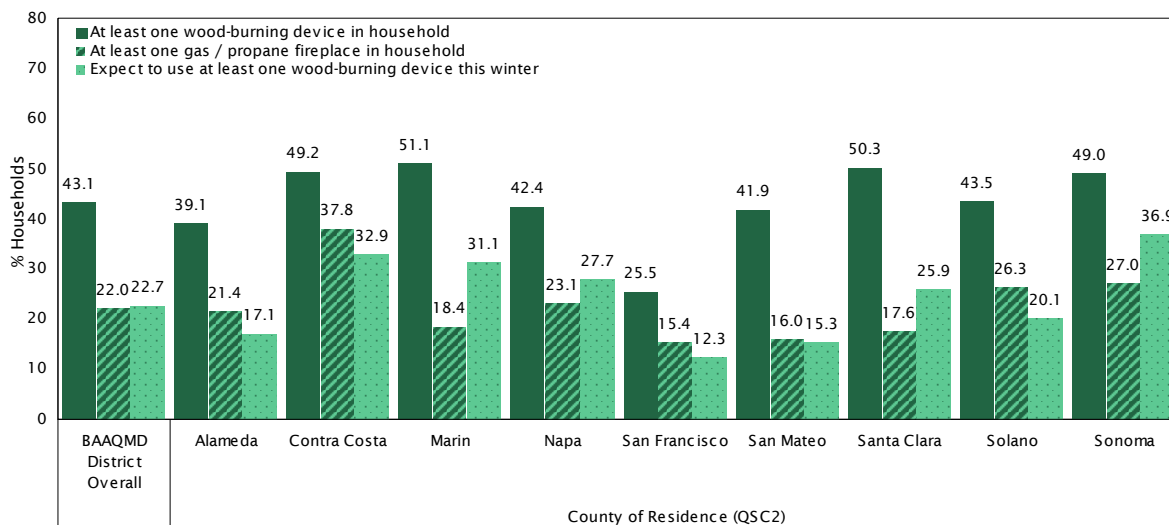


Figure 14 on the previous page summarizes the information collected in Question 8 among all households with a wood-burning device—overall and by county. Overall, 53% of households with at least one wood-burning device indicated that they would use the device this winter. The reported rate of expected use in 2013 among households with a wood-burning device was highest in Sonoma County (75%) and lowest in San Mateo County (37%).

Below, Figure 15 provides a more detailed summary of the presence and expected use of wood-burning heating devices for the District as a whole, as well as by the nine member counties. Among *all households in the District*, 43% own a wood-burning fireplace, pellet stove, or wood stove, 22% own a natural gas/propane fireplace, and 23% expected to use a wood-burning device this winter. San Mateo County residents reported the greatest gap between ownership (42%) and expected use (15%).

FIGURE 15 WOOD-BURNING DEVICE USAGE THIS WINTER BY COUNTY OF RESIDENCE (N = 1,300)



Respondents who indicated that they do not expect to use their fireplace, wood stove, or pellet stove this winter in Question 8 were next asked to indicate *why* they do not intend to use the device. Figure 16 summarizes the results of those who offered program-related reasons. Approximately 17% of wood-burning fireplace owners who did not intend to use the device this winter offered a reason related to air quality and an additional 24% mentioned a specific health-related reason. Approximately 17% of pellet stove owners and 8% of wood stove owners who did not intend to use their device mentioned a reason related to air quality or health concerns. The remaining respondents offered a reason unrelated to air quality or health.

Question 9 Why do you not expect to use your _____ this winter?

FIGURE 16 REASON FOR NOT USING HEATING DEVICE THIS WINTER (WOOD-BURNING FIREPLACE N = 230; GAS FIREPLACE N = 100; PELLET STOVE N = 15; WOOD STOVE N = 42)

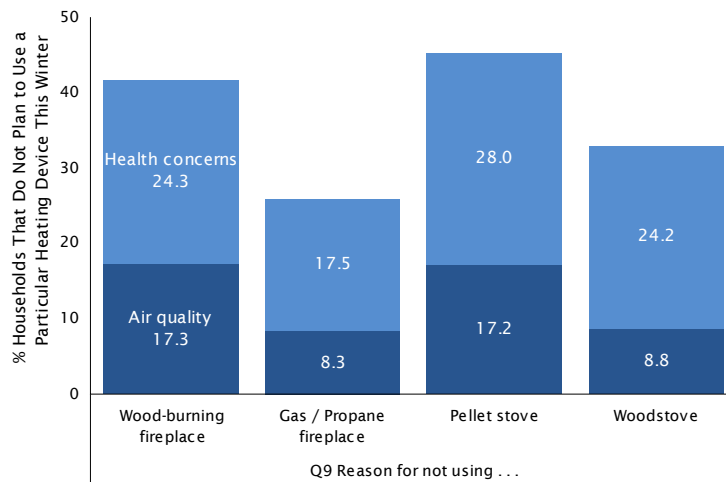
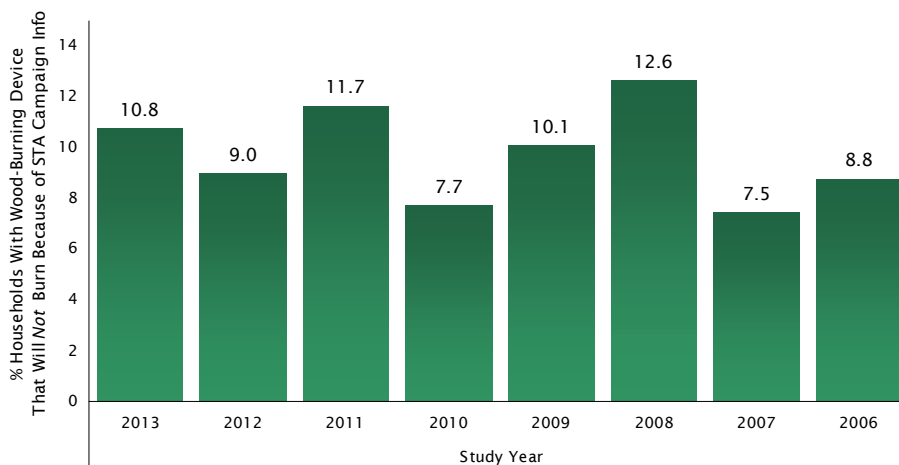


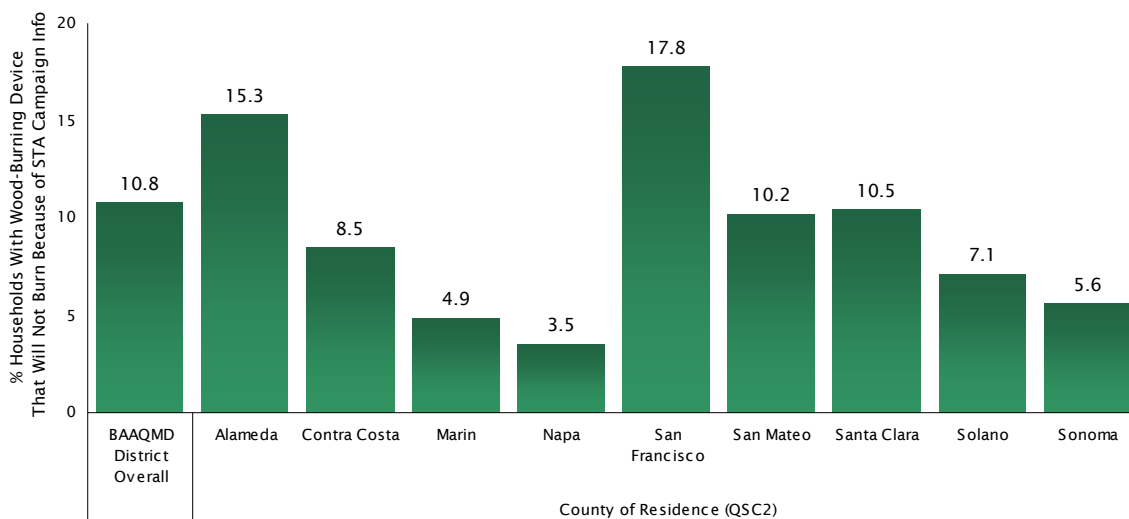
Figure 17 displays the percentage of households that own a wood-burning fireplace, wood stove, or pellet stove and indicated that they will not use the device this winter for reasons that can be attributed to the Winter Spare the Air Alert Program.⁷ Overall, 11% of households District-wide reported that they would not use their wood-burning heating device at all during the 2013-2014 winter season due to the Program. Among the nine member counties, San Francisco had the highest percentage of wood-burning device-owning households that fit this description, whereas Napa and Marin had the lowest (see Figure 18 on page 21).

FIGURE 17 NOT BURNING WOOD THIS WINTER BECAUSE OF WINTER SPARE THE AIR ALERT PROGRAM BY STUDY YEAR (N = 561)



7. That is, they mentioned air quality and/or health-related reasons for not using the wood-burning device this winter *and* they were aware of the Winter Spare the Air Alert Program. Note that this figure does not include households that intend to use their wood-burning device, but did refrain from burning wood on at least one occasion due to the Program (see Figure 37 on page 32 for figure on full program impacts).

FIGURE 18 NOT BURNING WOOD THIS WINTER BECAUSE OF WINTER SPARE THE AIR ALERT PROGRAM BY COUNTY OF RESIDENCE (N = 561)



SEASONAL WOOD BURNING BEHAVIOR The next series of questions was asked only of respondents who owned at least one wood-burning fireplace, pellet stove, or wood stove *and* indicated that they would burn wood during the 2013-2014 winter months.

The first question (Question 10) asked each respondent how often they expected that they would burn wood this winter—at least once per week or less often? Respondents who indicated that they expected to burn wood less often than once per week were next asked (Question 11) to be more specific as to how often they expected to burn wood—two to three times per month, once per month, or less often than once per month? For respondents who indicated that they expected to burn wood weekly, Question 12 asked how many days they expected to burn wood in a typical winter week. The results to all three questions are combined in Figure 19.

Overall, 48% of respondents indicated that they expected to burn wood on a weekly basis, although most (32%) stated that they would burn wood three or fewer days per week. Overall, 13% indicated that they expected to burn wood two to three times per month, 21% once per month, and 14% expected to burn wood less often than once per month. When compared with 2012, there no statistically significant changes in the expected frequency of wood-burning among households that own a wood-burning device and expected to use it this winter (see Table 2 on the next page).

Question 10 How often do you expect to burn wood this winter? At least once per week or less often than that?

Question 11 Would you say that you will burn wood about two to three times per month, once per month, or less often than once per month?

Question 12 In a typical winter week, how many days do you expect to burn wood?

FIGURE 19 FREQUENCY OF WOOD BURNING THIS WINTER (N = 295)

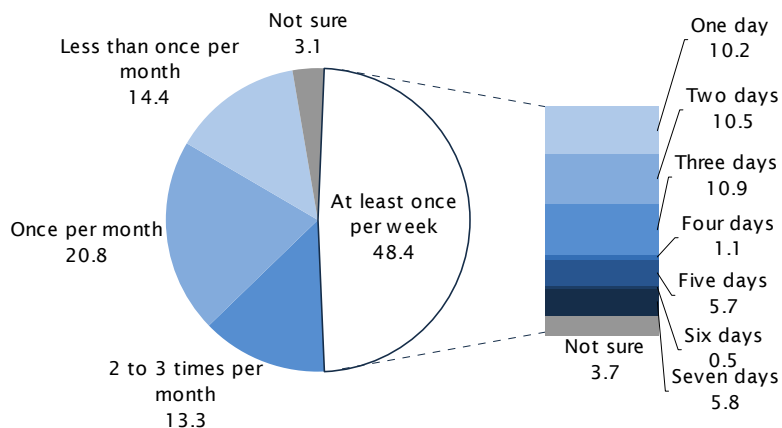


TABLE 2 FREQUENCY OF WOOD BURNING THIS WINTER BY STUDY YEAR (N = 295)

	Study Year							
	2013	2012	2011	2010	2009	2008	2007	2006
At least once per week	48.4%	51.3%	38.2%	40.2%	44.7%	48.7%	54.3%	52.9%
One day	10.2%	5.3%	10.1%	9.9%	11.9%	10.3%	10.4%	10.0%
Two days	10.5%	11.0%	6.8%	10.2%	8.2%	16.2%	8.6%	17.2%
Three days	10.9%	12.0%	4.4%	5.3%	6.9%	6.0%	10.1%	8.0%
Four days	1.1%	7.1%	2.4%	4.2%	4.3%	2.2%	6.6%	3.5%
Five days	5.7%	4.2%	3.5%	2.3%	2.1%	4.0%	8.3%	3.8%
Six days	0.5%	1.5%	0.2%	0.4%	0.6%	0.5%	0.2%	1.9%
Seven days	5.8%	5.0%	7.1%	4.5%	6.2%	5.9%	8.9%	7.2%
Not sure # of days	3.7%	5.2%	3.7%	3.4%	4.5%	3.6%	1.3%	1.3%
2 to 3 times per month	13.3%	15.7%	16.6%	22.4%	16.2%	19.8%	14.9%	15.0%
Once per month	20.8%	14.2%	24.8%	19.7%	20.0%	15.2%	18.0%	15.0%
Less than once per month	14.4%	15.8%	14.7%	11.4%	14.8%	13.2%	11.4%	16.4%
Not sure of frequency	3.1%	3.1%	5.7%	6.2%	4.3%	3.1%	1.4%	0.6%

Figures 20 and 21 on the next page provide a useful summary of wood burning behavior among households that own a wood-burning heating device in the District overall, as well as by county. Overall, 25% of households in 2013 expected to burn wood weekly, 27% expected to burn wood less frequently than once per week, and 48% indicated that they do not expect to burn wood this winter. When compared with 2012, there were no statistically significant changes.

Among the nine member counties, Napa County had the highest percentage of wood-burning device-owning households that expected to burn wood weekly, whereas Alameda and San Mateo County had the lowest.

FIGURE 20 FREQUENCY OF WOOD BURNING THIS WINTER AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY STUDY YEAR (N = 561)

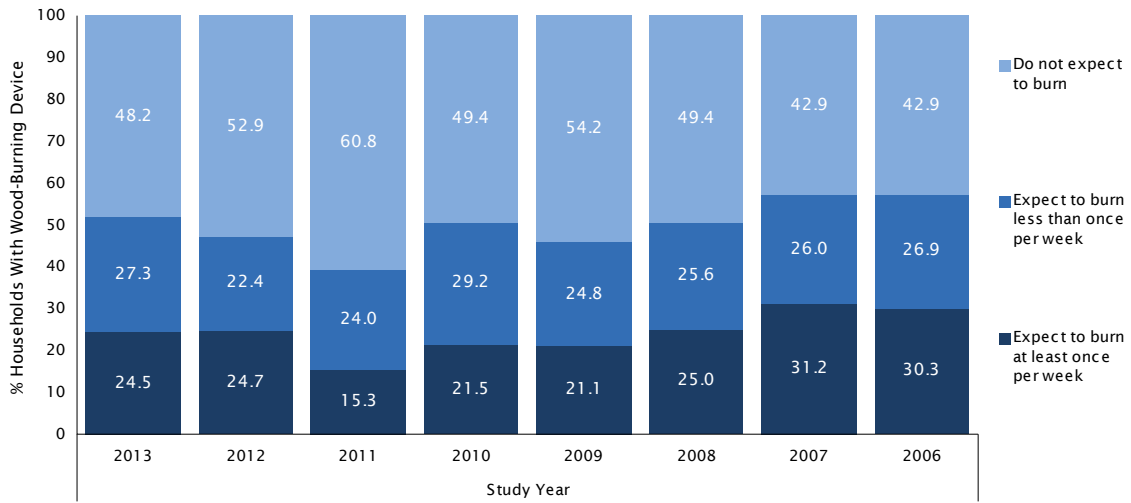
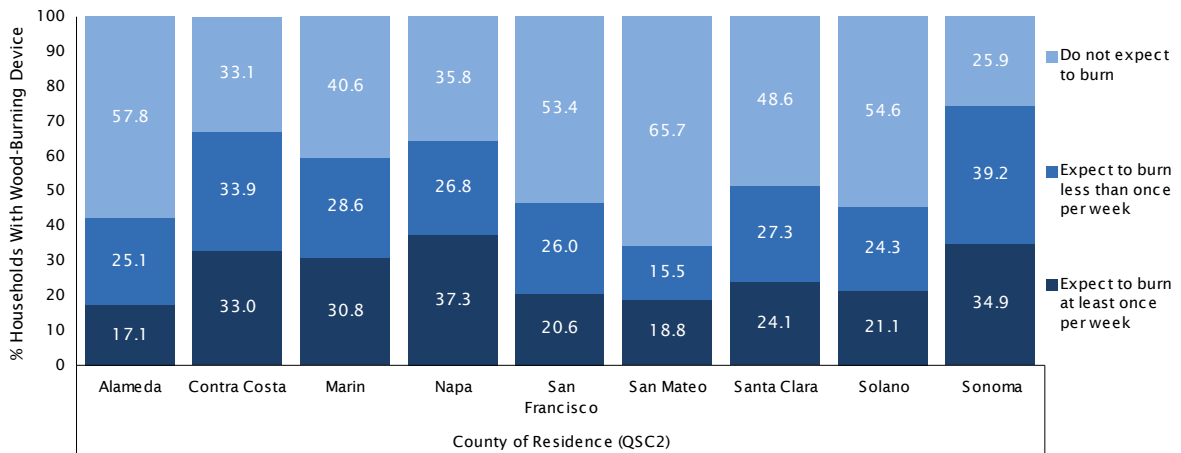


FIGURE 21 FREQUENCY OF WOOD BURNING THIS WINTER AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY COUNTY OF RESIDENCE (N = 561)



WOOD BURNING BEHAVIOR IN PAST WEEK Respondents were also asked whether they burned wood in the past week and, if yes, if they burned wood the day or evening prior to the interview. The results to these two questions are combined in Figure 22. Thirty-two percent (32%) of respondents whose household includes at least one wood-burning fireplace, pellet stove, and/or wood stove *and* expected to burn wood during the winter months indicated that they had burned wood during the week prior to the interview. Moreover, 14% had burned wood the day prior to the interview. When compared with the 2012 season, there was a statistically significant decrease in the percentage of households in this subgroup that reported they had burned wood in the week prior to the interview (see Table 3).

Question 13 *Did you burn wood in the past seven days?*

Question 14 *Did you burn wood yesterday or last night?*

FIGURE 22 BURNED WOOD IN PAST SEVEN DAYS (N = 295)

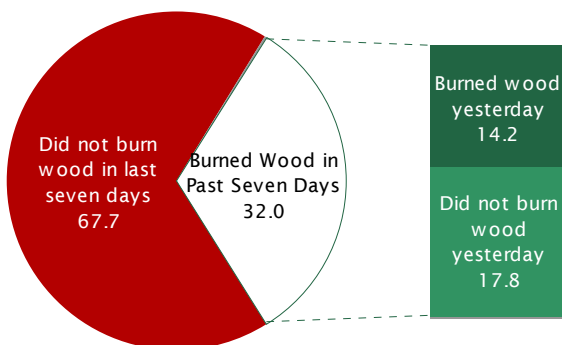


TABLE 3 BURNED WOOD IN PAST SEVEN DAYS BY STUDY YEAR (N = 295)

	Study Year							
	2013	2012	2011	2010	2009	2008	2007	2006
Burned wood in past seven days	32.0%†	41.9%	37.0%	39.1%	50.9%	54.4%	62.4%	60.8%
Burned wood yesterday	14.2%	16.2%	11.1%	17.0%	13.8%	15.1%	27.2%	22.3%
Did not burn wood yesterday	17.8%	25.7%	25.2%	22.1%	37.0%	39.1%	34.8%	38.5%
Not sure of burning yesterday	0.0%	0.0%	0.7%	0.0%	0.1%	0.1%	0.4%	0.0%
Did not burn wood in last seven days	67.7%†	57.9%	63.0%	59.2%	65.0%	61.5%	45.8%	49.0%
Not sure of burning in past seven days	0.3%	0.2%	0.0%	1.7%	0.2%	0.0%	0.7%	0.0%

The next four figures show the percentage of all wood-burning device-owning households that burned wood in the seven days prior to the interview (figures 23 and 24) and on the day prior to the interview (figures 25 and 26) for the District as a whole, as well as by the nine member counties. Between 2012 and 2013, there were no significant changes in the percentage of all wood-burning device households that burned in the past week or in the past day.

FIGURE 23 BURNED WOOD IN PAST SEVEN DAYS AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY STUDY YEAR (N = 561)

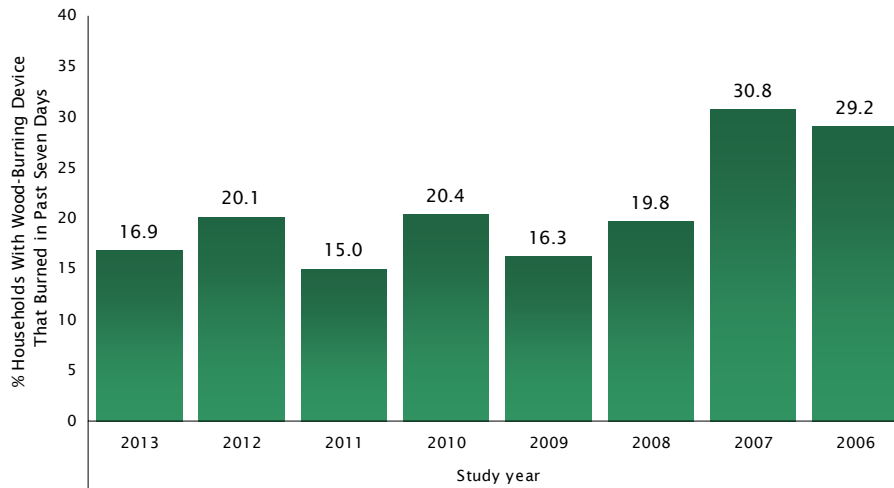


FIGURE 24 BURNED WOOD IN PAST SEVEN DAYS AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY COUNTY OF RESIDENCE (N = 561)

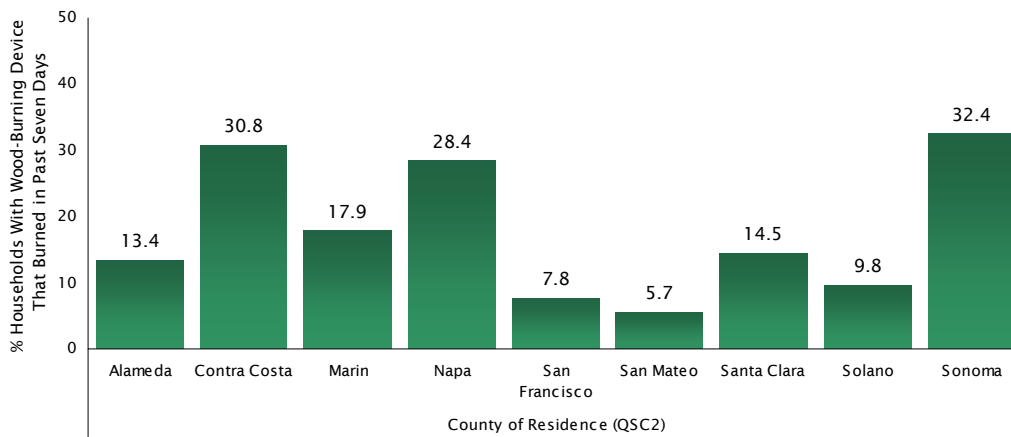


FIGURE 25 BURNED WOOD YESTERDAY AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY STUDY YEAR (N = 561)

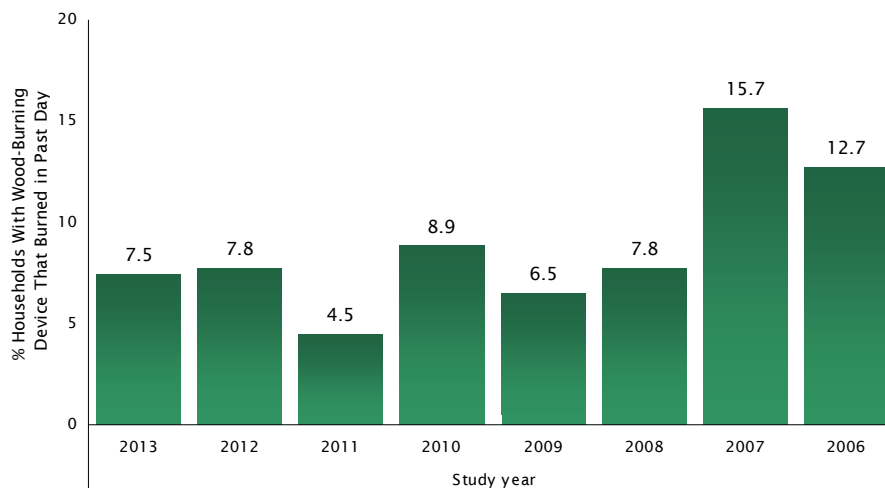
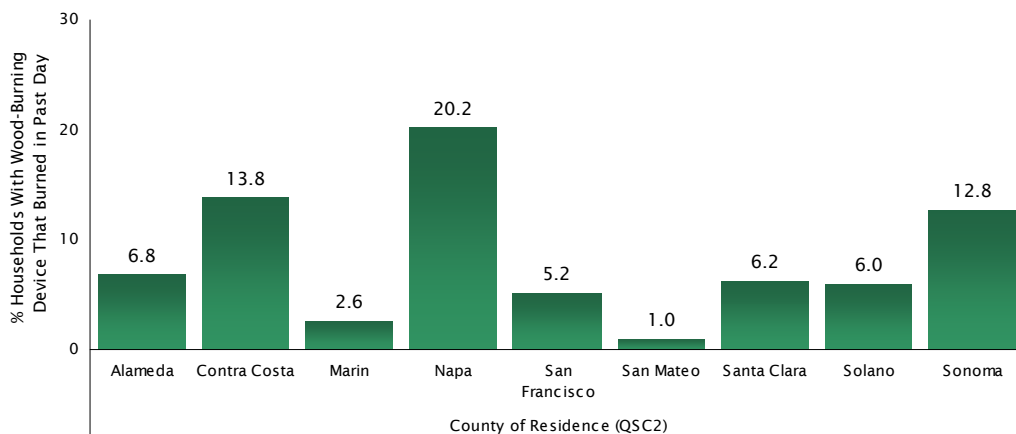


FIGURE 26 BURNED WOOD YESTERDAY AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY COUNTY OF RESIDENCE (N = 561)



DURATION & VOLUME OF WOOD BURNING Questions 15 and 16 asked respondents with wood-burning devices who also expected to use the device this winter to estimate the number of hours they have a fire burning, as well as the number of logs they burn, on a typical day that they burn wood. In terms of hours, respondents were split between those who burn at least four hours on a typical day (40%), those who burn approximately three hours per day (26%), and those who burn fewer than three hours (33%). The average duration among all respondents who received this question in 2013 was 4.47 hours, which is similar to the 4.38 hours reported in 2012. Among the nine member counties, respondents from Sonoma County reported the highest average hours burned per burn day at 6.22 hours (Figure 28). Frequent burners also reported a longer duration (5.47 hours) for a typical burn day when compared with those who burn less than once per week (3.47 hours).

Question 15 *In a typical day that you burn wood, how many hours of the day do you have a fire burning?*

FIGURE 27 DISTRIBUTION AND AVERAGE HOURS OF BURNING IN TYPICAL DAY OF WOOD-BURNING BY STUDY YEAR (N = 295)

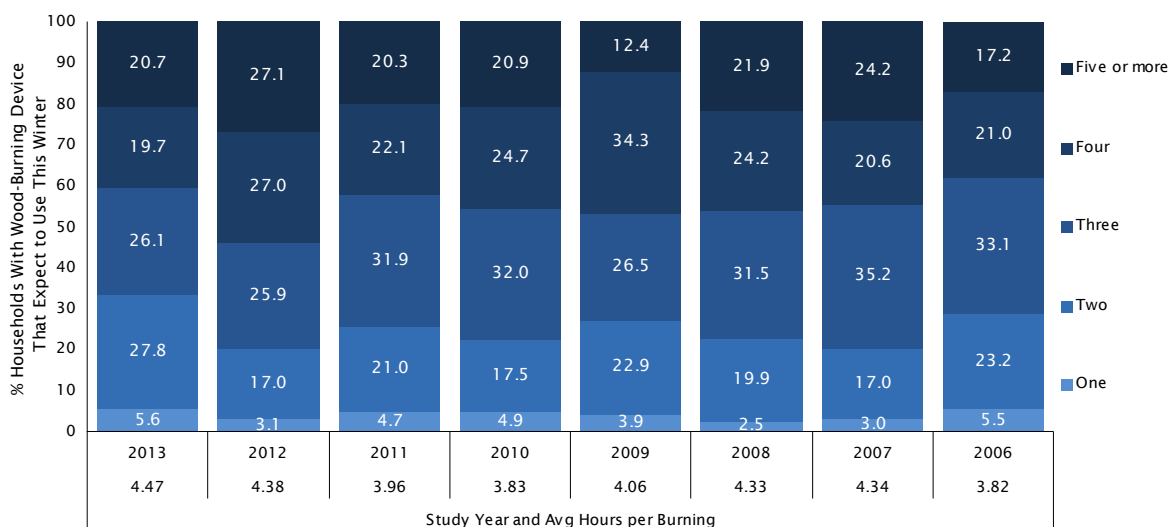
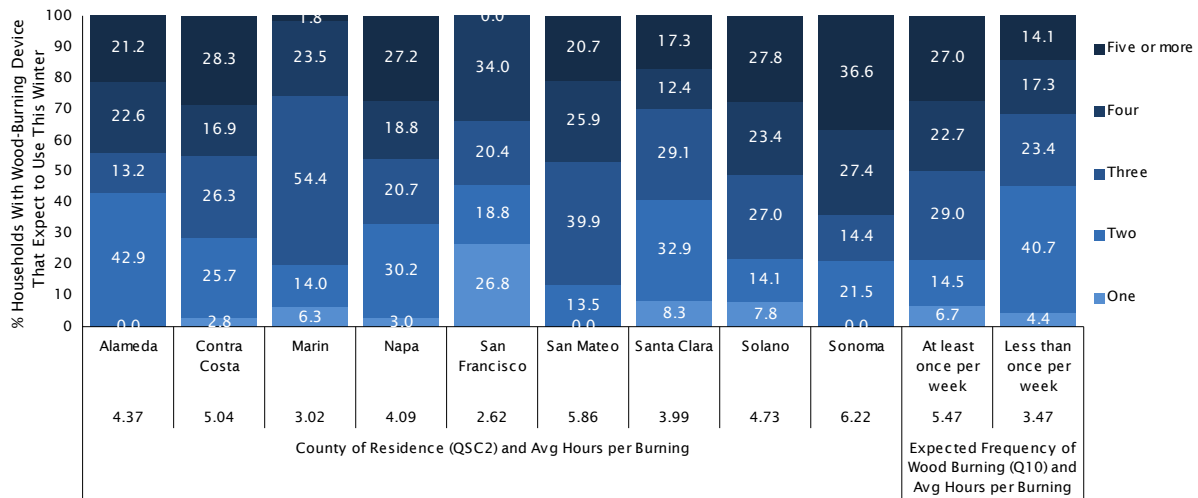


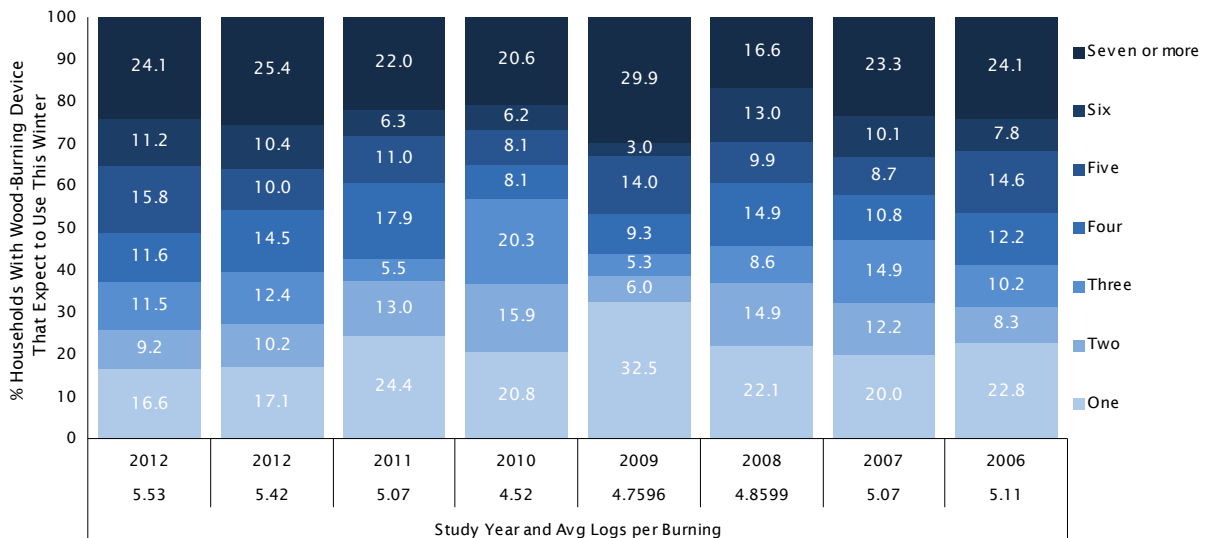
FIGURE 28 DISTRIBUTION AND AVERAGE HOURS OF BURNING IN TYPICAL DAY OF WOOD-BURNING BY COUNTY OF RESIDENCE & EXPECTED FREQUENCY OF WOOD BURNING (N = 295)



In terms of volume, respondents were split in 2013 between those who burn one or two logs per typical burn day (26%), those who estimated that they burn three to five logs (39%), and those who reported burning more than five logs per day (35%). The average number of logs reported per burn day in 2013 was 5.53, similar to the 5.42 recorded in the prior study (Figure 29).

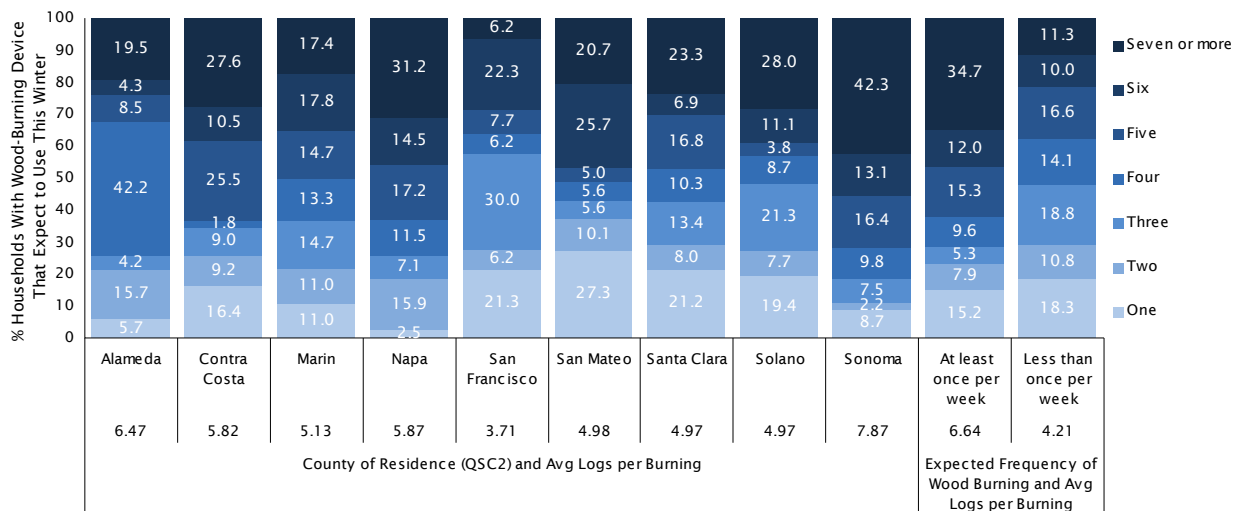
Question 16 *In a typical day that you burn wood, how many logs do you burn throughout the entire day?*

FIGURE 29 DISTRIBUTION AND AVERAGE NUMBER OF LOGS BURNED IN TYPICAL DAY OF WOOD-BURNING BY STUDY YEAR (N = 260)



As shown in Figure 30 on the next page, counties that reported longer than average burn durations on a typical burn day also tended to report higher than average volumes of logs burned per burn day. Frequent burners also reported a higher number of logs burned (6.64) per burn day when compared with their counterparts (4.21) who burn less frequently than once per week.

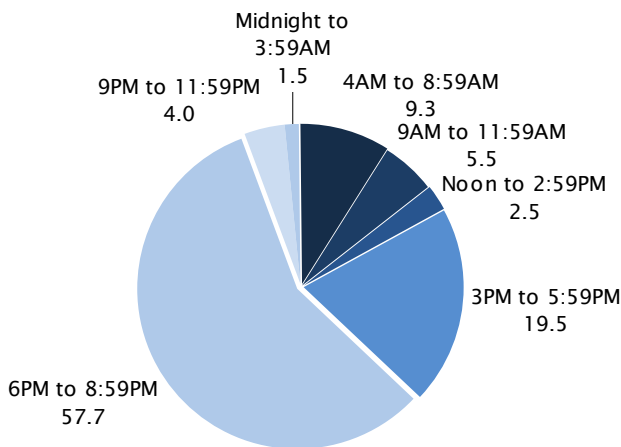
FIGURE 30 DISTRIBUTION AND AVERAGE NUMBER OF LOGS BURNED IN TYPICAL DAY OF WOOD-BURNING BY COUNTY OF RESIDENCE & EXPECTED FREQUENCY OF WOOD BURNING (N = 260)



The final question in this series asked respondents to identify the time of day that they first lit their most recent fire. More than half (58%) of respondents indicated that they started their most recent fire between 6PM and 8:59PM, and an additional one-fifth (20%) started their fire a bit earlier between 3PM and 5:59PM (see Figure 31).

Question 17 *Thinking back to your most recent fire, approximately what time of the day did you first light the fire?*

FIGURE 31 TIME OF LIGHTING MOST RECENT FIRE (N = 295)



CHANGES IN WOOD BURNING BEHAVIOR

Having measured respondents' basic wood burning behavior, the survey next focused on whether respondents had made changes in their wood burning behavior during the 2013-2014 winter season in response to the Winter Spare the Air Alert Program or other factors.

GENERAL CHANGES IN WOOD BURNING BEHAVIOR The first question in this series asked respondents if they expected to burn wood more frequently, less frequently, or at about the same frequency as the prior winter season. Overall, 52% of households that own a wood-burning heating device and expected to burn wood this season anticipated burning wood at about the same frequency this season as last (Figure 32). Approximately one-quarter (27%) expected to burn less often this season, and 10% expected to burn more frequently. Among the nine member counties, Napa County contained the highest proportion of households that expected to burn more frequently this season, whereas San Mateo County contained the largest percentage that expected to burn less frequently (see Figure 33).

Question 18 *This winter, do you expect that you will burn wood more often, less often, or about the same frequency as you did last winter?*

FIGURE 32 EXPECTED FREQUENCY OF WOOD BURNING THIS WINTER COMPARED WITH LAST WINTER BY STUDY YEAR (N = 295)

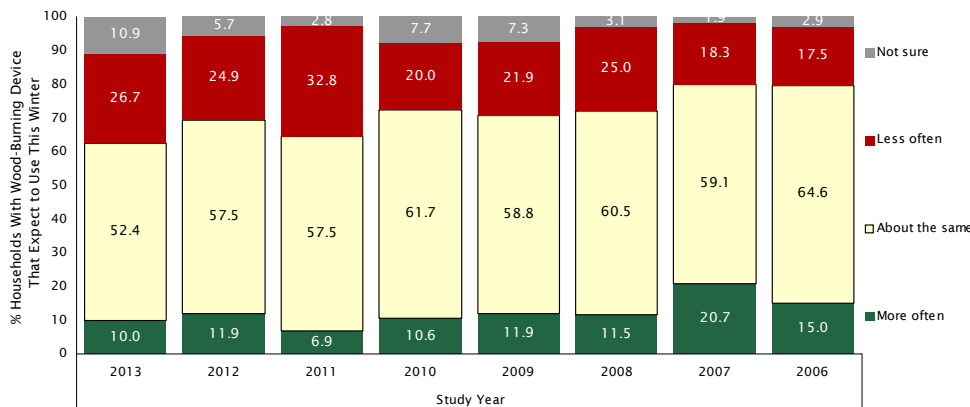
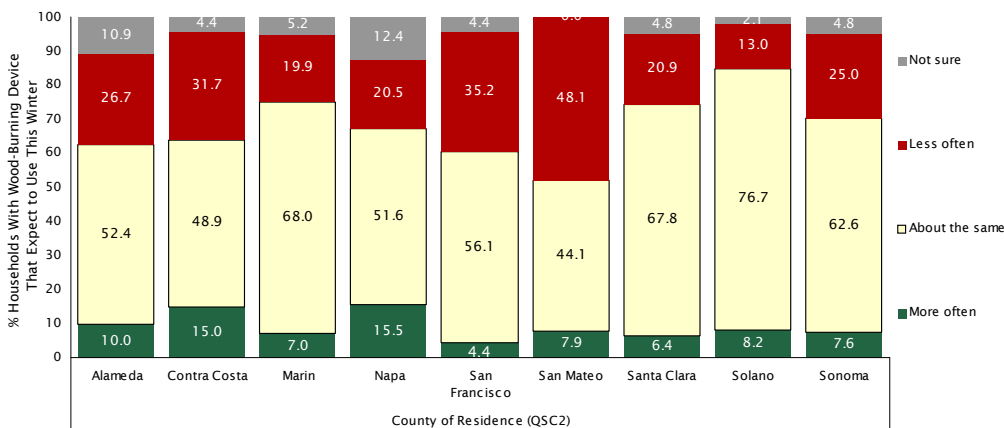


FIGURE 33 EXPECTED FREQUENCY OF WOOD BURNING THIS WINTER COMPARED WITH LAST WINTER BY COUNTY OF RESIDENCE (N = 295)

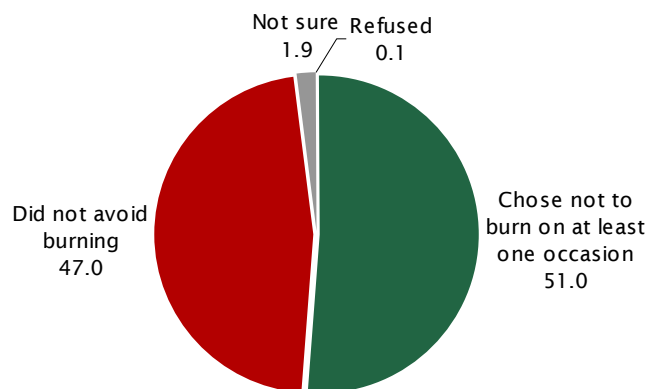


SEASONAL CHANGES IN WOOD BURNING BEHAVIOR Those in households that burned wood this winter (or anticipated doing so) were next asked whether there were occasions when they normally would have burned wood, but refrained from doing so. For those who answered in the affirmative, the survey next asked in an open-ended manner *why* they decided not to burn wood on these occasions.

The manner in which these questions were asked, as well as their placement in the survey relative to specific questions about the Winter Spare the Air Alert Program, was changed in 2004 from prior surveys. Previous surveys first introduced the Winter Spare the Air Alert Program and then asked if individuals responded to the Program by reducing the amount of wood they burned. Asking the question in this manner is likely to prompt a *socially desirable* response from some respondents that they had reduced their wood burning even if they had not—which leads to artificially high estimates of the Program’s impact. To more accurately measure reductions in wood burning that can be attributed to the Program, the 2004 to 2013 surveys employed an indirect approach similar to that used in the CARB/EPA Method for estimating reductions in driving due to the summer Spare the Air Program.

As shown in Figure 34, 51% of respondents who have a wood-burning fireplace, wood stove, and/or pellet stove *and* expected to burn wood during the 2013-2014 winter season indicated that, on at least one occasion this season, they refrained from burning wood. When asked *why* they chose not to burn wood on these occasions, 31% specifically mentioned the Winter Spare the Air Alert Program and an additional 8% offered an air quality or health-related reason (see Figure 35).⁸ When compared with 2012, there were no statistically significant changes for the 2013 season. For the interested reader, the proportion of respondents who mentioned the Program or air quality and/or health reasons as a reason for not burning wood at least once this winter is shown by county in Figure 36 on page 31.

FIGURE 34 CHOSE NOT TO BURN THIS WINTER (N = 295)



Question 19 *Were there occasions this winter when you normally would have burned wood, but decided not to?*

Question 20 *Why did you decide not to burn wood on these occasions?*

8. Among those who refrained from burning wood due to Winter Spare the Air, air quality and/or health-related reasons, the average number of occasions they refrained from burning wood during the season prior to taking the interview was 6.12.

FIGURE 35 CHOSE NOT TO BURN THIS WINTER BECAUSE OF WINTER SPARE THE AIR ALERT PROGRAM INFO OR AIR QUALITY / HEALTH CONCERNS BY STUDY YEAR (N = 295)

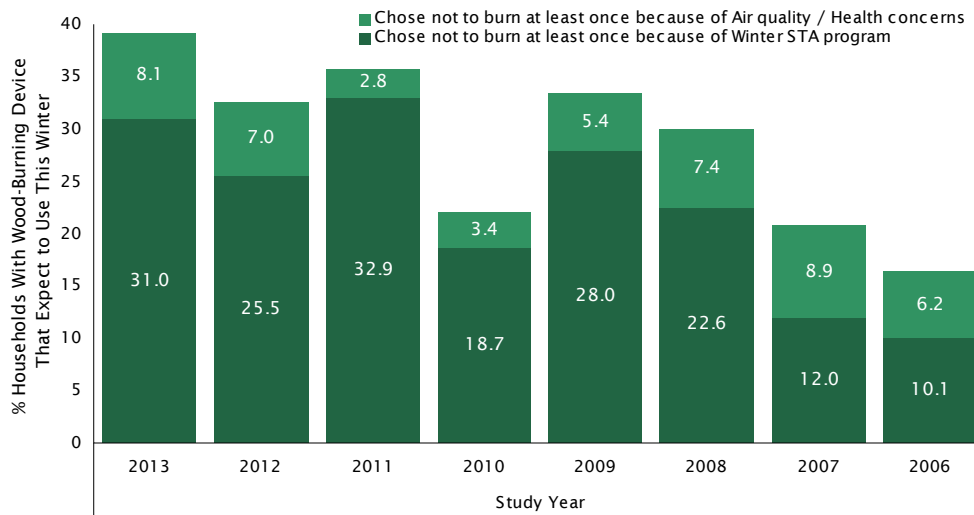
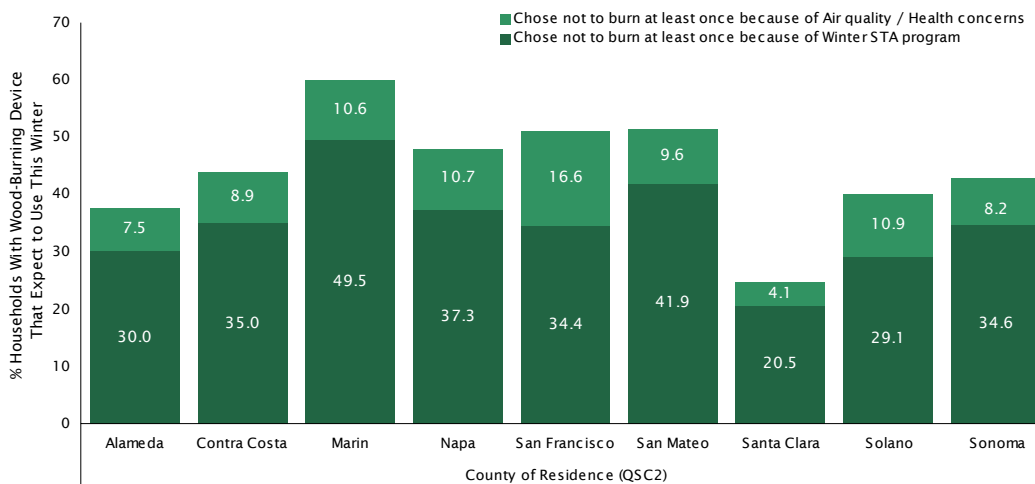
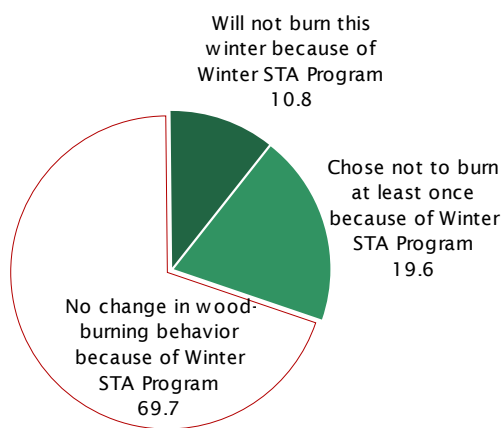


FIGURE 36 CHOSE NOT TO BURN THIS WINTER BECAUSE OF WINTER SPARE THE AIR ALERT PROGRAM INFO OR AIR QUALITY / HEALTH CONCERNS BY COUNTY OF RESIDENCE (N = 295)



SEASONAL PROGRAM IMPACTS ON WOOD BURNING To estimate the proportion of adults in the District who reduced the amount of wood that they burned during the winter season in response to the Program, one must combine the responses from several questions in the survey. Naturally, respondents who do not live in a household that contains a wood-burning fireplace, wood stove, or pellet stove (Question 1) should not be included in the analysis because they could not respond to the Program by reducing their wood burning behavior. Respondents who chose not to burn wood *at all* during the winter (Question 8), did so because of air quality or health related reasons (Question 9), *and* were aware of the Winter Spare the Air Alert Program (Question 23) can be considered a Spare the Air (STA) reducer. So too can respondents who indicated that although they did burn wood, they refrained from doing so on occasion (Question 19), did so because of the Program and/or for air quality/health reasons (Question 20), *and* were aware of the Winter Spare the Air Alert Program (Question 23).

FIGURE 37 SPARE THE AIR REDUCERS (N = 561)



Among all households with a wood-burning fireplace, pellet stove or wood stove, 11% chose not to burn *at all* during the winter season because of the Winter Spare the Air Alert Program, and an additional 20% refrained from burning on at least one occasion for the same reason. Collectively, the Winter Spare the Air Alert Program influenced approximately 30% of households with a wood-burning fireplace, pellet stove or wood stove to reduce their wood burning during the 2013-2014 winter season (Figure 37).

Table 4 shows that of the 561 respondents in the survey eligible to respond to the Program, 170 (30%) reduced their wood burning behavior on at least one occasion during the 2013-2014 winter in response to the Winter Spare the Air Alert Program.⁹ This represents 340,909 households out of the estimated 1,123,999 households with a wood-burning heating device. In terms of the reliability of the estimate, we can be 95% confident that the actual proportion of Winter Spare the Air reducer households this season was between 26.53% and 34.13%.

TABLE 4 SPARE THE AIR REDUCERS: CONFIDENCE INTERVAL

Winter Spare the Air Alert Reducers		
Universe Estimate (households with heating device)		1,123,999
Sample Size (surveyed households with heating device)		561
STA Reducers		170
Non-STA Reducers		391
Proportion of STA Reducers		30.33%
Proportion of Non-STA Reducers		69.67%
Maximum Margin of Error (95% confidence)		3.80%
Confidence Interval for Proportion of Winter STA Reducers	Lower Bound	26.53%
	Upper Bound	34.13%

Figure 38 on the next page displays the estimated percentage of wood-burning fireplace, wood stove, and pellet stove owning households that reduced their wood burning on at least one occasion due to the Winter Spare the Air Alert Program by study year. For reference, the confidence intervals are also shown to provide a sense for the reliability of the estimates.¹⁰ Compared with 2012, the percentage of spare the air reducers identified in 2013 was higher, although the difference is not statistically significant. Historically, the 2013 percentage is the highest seen to date. Just 4% of eligible households in 2004 and 2% of eligible households in 2005 responded to the Program.

9. The survey included a follow-up question (Question 21) which asked respondents who refrained from burning wood for program-related reasons (Question 20) how many times they refrained from burning wood for air quality or health-related reasons during the winter season. The average response was 6.12 times, although the small sample size for this question means that the statistical margins of error around the estimate are large. Moreover, respondents who did not burn wood at all during the winter were not asked this question, so the figure represents the average reduction among individuals who normally burn wood.
 10. The confidence intervals indicate the range within which one can be 95% confident that the true value exists.

FIGURE 38 SPARE THE AIR REDUCERS BY STUDY YEAR SHOWING CONFIDENCE INTERVALS (N = 561)

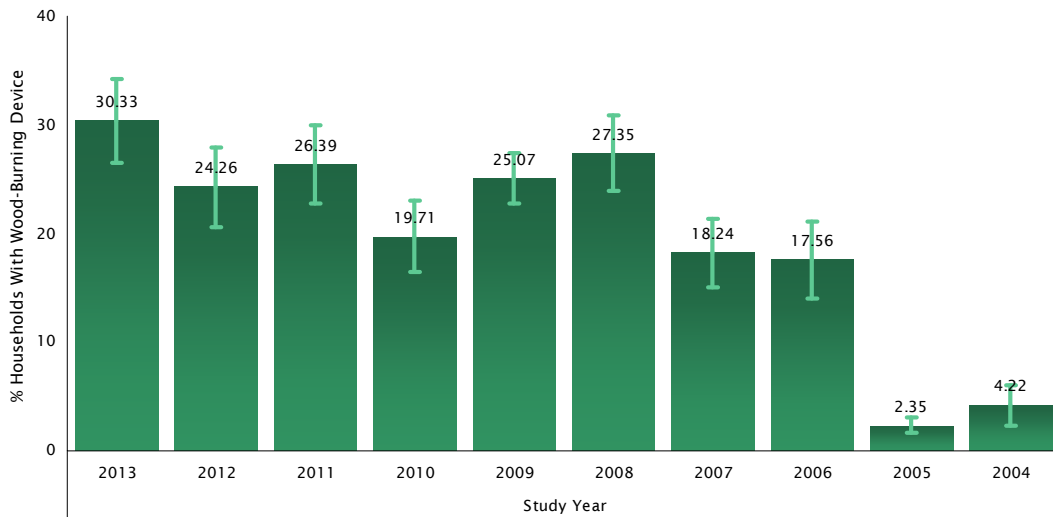
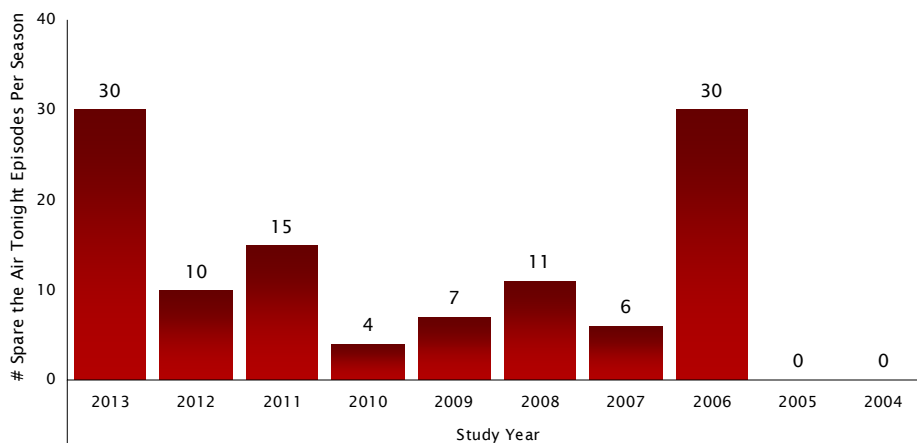


Figure 39 displays the number of Spare the Air Alert episodes called per winter season, as they correspond to Study Year. Comparing figures 38 and 39, we see a relationship between the number of episodes and response to the Program. That is, response to the Program during winter seasons in which no Spare the Air Alert episodes were called (2004 and 2005) was low, as one would expect given fewer opportunities to encounter program and air quality information, and fewer opportunities to respond to the Program by not burning on specific episode evenings. With the substantial increase in episodes during the 2006 and 2007 seasons came a substantial increase in awareness of and response to the Program.¹¹ Since that time, response to the Program has remained high and somewhat proportional to the number of Spare the Air Alert episodes, and thus opportunities for exposure to air quality information, called each winter season.

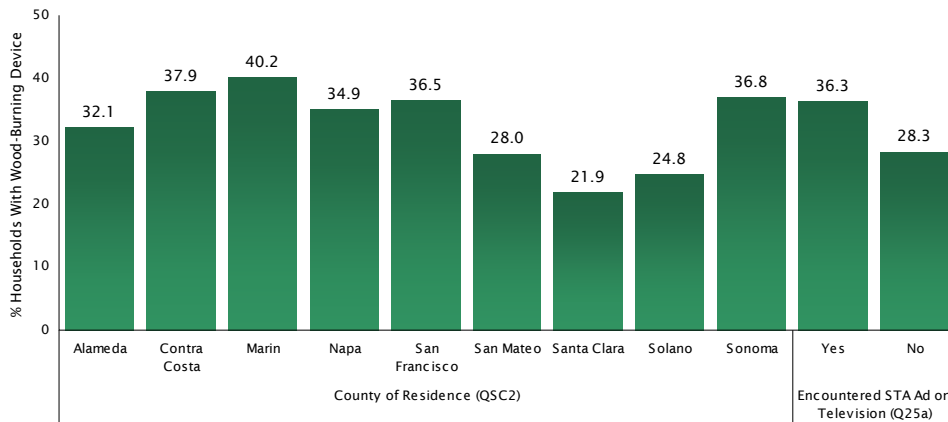
FIGURE 39 NUMBER OF SPARE THE AIR ALERT EPISODES PER SEASON



11. Between 1995 and 2005, only one Spare the Air Alert episode was called. In 2006, research on the impacts of fine particles on public health prompted federal government to strengthen particulate matter air quality standards, resulting in a dramatic increase in the number of episodes called during the 2006 winter season.

Figure 40 provides the percentage of wood-burning households that reduced their burning on at least one occasion due to the Winter Spare the Air Alert Program by county of residence and whether or not the respondent had encountered a Spare the Air ad on television. Households in Marin County, and those in which the survey respondent had seen a Spare the Air advertisement or announcement on television were the most likely to have responded to the Program.

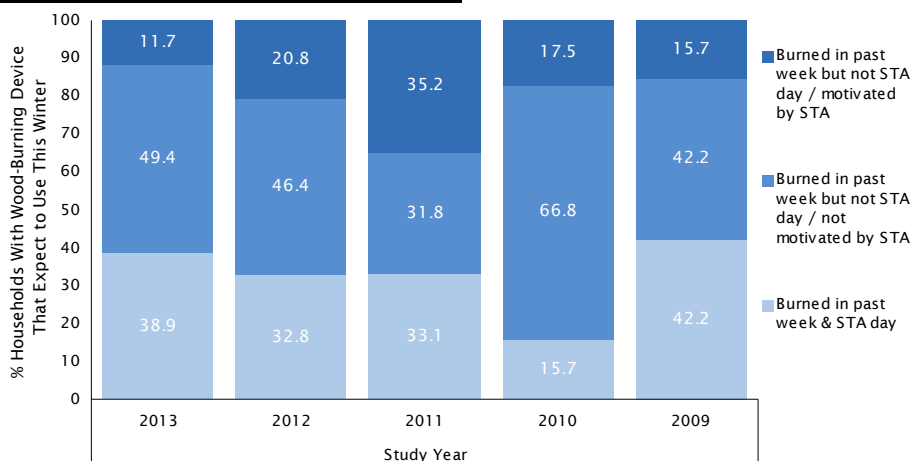
FIGURE 40 SPARE THE AIR REDUCERS BY COUNTY OF RESIDENCE & ENCOUNTERED STA AD ON TELEVISION (N = 561)



EPISODIC IMPACTS OF PROGRAM ON WOOD BURNING Whereas the prior section discussed changes to wood-burning on a *seasonal* basis, the 2013 study also sought to identify the impact that occurs when specific Spare the Air alerts are issued. To characterize the impacts, it is important to isolate the target market for the alert: households that are inclined to burn on the Spare the Air episode. Figure 41 shows that among households that burned during the week prior to a Spare the Air alert (and thus had demonstrated an inclination to burn), 12% chose not to burn on the episode in response to the Program. An additional 49% refrained from burning on the Spare the Air day, but for reasons not related to the Program. Approximately 39% of households that had burned in the prior week also burned on the Spare the Air day.

Question 22 *You previously indicated that you chose not to burn wood yesterday or last night. Why did you decide not to burn wood yesterday or last night?*

FIGURE 41 ANALYSIS OF WOOD BURNING ON STA EVENINGS: BURNED THIS SEASON AND IN PAST WEEK BY STUDY YEAR (N = 36)



RECALL AND AWARENESS OF WINTER SPARE THE AIR ALERT MESSAGING

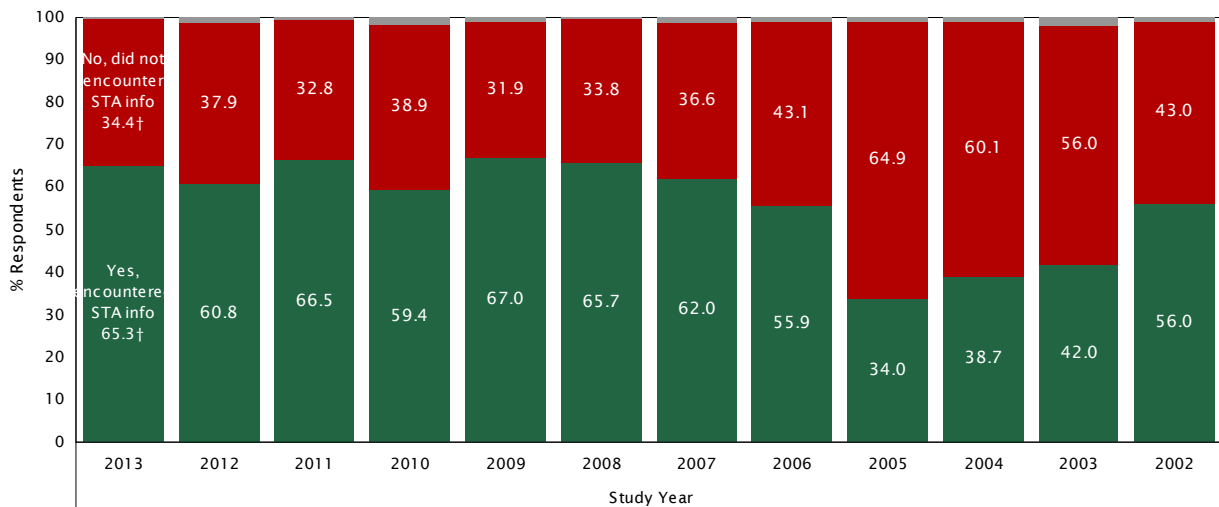
Although the ultimate goal of the Winter Spare the Air Alert Program is to persuade individuals to reduce the amount of wood they burn and to replace wood-burning devices with cleaner alternatives, there are a series of related objectives which must be met for this to occur. For example, regardless of how compelling the message may be, if the message does not reach the target audience then the Program cannot succeed in its primary goal. Thus, an objective of the Program is simply to increase awareness of the Winter Spare the Air Alert Program and related events.

RECALL EXPOSURE TO SPARE THE AIR MESSAGING Accordingly, a series of questions was asked of respondents about their recall of Winter Spare the Air messaging. The first of these questions asked: *During this winter, have you heard, read, or seen any news stories, advertisements or public service announcements about the Winter Spare the Air Alert Program, poor air quality, or requests not to use your fireplace, pellet stove or wood stove?*

Figure 42 presents the results to this question for the study years 2002 through 2013. In 2013, 65% of respondents recalled being exposed to news stories, advertisements, or public service announcements related to the Winter Spare the Air Alert Program during the winter months. This finding is significantly higher than the 61% recorded in 2012.

Question 23 *During this winter, have you heard, read, or seen any news stories, advertisements, or public service announcements about the Winter Spare the Air Alert Program, poor air quality, or requests not to use your fireplace, pellet stove, or wood stove?*

FIGURE 42 ENCOUNTED WINTER SPARE THE AIR INFORMATION BY STUDY YEAR (N = 1,300)



† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

For the interested reader, Figures 43 and 44 display the percentage of respondents who recalled being exposed to news stories, advertisements, or public service announcements related to the Winter Spare the Air Alert Program during the 2013 winter months by county, gender, age and education level. When compared with their respective counterparts, those in Contra Costa County, men, those 45 years of age and older, and college graduates were the most likely to recall being exposed to the Winter Spare the Air Alert Program.

FIGURE 43 ENCOUNTED WINTER SPARE THE AIR INFORMATION BY COUNTY OF RESIDENCE & GENDER (N = 1,300)

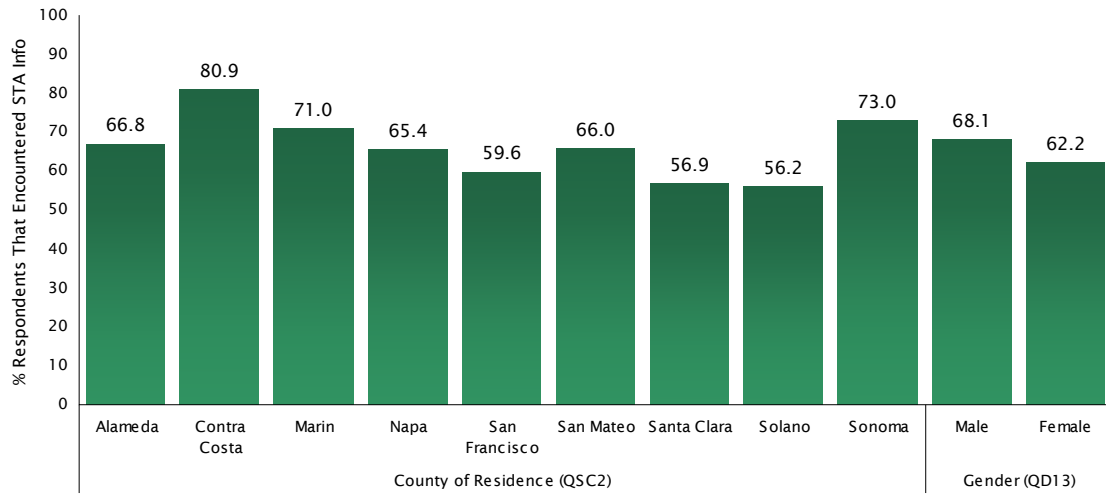
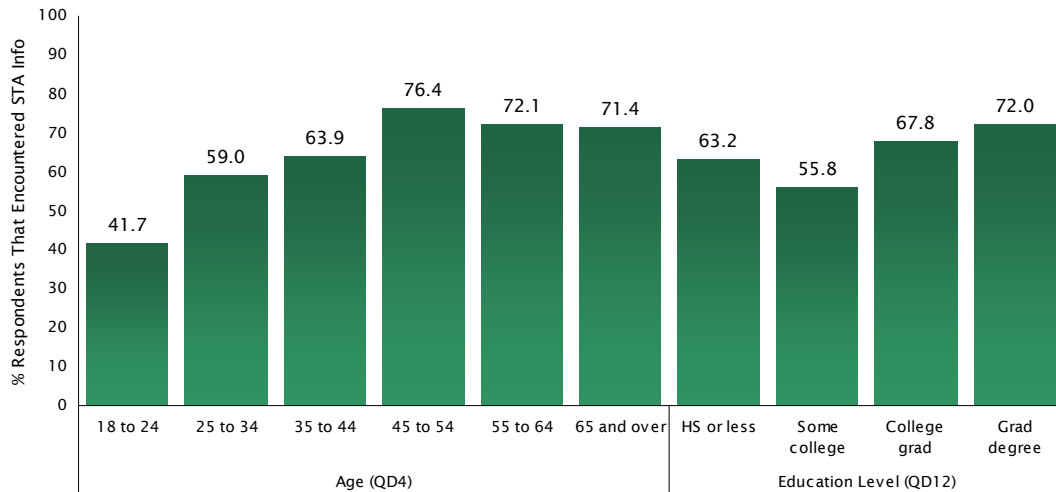


FIGURE 44 ENCOUNTED WINTER SPARE THE AIR INFORMATION BY AGE & EDUCATION LEVEL (N = 1,300)

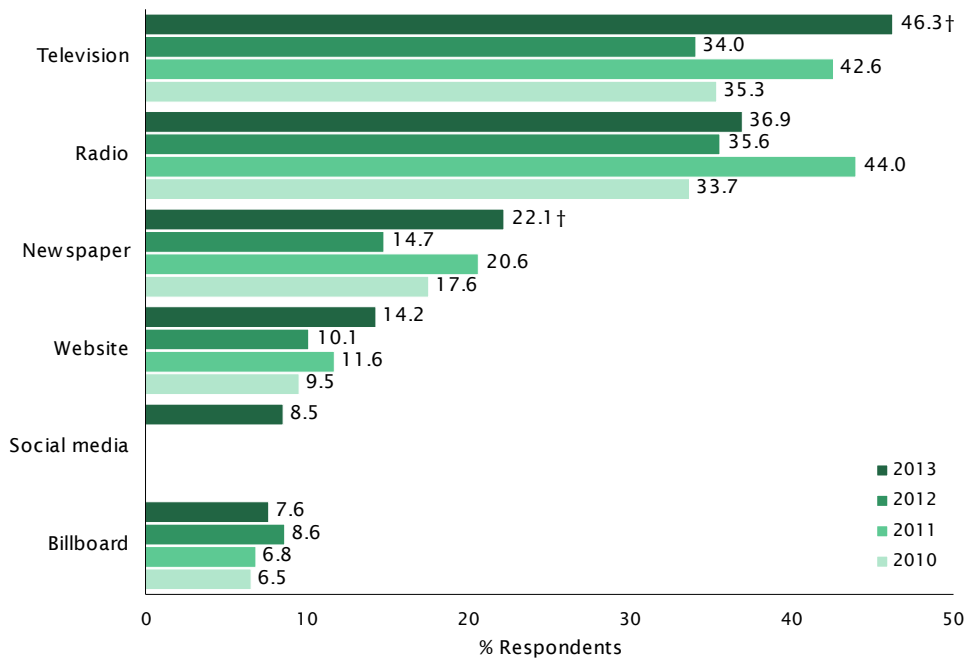


INFORMATION SOURCE Those who indicated that they recalled hearing, reading, or seeing Winter Spare the Air related information during the winter were asked where they obtained the information. In prior years, this question was asked in an open-ended manner, allowing respondents to mention a particular source or sources without being prompted. To more accurately gauge exposure to various media types, in 2010 the question was modified to ask respondents if they had or had not encountered Bay Area Air Quality Management District or Winter Spare the Air Alert Program information via *each* of the media types presented below in Figure 45. Percentages in the figure were calculated to represent the portion of *all* survey respondents who encountered information, not just those who received the question.

As shown in the figure, almost half (46%) of respondents encountered Bay Area Air Quality Management District or Winter Spare the Air Alert Program information via television during the 2013 winter season, and more than one-third (37%) via radio. Twenty-two percent (22%) of respondents encountered information via newspaper, 14% on a website, 9% through social media, and 8% on a billboard. Compared with 2012, there were statistically significant increases in exposure to Bay Area Air Quality Management District or Winter Spare the Air Alert Program information via television and newspaper. For the interested reader, Figure 46 on the next page displays exposure to media types by age of the respondent.

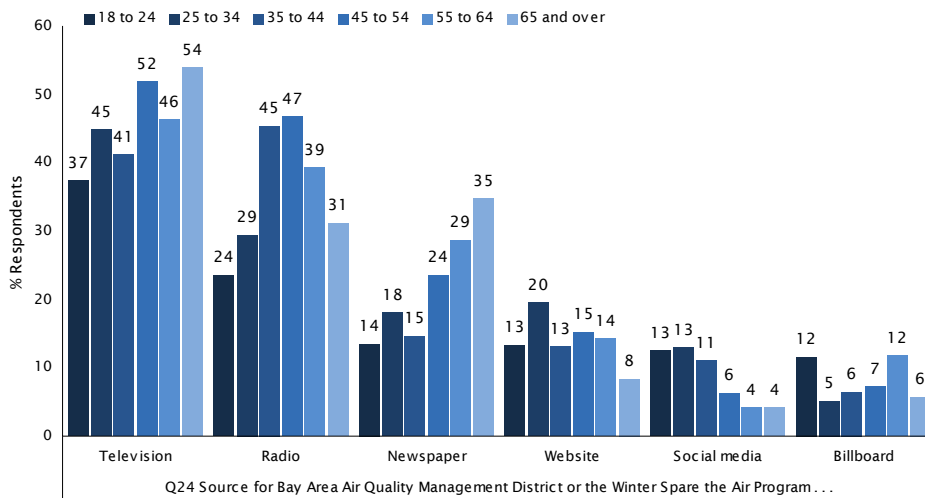
Question 24 *During this winter, do you recall encountering information about the Bay Area Air Quality Management District or the Winter Spare the Air Program: _____?*

FIGURE 45 SOURCE FOR WINTER SPARE THE AIR INFORMATION BY STUDY YEAR (N = 1,300)



† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

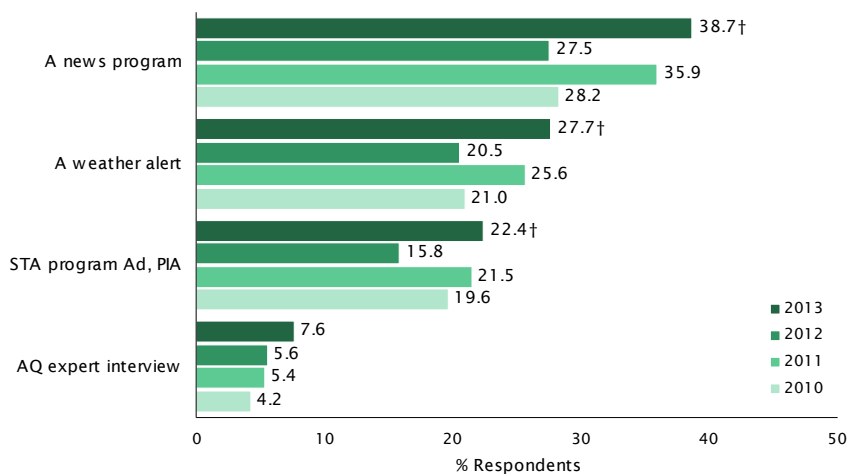
FIGURE 46 SOURCE FOR WINTER SPARE THE AIR INFORMATION BY AGE (N = 1,300)



Air quality information on television originates from a variety of sources, directly and indirectly related to the District’s outreach efforts. To look more closely at penetration rates of four different television sources, Question 25 was asked of those who had encountered Spare the Air information on television in the prior question. The results of this question are presented below, with percentages calculated to represent the portion of *all* survey respondents who encountered information from each television source. Thirty-nine percent (39%) of all respondents encountered Winter Spare the Air information on television in a news program, 28% said they encountered the information on a weather report, and just over one-fifth (22%) of all respondents encountered Winter Spare the Air information on television in *an advertisement or public information announcement that talks about fires, wood smoke, air quality and the Winter Spare the Air Program*. All three findings represent statistically significant increases from the 2012 study.

Question 25 *Information about the Winter Spare the Air Program is carried on television in a number of ways. Do you recall encountering information about Winter Spare the Air on television in: _____?*

FIGURE 47 SOURCE OF SPARE THE AIR INFORMATION ON TELEVISION BY STUDY YEAR (N = 1,300)



† Statistically significant change (p < 0.05) between the 2012 and 2013 studies.

For the interested reader, Figures 48 and 49 present the percentage of all respondents who encountered Winter Spare the Air information on television in *an advertisement or public information announcement that talks about fires, wood smoke, air quality and the Winter Spare the Air Program* by county of residence, whether or not the household has responded to the Program by reducing wood-burning behavior, and age of the respondent.

FIGURE 48 ENCOUNTERED AD, PIA ABOUT FIRES, WOOD SMOKE, AIR QUALITY ON TELEVISION BY COUNTY OF RESIDENCE (N = 1,300)

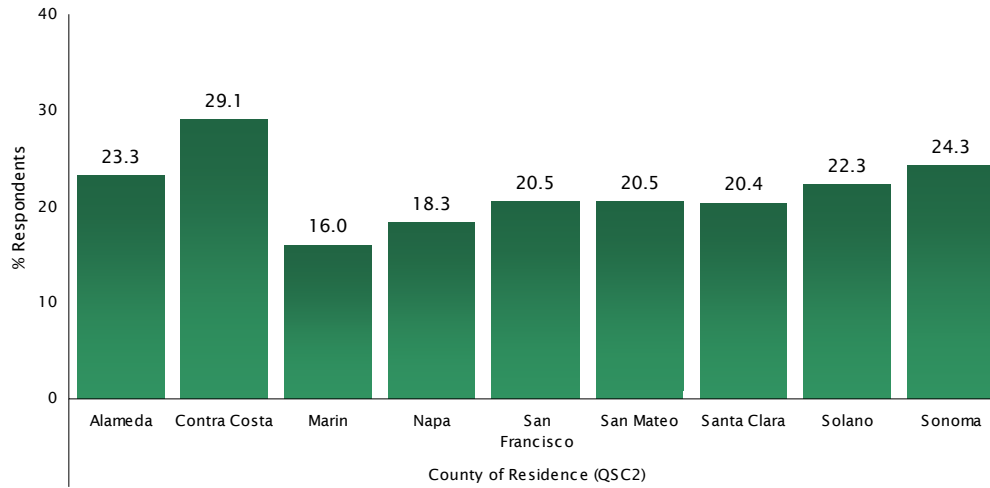
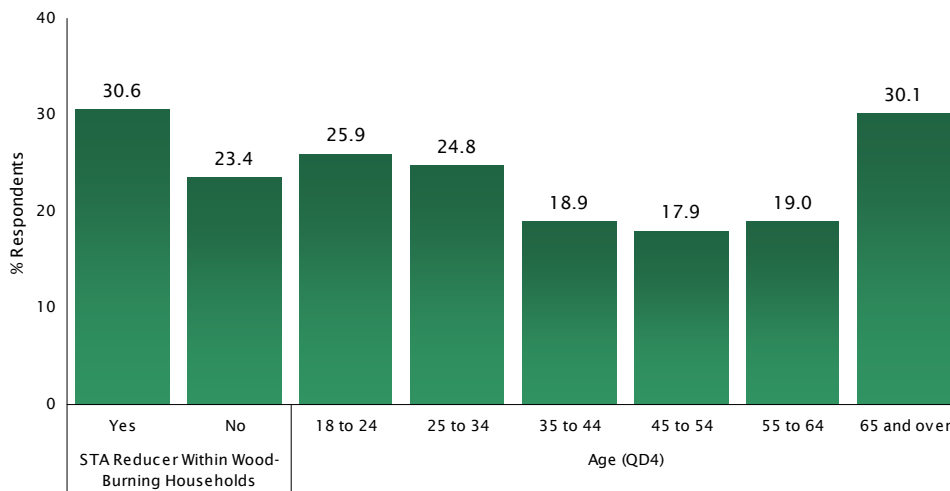


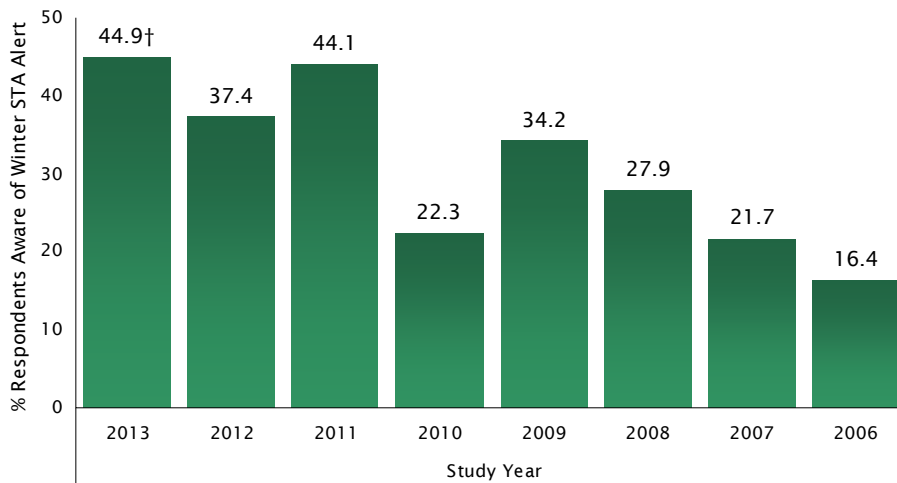
FIGURE 49 ENCOUNTERED AD, PIA ABOUT FIRES, WOOD SMOKE, AIR QUALITY BY STA REDUCER WITHIN WOOD-BURNING HOUSEHOLDS & AGE (N = 1,300)



AWARE OF SPARE THE AIR DAY The final question in this series asked all respondents who received the interview on the day after a Winter Spare the Air episode if, prior to taking the survey, they were aware that a Winter Spare the Air advisory had been issued the day before. As shown in Figure 50, 45% of respondents in 2013 answered this question in the affirmative, which is significantly higher than the percentage found in 2012, and higher than the percentages found in any other year dating back to 2006. When compared with their respective counterparts, awareness was highest among Marin County residents, those who had encountered a Spare the Air ad on television, those 45 years and older, individuals with a graduate degree, and, as one would expect, those in households that responded to the Program (see Figures 51 and 52).

Question 26 *Prior to taking this survey, were you aware that there was a “Winter Spare the Air Alert” yesterday?*

FIGURE 50 AWARE OF WINTER SPARE THE AIR ALERT BY STUDY YEAR (N = 823)



† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

FIGURE 51 AWARE OF WINTER SPARE THE AIR ALERT BY COUNTY OF RESIDENCE & ENCOUNTERED STA AD ON TELEVISION (N = 823)

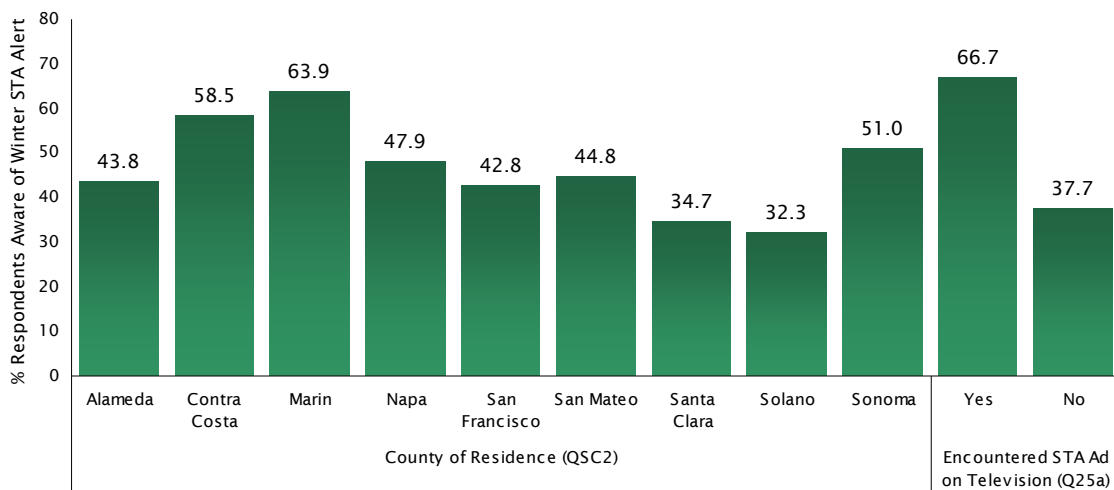
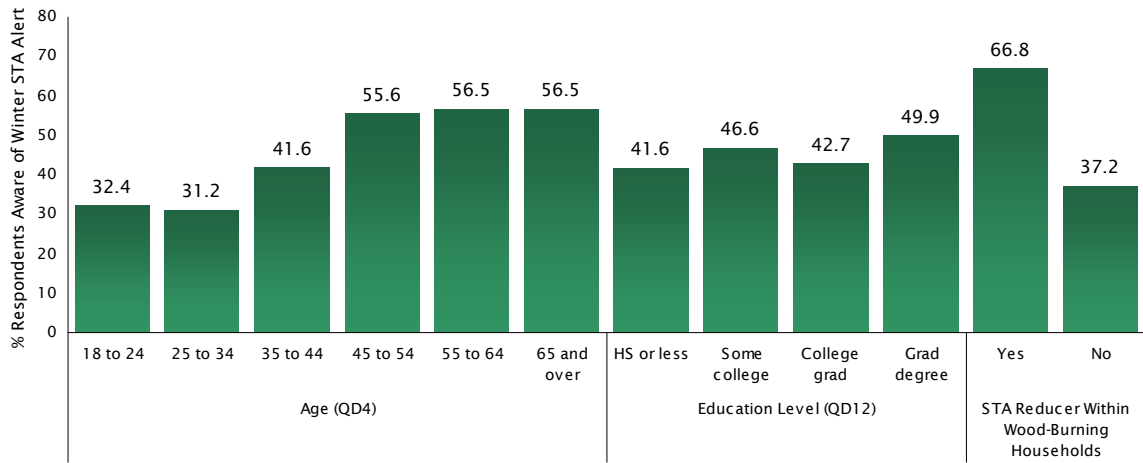


FIGURE 52 AWARE OF WINTER SPARE THE AIR ALERT BY AGE, EDUCATION LEVEL & STA REDUCER WITHIN WOOD-BURNING HOUSEHOLDS (N = 634)



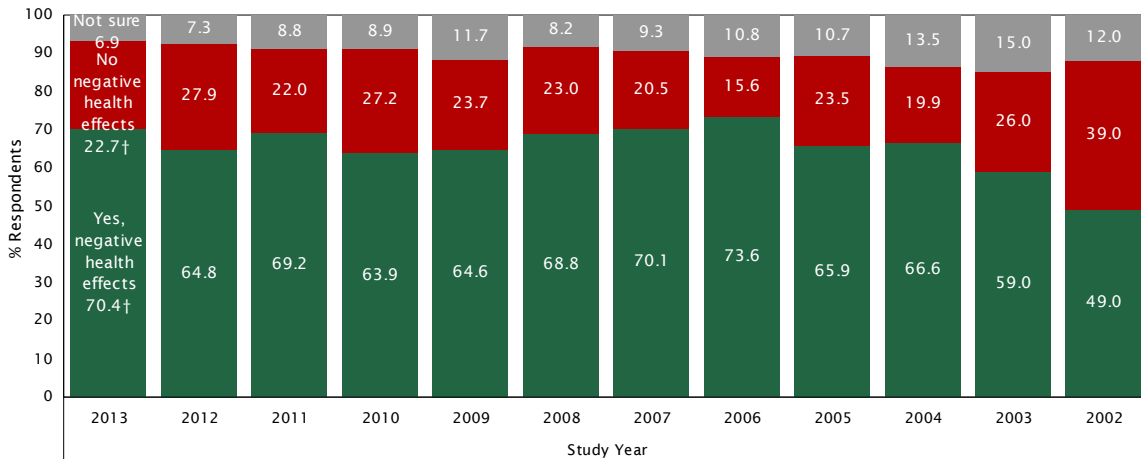
ATTITUDES ABOUT WOOD SMOKE

In addition to changing wood burning behavior, one of the goals of the Winter Spare the Air Alert Program is to change how residents think about wood smoke and its impact on public health. To track how effective the Program has been in achieving this goal, the survey included several measures of residents' opinions and perceptions about wood smoke.

The first of these questions simply asked the respondent whether they think there are any negative health effects associated with breathing wood smoke. As shown in Figure 53, approximately 70% of adults in the Bay Area perceive wood smoke to have negative health impacts, which represents a statistically significant increase from the findings of the 2012 survey. It is worth noting that public opinion on this matter has changed substantially since 2002—in part likely due to the Winter Spare the Air Alert Program. The proportion of adults that perceive wood smoke to have negative health impacts has increased by 21% since 2002.

Question 27 *Do you think there are any negative health effects associated with breathing wood smoke?*

FIGURE 53 PERCEIVE NEGATIVE HEALTH EFFECTS ASSOCIATED WITH WOOD SMOKE BY STUDY YEAR (N = 1,300)



† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

For the interested reader, Figures 54 and 55 on the next page display the percentage of respondents that perceive wood smoke to have negative health impacts by a variety of demographics.

FIGURE 54 PERCEIVE NEGATIVE HEALTH EFFECTS ASSOCIATED WITH WOOD SMOKE BY COUNTY OF RESIDENCE, STA REDUCER WITHIN WOOD-BURNING HOUSEHOLDS & ENCOUNTERED STA INFO (N = 1,300)

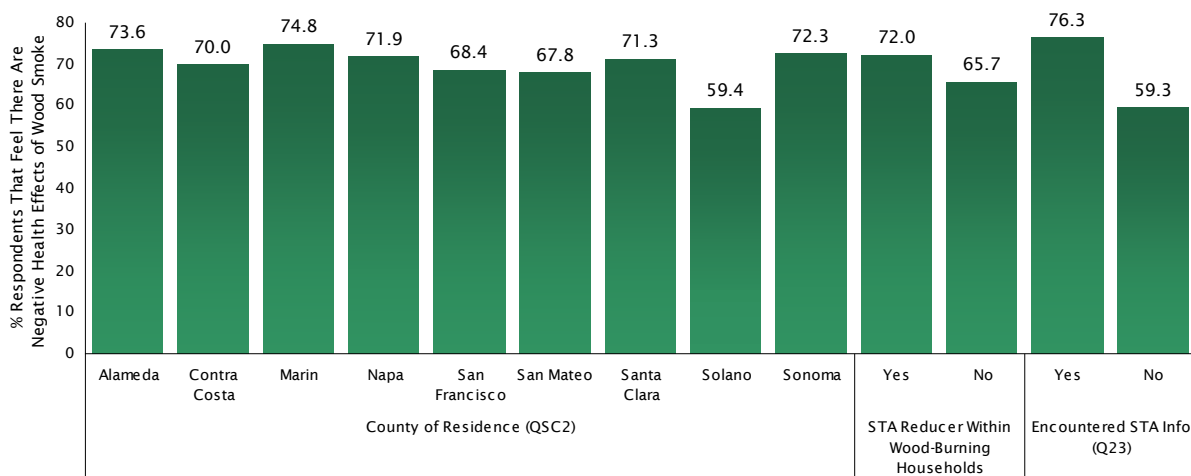
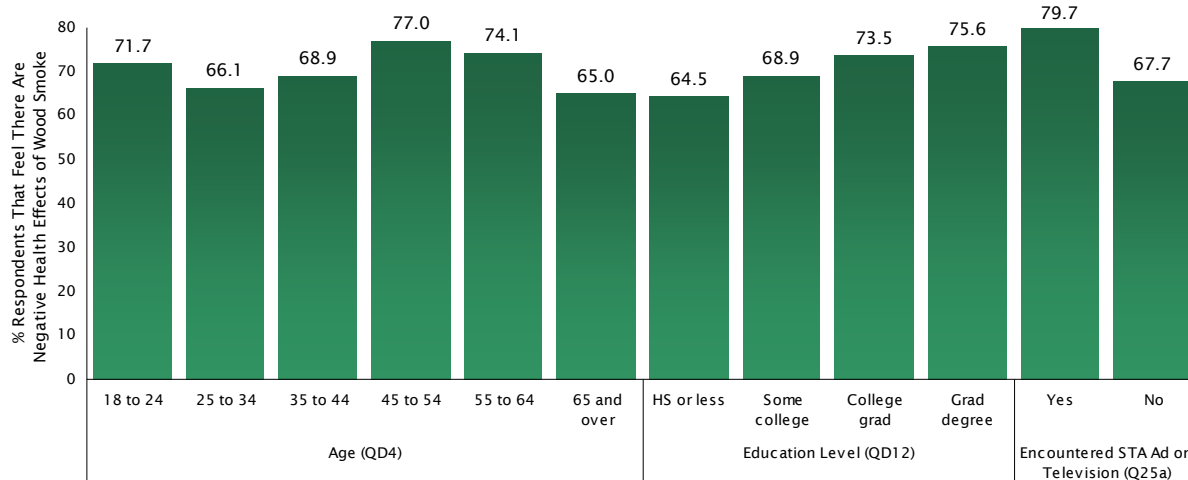
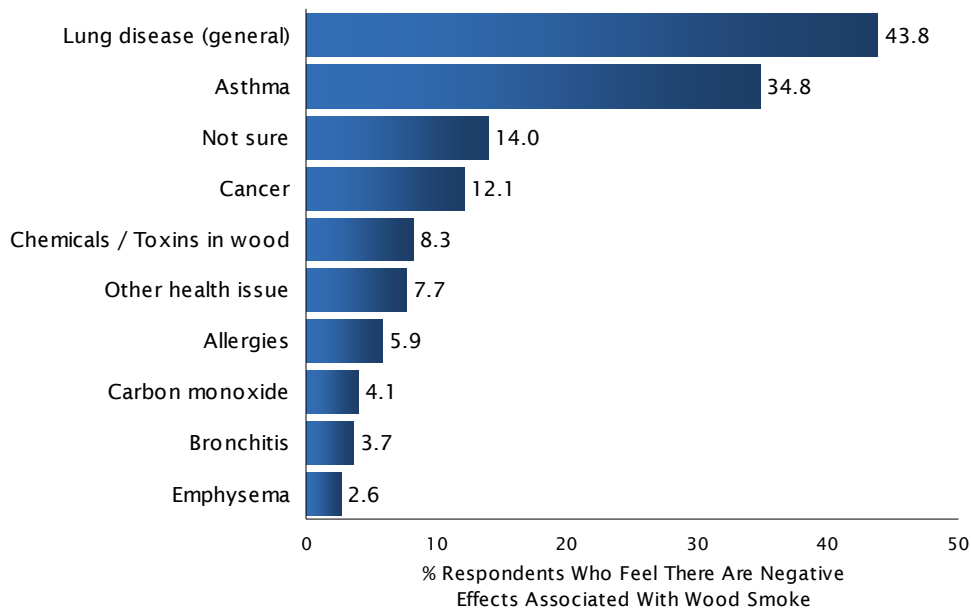


FIGURE 55 PERCEIVE NEGATIVE HEALTH EFFECTS ASSOCIATED WITH WOOD SMOKE BY AGE, EDUCATION LEVEL & ENCOUNTERED AD ON TELEVISION (N = 1,300)



Respondents who perceived wood smoke to have negative health impacts (Question 27) were asked to identify what the specific health effects are of breathing wood smoke. This question was asked in an open-ended manner, allowing respondents to mention any health impact that came to mind without being prompted by or restricted to a list of options. Multiple responses were allowed for this question, so the percentages shown in Figure 56 on the next page represent the percentage of respondents who mentioned a particular health effect. The most common response was a general reference to lung disease (44%), followed by a specific reference to asthma (35%) and cancer (12%).

Question 28 *What are the negative health effects associated with breathing wood smoke?***FIGURE 56 PERCEIVED NEGATIVE HEALTH EFFECTS ASSOCIATED WITH WOOD SMOKE (N = 916)**

WOOD SMOKE A NEIGHBORHOOD PROBLEM? Most adults recognize that there are negative health impacts due to wood smoke, but do they think that *their* neighborhood has a wood smoke problem? To answer this question, the survey first informed respondents that neighborhoods in the Bay Area experience different levels of air pollution from wood smoke. Respondents were then asked to indicate if, in their opinion, their neighborhood periodically experiences air pollution from wood smoke. Those who perceived their neighborhood to have a wood smoke problem were asked in a follow-up question to identify the magnitude of the problem. The answers to both of these questions are combined in Figure 57 on the next page.

Overall, 19% of adults surveyed indicated that their neighborhood periodically experiences air pollution from wood smoke. Eleven percent (11%) said the problem was a small one, 4% indicated it was a moderate or medium problem, and 3% felt that air pollution due to wood smoke was a big problem in their neighborhood. When compared with 2012, there were no statistically significant changes in the perceived magnitude of their neighborhoods' wood smoke problem among those who held an opinion (see Figure 58). Figure 59 presents the results of these questions by county of residence.

Question 29 *Different neighborhoods in the Bay Area experience different levels of air pollution from wood smoke. In your opinion, does your neighborhood periodically experience air pollution from wood smoke?*

Question 30 *Would you say that periodic air pollution from wood smoke in your neighborhood is a big problem, medium problem, or a small problem?*

FIGURE 57 PERCEPTION OF PERIODIC WOOD SMOKE PROBLEM IN NEIGHBORHOOD (N = 1,300)

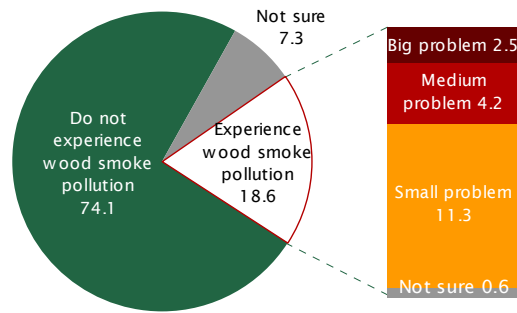


FIGURE 58 PERCEPTION OF PERIODIC WOOD SMOKE PROBLEM IN NEIGHBORHOOD BY STUDY YEAR (N = 1,300)

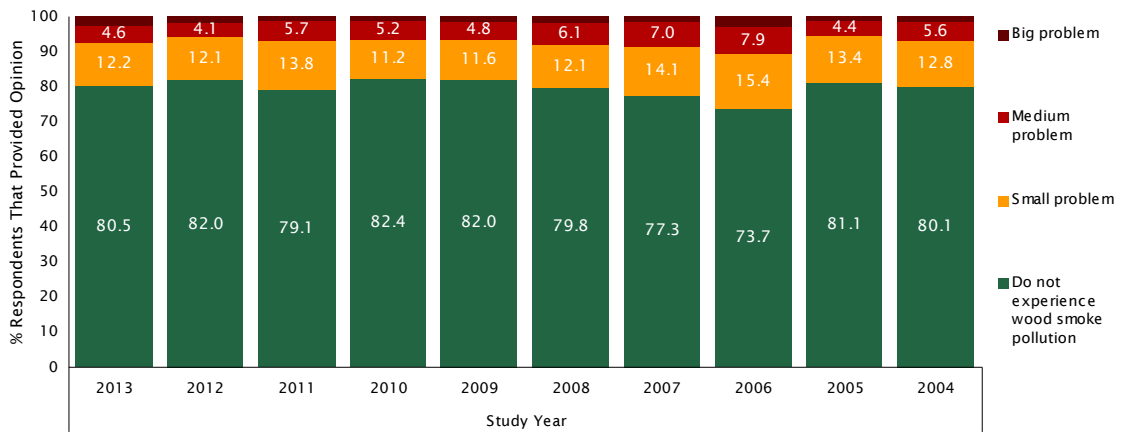
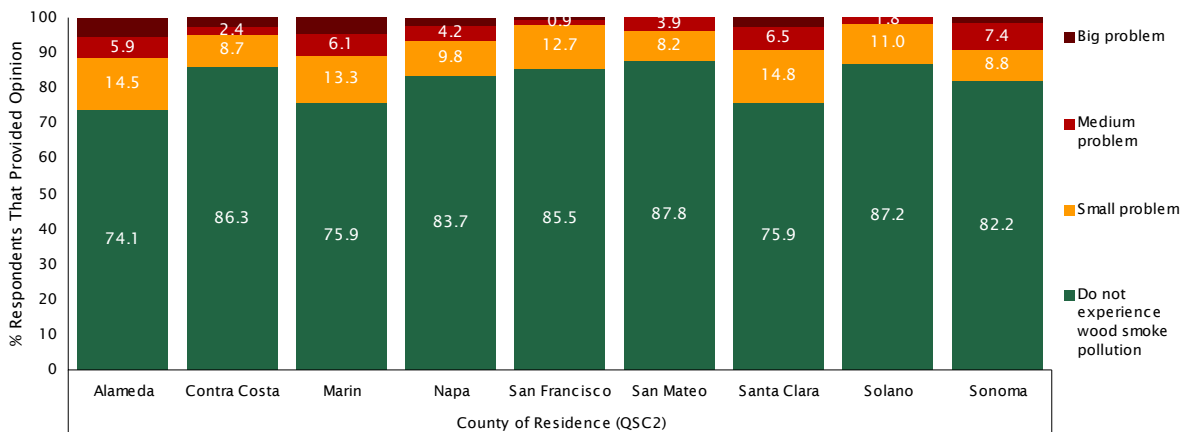


FIGURE 59 PERCEPTION OF PERIODIC WOOD SMOKE PROBLEM IN NEIGHBORHOOD BY COUNTY OF RESIDENCE (N = 1,300)



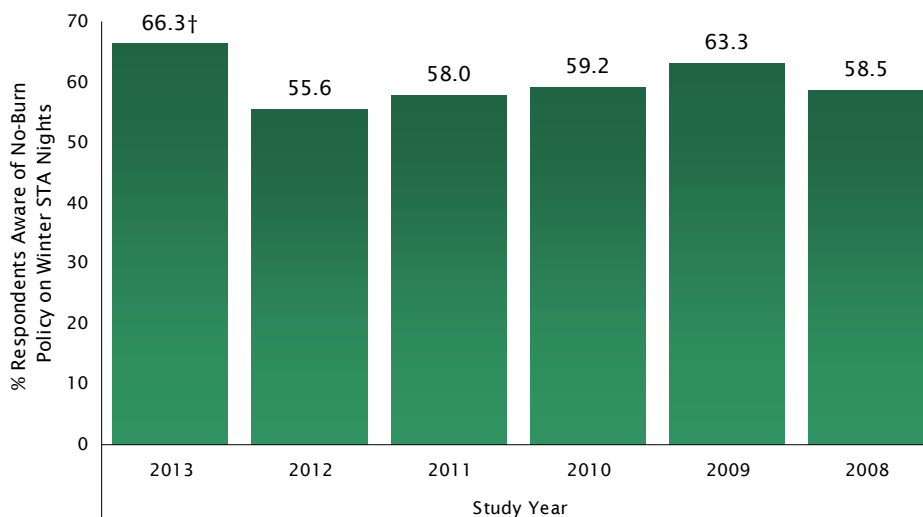
POLICY ATTITUDES

In 2008, the BAAQMD adopted *Regulation 6, Rule 3: Wood-burning Devices* to reduce the harmful emissions that come from wood smoke. The rule restricts wood burning when air quality reaches unhealthy levels and a Spare the Air advisory is issued, places limits on excessive smoke, requires that only cleaner burning EPA certified stoves and inserts be sold or installed in new construction/remodels, and prohibits the burning of garbage and other harmful materials. This section of the report presents the results of a series of questions designed to measure public awareness, knowledge, and attitudes as they relate to the rule and related policies.

AWARENESS The first question in this series simply asked respondents whether or not they were aware that the BAAQMD had passed a policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels. As shown in Figure 60, approximately two-thirds (66%) of respondents indicated that they were aware of the policy in 2013, which is significantly higher than the 56% recorded in 2012 and the highest awareness seen since the rule was adopted. Awareness of the rule was highest in Marin and Napa counties. Awareness was also strongly and positively related to respondent age, and 83% of respondents who encountered a Spare the Air advertisement on television were aware of the rule (see figures 61 and 62).

Question 31 *Prior to taking this survey, were you aware that several years ago the Bay Area Air Quality Management District passed a rule that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels?*

FIGURE 60 AWARENESS OF NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY STUDY YEAR (N = 1,300)



† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

FIGURE 61 AWARENESS OF NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY COUNTY OF RESIDENCE (N = 1,300)

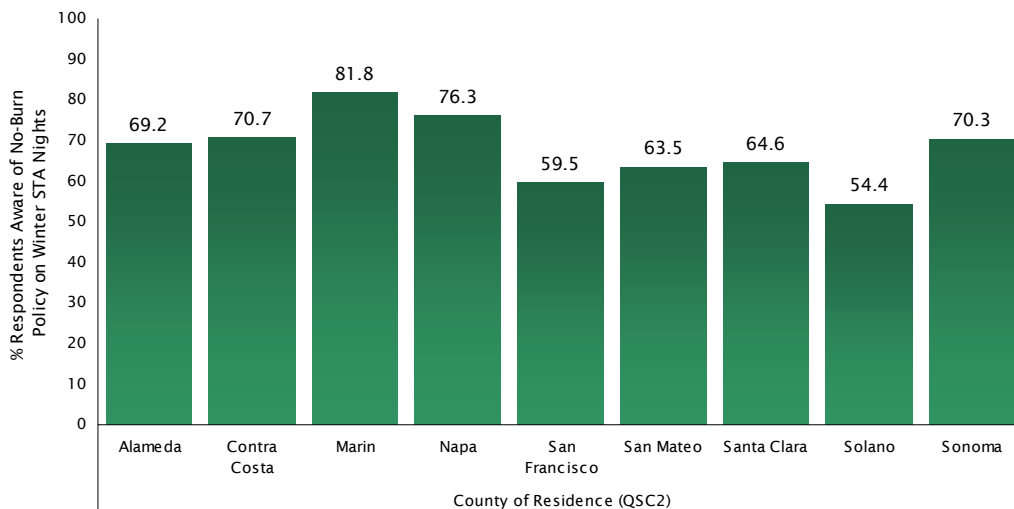
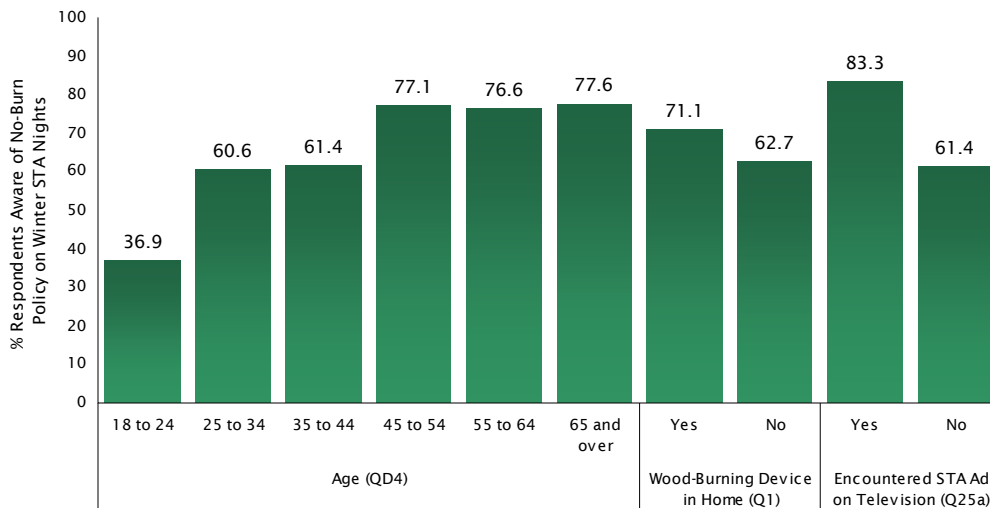


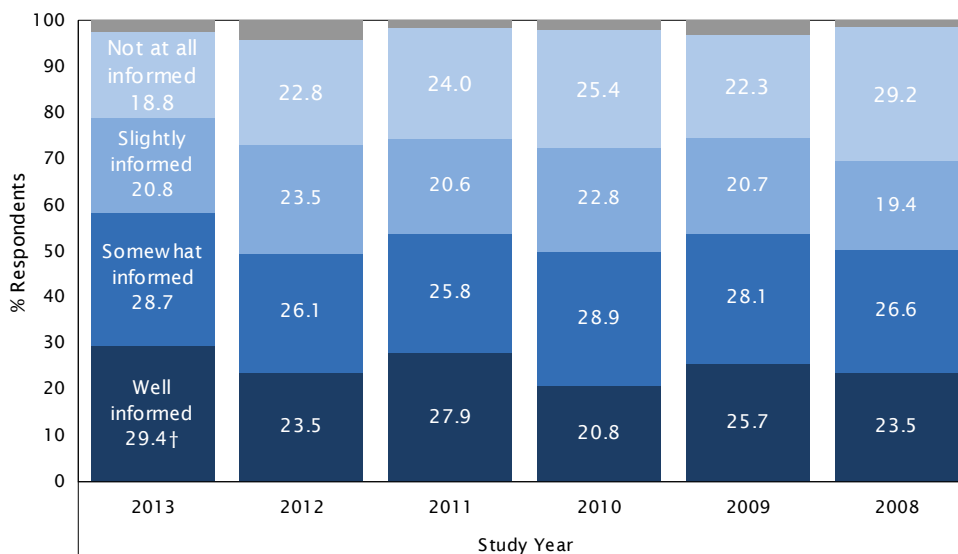
FIGURE 62 AWARENESS OF NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY AGE, WOOD-BURNING DEVICE IN HOME & ENCOUNTERED STA AD ON TELEVISION (N = 1,300)



Respondents were next asked how informed they felt about the rules that are part of the wood-burning policy. Overall, residents were mixed in how informed they felt, with 29% feeling well-informed, 29% somewhat informed, 21% slightly informed, and 19% feeling not at all informed about the rules that are part of the policy. These findings do represent a statistically significant increase from 2012 in public awareness about the rules that are part of the policy. Marin County residents, residents 45 years and older, and respondents who encountered a Spare the Air advertisement on television were the most likely to report feeling at least somewhat informed about the rules that are part of the new policy (see figures 64 and 65).

Question 32 Overall, how informed do you feel about the rules that are part of this new wood-burning policy? Would you say you feel well informed, somewhat informed, slightly informed, or not at all informed?

FIGURE 63 HOW INFORMED ABOUT NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY STUDY YEAR (N = 1,300)



† Statistically significant change (p < 0.05) between the 2012 and 2013 studies.

FIGURE 64 HOW INFORMED ABOUT NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY COUNTY OF RESIDENCE (N = 1,300)

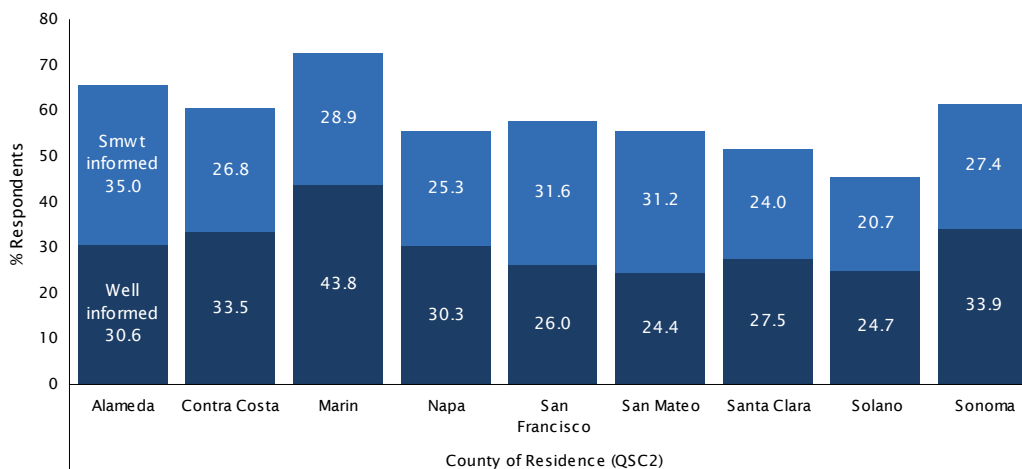
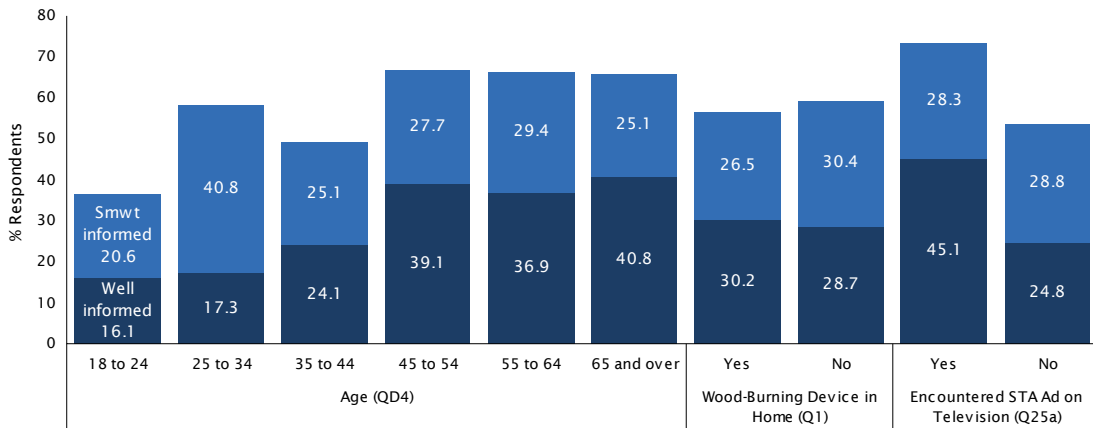


FIGURE 65 HOW INFORMED ABOUT NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY AGE, WOOD-BURNING DEVICE IN HOUSEHOLD & ENCOUNTERED STA AD ON TELEVISION (N = 1,300)



DO YOU SUPPORT THE POLICY? Regardless of how informed they felt about the policy, all respondents were asked whether they generally support or oppose a policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels. As shown in Figure 66, three-quarters (75%) of Bay Area residents indicated that they support the no-burn policy on nights when air pollution is expected to reach unhealthy levels. Approximately 17% opposed the policy, 4% said it depends, and 5% were unsure or offered no opinion. These results were nearly identical to those found in 2012. For the interested reader, figures 67 and 68 display how support for the no-burn policy varied across a variety of demographic subgroups.

Question 33 *In general, do you support or oppose a policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels?*

FIGURE 66 SUPPORT FOR NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY STUDY YEAR (N = 1,300)

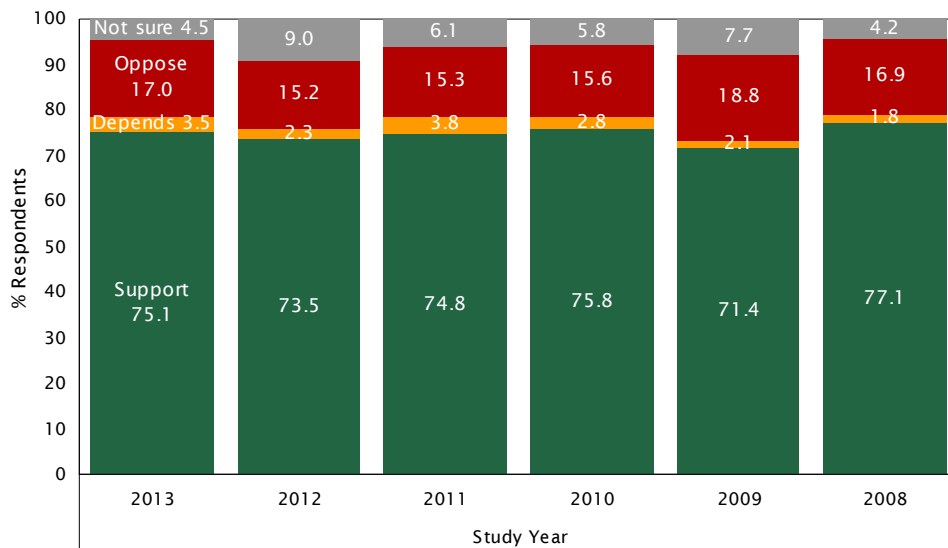


FIGURE 67 SUPPORT FOR NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY COUNTY OF RESIDENCE & ENCOUNTERED STA AD ON TELEVISION (N = 1,300)

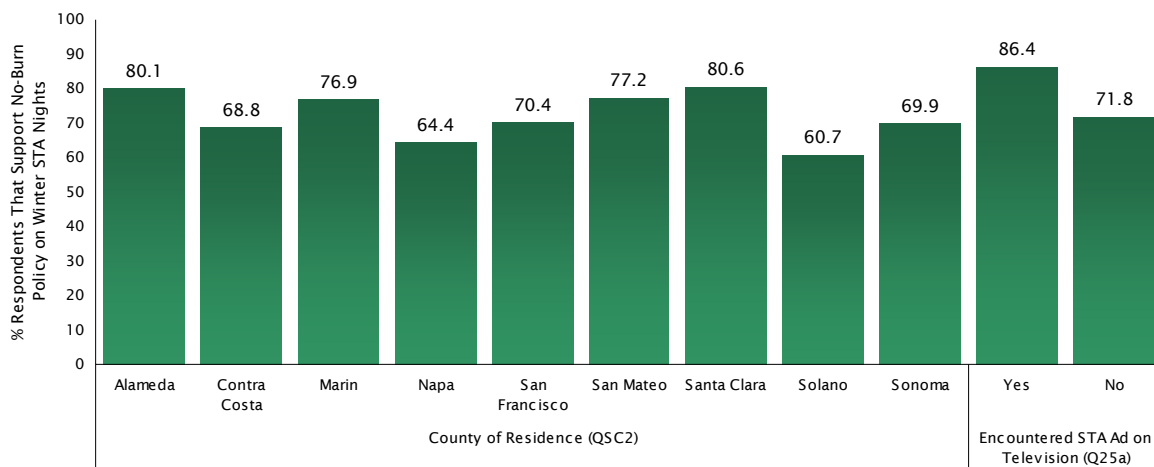
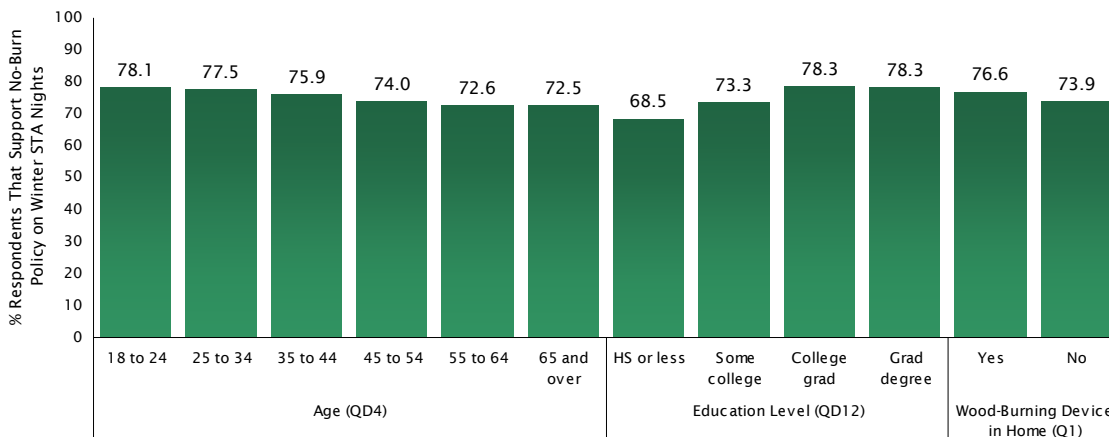


FIGURE 68 SUPPORT FOR NO-BURN POLICY ON WINTER SPARE THE AIR ALERT NIGHTS BY AGE, EDUCATION LEVEL & WOOD-BURNING DEVICE IN HOME (N = 1,300)



WOOD BURNING ON HOLIDAYS To gather a statistically reliable assessment of District residents’ opinions and behaviors regarding holiday wood burning, the survey included three questions. The first asked all respondents if they felt that residents should be allowed to burn wood on holidays like Christmas and New Year’s even if air pollution was expected to reach unhealthy levels. As shown in Figure 69 on the next page, the majority (61%) of respondents felt that households should *not* be allowed to burn on holidays when pollution levels are high, 34% felt households should be able to burn on holidays regardless of pollution levels, and 5% were unsure. Figure 70 displays the percentage of respondents who feel that burning should *not* be allowed on holidays by county of residence, presence of a wood-burning device in the household, and the intention to use at least one wood-burning device this winter.

Question 34 *Should people be allowed to burn wood on holidays like Christmas and New Year’s even if air pollution is expected to reach unhealthy levels that day?*

FIGURE 69 OPINION OF BURNING ON HOLIDAYS (N = 1,300)

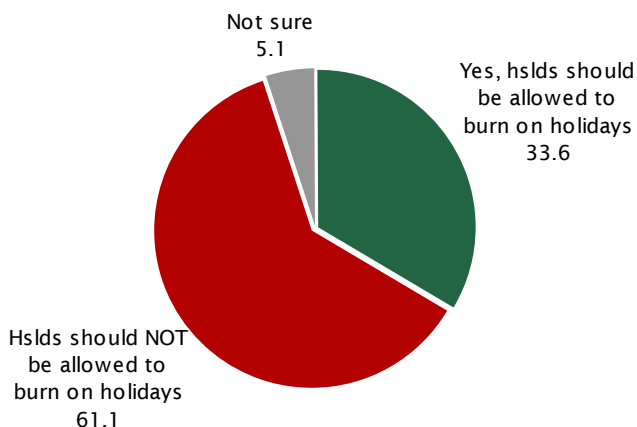
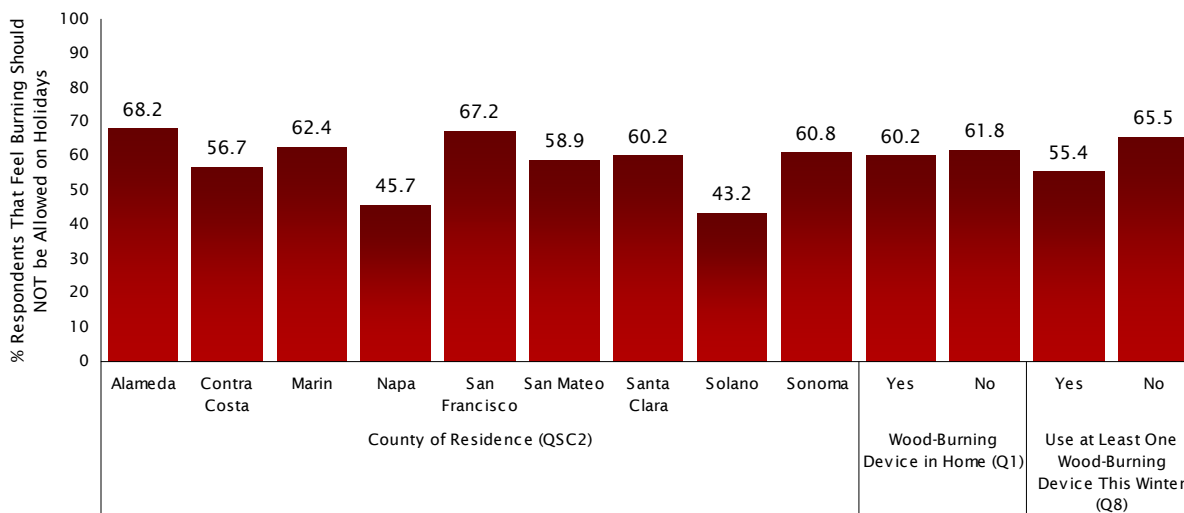


FIGURE 70 OPINION OF BURNING ON HOLIDAYS BY COUNTY OF RESIDENCE & ENCOUNTERED STA AD ON TELEVISION (N = 1,300)

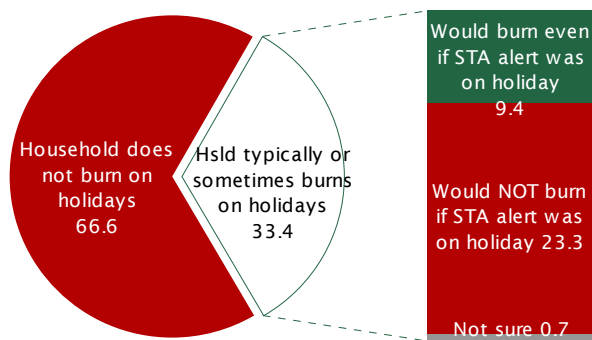


The next two questions addressed holiday wood-burning behavior. The first of these asked respondents if their household normally burns on holidays like Christmas and New Year’s, and those who said *yes* or *depends* were then asked if they would continue to do so if pollution levels were high and a ‘no burn’ day was set. Figure 71 combines the responses to these questions and presents the results among those in households with a wood-burning device. As shown in the figure, 33% of households with a wood-burning device typically burn wood on holidays, and 9% would continue to burn on a holiday, regardless of a Spare the Air episode. The overwhelming majority (90%) of households with a wood-burning device do not typically burn on holidays or would *not* burn on holidays if a Spare the Air episode were called.

Question 35 Does your household normally burn wood on holidays like Christmas and New Year's day?

Question 36 If air pollution levels were high and a 'no burn' day was set on Christmas or New Year's day, would you still burn wood?

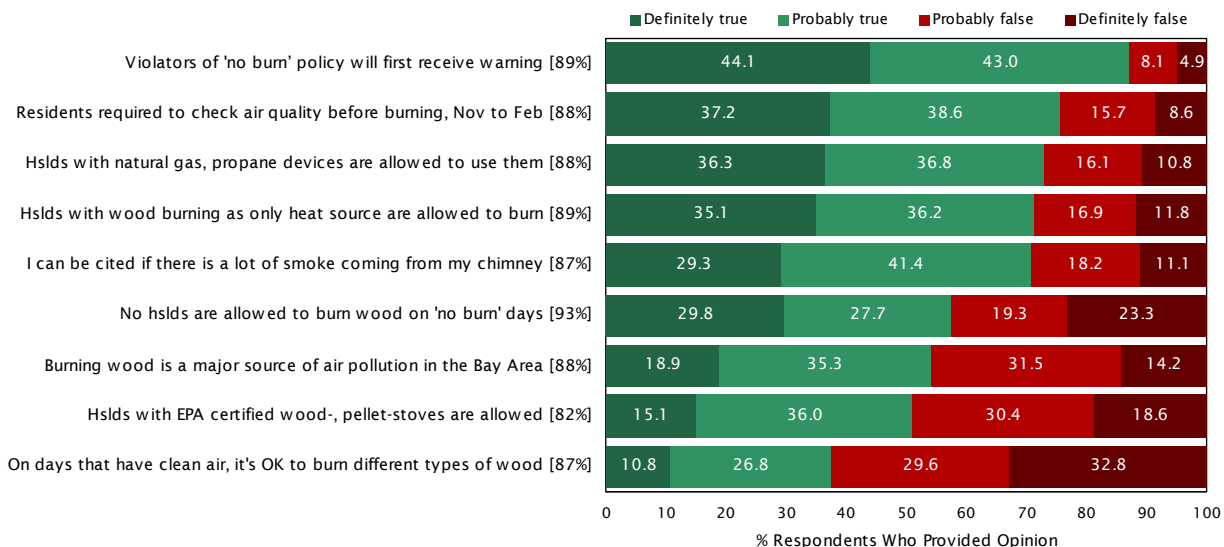
FIGURE 71 HOUSEHOLD WOOD BURNING ON HOLIDAYS (N = 561)



KNOWLEDGE ABOUT NO-BURN POLICY The next question in the Policy Attitudes section was designed to test respondents' knowledge of the rules associated with wood smoke regulations. For each of the statements shown to the left of Figure 72, respondents were asked to indicate whether they thought the statement was true or false. To avoid a systematic position bias, the statements were administered in random order for each respondent. Only those who held an opinion are factored into the responses shown in Figure 72—the percentage with an opinion is shown in brackets next to each statement in the figure.

Question 37 Next, I'm going to read a series of statements. For each statement, I'd like to know whether you think the statement is true or false.

FIGURE 72 STATEMENTS ABOUT NO-BURN POLICY (N = 1,300)



Overall, approximately three-quarters or more of the public appear correctly informed regarding the fact that violators of the ‘no burn’ policy will receive a warning prior to citations (87%), that residents are required to check the status of air quality prior to burning wood between November and February (76%), and that households with natural gas/propane fireplaces are still allowed to burn on designated ‘no burn’ days (73%). At least two-thirds of respondents also held the correct opinion that households for which wood burning is their only source of heat are still allowed to burn wood on ‘no burn’ days (71%), and that they can be cited at any time of the year if there is a lot of visible smoke coming from their chimney (71%).

Public knowledge regarding the remaining aspects of the wood burning rule was far more mixed, however. More than half (58%) incorrectly assumed that *no* households are allowed to burn wood on no burn days, just 54% agreed that wood burning is a major source of pollution in the Bay Area contributing up to one-third or more of the airborne particle pollution on many winter days, half (51%) of respondents felt that households with EPA certified stoves would still be allowed to burn on ‘no burn’ days, and 38% believed that it’s okay to burn different types of wood—including driftwood, treated wood, moist wood, and used pallets—as long as it is a clean air day.

When compared with the 2013 survey results, there was one statistically significant change in knowledge: a decrease in the percentage of respondents who (correctly) believed that wood burning is a major source of pollution in the Bay Area contributing up to one-third or more of the airborne particle pollution on many winter days (see Table 5).

TABLE 5 STATEMENTS ABOUT NO-BURN POLICY BY STUDY YEAR SHOWING % TRUE (N = 1,300)

	Study Year					
	2013	2012	2011	2010	2009	2008
Violators of ‘no burn’ policy will first receive warning	87.1	88.9	95.0	89.7	88.9	87.8
Residents required to check air quality before burning, Nov to Feb	75.7	76.2	70.7	76.8	75.7	74.2
Hslds with natural gas, propane devices are allowed to use them	73.1	76.6	75.8	78.4	84.7	84.2
Hslds with wood burning as only heat source are allowed to burn	71.3	73.3	69.4	70.4	67.1	68.5
I can be cited if there is a lot of smoke coming from my chimney	70.7	69.6	68.6	69.7	61.9	64.1
No hslds are allowed to burn wood on ‘no burn’ days	57.5	55.8	60.3	58.1	59.7	56.8
Burning wood is a major source of air pollution in the Bay Area	54.3†	61.5	61.4	51.2	56.2	59.2
Hslds with EPA certified wood-, pellet-stoves are allowed	51.0	51.1	49.8	51.4	51.3	47.6
On days that have clean air, it’s OK to burn different types of wood	37.6	38.4	38.9	41.7	41.4	35.3

† Statistically significant change ($p < 0.05$) between the 2012 and 2013 studies.

HOW TO FIND OUT ABOUT ‘NO BURN’ STATUS The final questions in this series were designed to measure how informed the public is about how they can find out the day’s ‘no burn’ status. Overall, 51% of respondents indicated that they do know how to find out whether today is a ‘no burn’ day (see Figure 73 on the next page). Residents in Contra Costa, Marin, Napa, and Sonoma counties, those between the ages of 45 and 54, those with a wood-burning device in the home, and those who encountered a Spare the Air advertisement on television were the most likely subgroups to report awareness (see figures 74 and 75 on the next page).

Question 38 Do you know how you could find out whether today is a 'no burn' day?

FIGURE 73 AWARE OF METHODS TO LEARN ABOUT NO-BURN STATUS BY STUDY YEAR (N = 1,300)

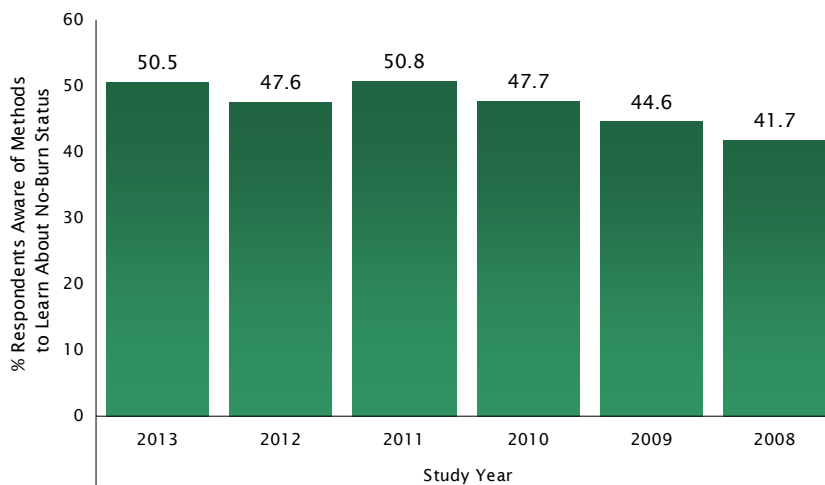


FIGURE 74 AWARE OF METHODS TO LEARN ABOUT NO-BURN STATUS BY COUNTY OF RESIDENCE (N = 1,300)

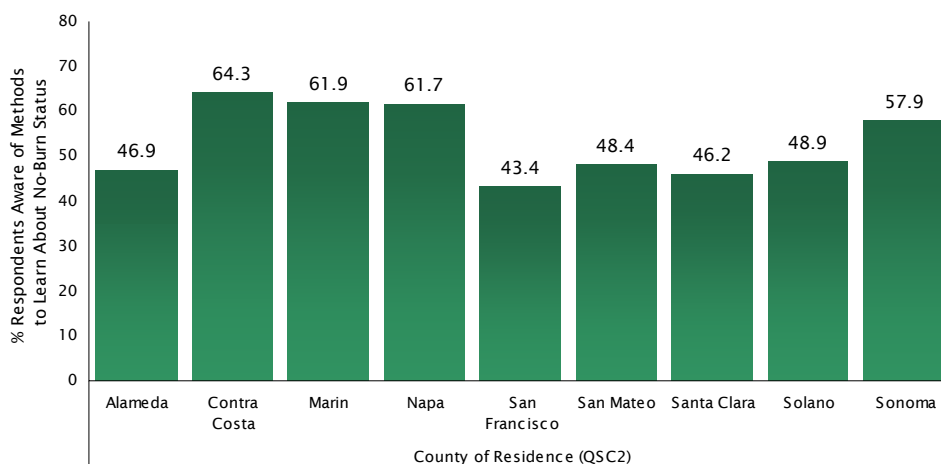
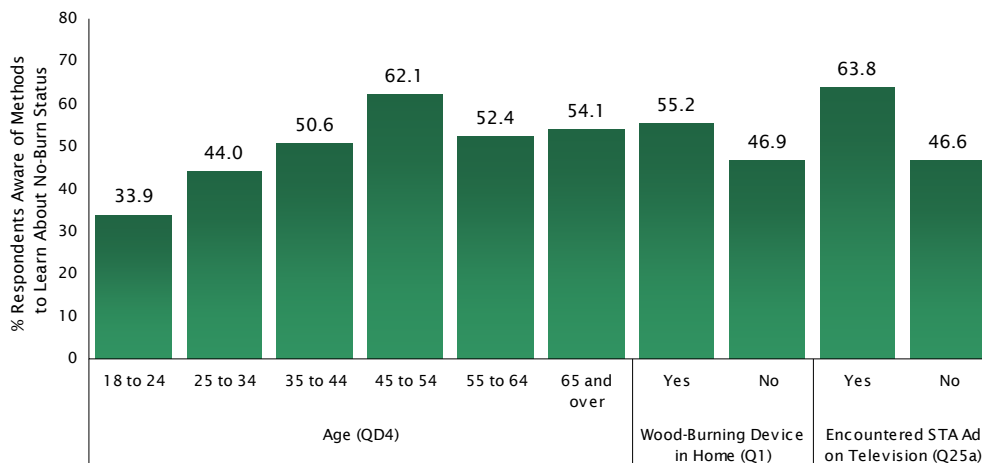


FIGURE 75 AWARE OF METHODS TO LEARN ABOUT NO-BURN STATUS BY AGE, WOOD-BURNING DEVICE IN HOME & ENCOUNTERED STA AD ON TELEVISION (N = 1,300)



When asked what sources they would turn to for this information (see Figure 76), the most commonly mentioned sources were a website in general (62%), newspaper (22%), radio (21%), telephone hotline (12%), and the District’s website (12%). As shown in Table 6, there were no statistically significant changes in sources cited in 2013.

Question 39 *How can you find out [whether today is a 'no burn' day]?*

FIGURE 76 SOURCES FOR LEARNING ABOUT NO-BURN STATUS (N = 656)

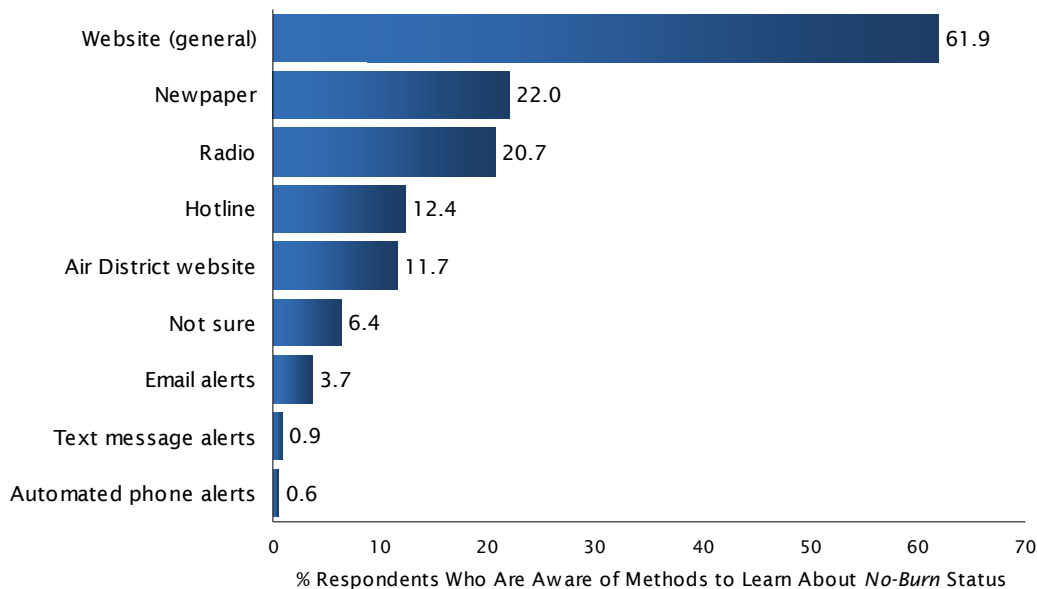


TABLE 6 SOURCES FOR LEARNING ABOUT NO-BURN STATUS BY STUDY YEAR (N = 656)

	Study Year					
	2013	2012	2011	2010	2009	2008
Website (general)	61.9	63.2	59.5	62.9	61.8	59.2
Newspaper	22.0	16.5	19.8	24.5	22.6	24.2
Radio	20.7	17.0	20.3	17.3	16.5	16.2
Hotline	12.4	11.7	12.7	14.2	18.2	16.4
Air District website	11.7	11.8	15.6	16.4	13.6	17.5
Not sure	6.4	4.5	8.4	5.5	5.7	5.6
Email alerts	3.7	3.6	2.3	2.6	2.2	4.9
Text message alerts	0.9	0.2	0.2	0.9	0.2	0.2
Automated phone alerts	0.6	2.8	1.6	1.9	1.2	2.1

FIREPLACE & POLLUTION KNOWLEDGE

In addition to measuring respondents' awareness, knowledge and opinions regarding the 'no burn' policy, the survey continued a question series first implemented in 2007 that measured knowledge with respect to fireplaces and pollution.

For each of the statements shown to the left of Figure 77, respondents were asked to indicate whether they thought the statement was true or false. To avoid a systematic position bias, the statements were administered in random order for each respondent. Only those who held an opinion are factored into the responses shown in the figure—the percentage with an opinion is shown in brackets next to each statement in the figure.

A clear majority (83%) of respondents correctly labeled as false the statement, *It is okay to burn materials other than firewood in my fireplace*. The percentage who correctly identified as false the other three statements was lower, however, with almost two-thirds (64%) disagreeing that *A fireplace is an efficient source of heat*, 52% disagreeing that *All fires in my fireplace should produce visible smoke from the chimney*, and 43% disagreeing that *Manufactured logs burn cleaner than seasoned firewood*. When compared with 2012, there were no statistically significant changes in opinion (see Table 7).

Question 40 *Next, I'm going to read a series of statements. For each statement, I'd like to know whether you think the statement is true or false.*

FIGURE 77 STATEMENTS ABOUT FIREPLACES & POLLUTION (N = 194)

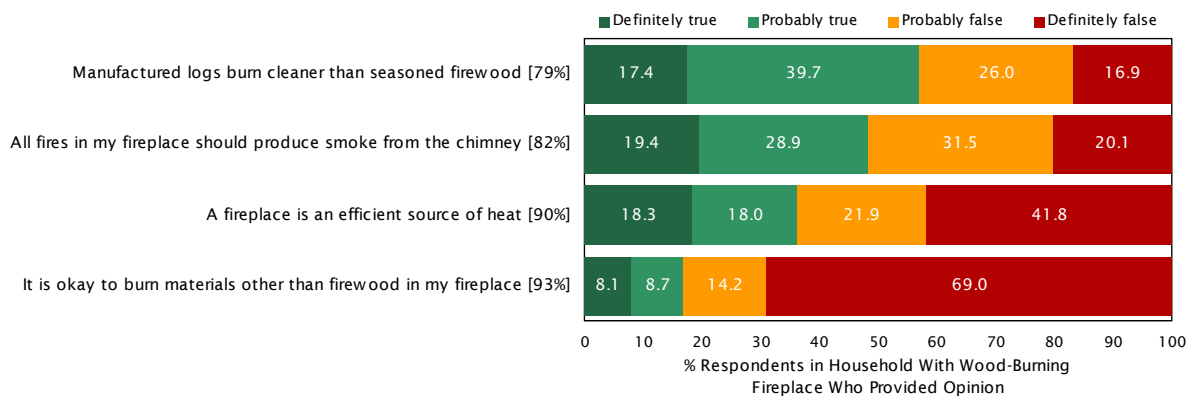


TABLE 7 STATEMENTS ABOUT FIREPLACES & POLLUTION SHOWING % TRUE: BY STUDY YEAR (N = 233)

	Study Year						
	2013	2012	2011	2010	2009	2008	2007
Manufactured logs burn cleaner than seasoned firewood	57.1	50.9	63.3	58.7	59.6	57.9	53.0
All fires in my fireplace should produce smoke from the chimney	48.3	43.8	47.5	43.7	49.6	48.8	48.9
A fireplace is an efficient source of heat	36.2	31.5	33.3	44.5	30.1	30.6	34.1
It is okay to burn materials other than firewood in my fireplace	16.8	14.8	20.1	18.1	17.7	13.6	14.0

PERCEPTIONS OF ENTITIES

To identify and track perceptions of the District and the Winter Spare the Air Alert Program, a series of three questions was presented to respondents to measure their awareness and opinions of the agency and the Program, as well their recent exposure to information about each. Because these questions were asked in an identical manner in past winter surveys dating back to 2002, the results from these studies are also shown for comparison.

AWARENESS Figure 78 shows that overall awareness of the BAAQMD (64%) has remained stable since 2009. Awareness of the Winter Spare the Air Alert Program (62%) increased steadily from 2005 to 2008 but has not changed significantly since.

Question 41 *Let's change gears a bit. Have you ever heard of the _____?*

FIGURE 78 AWARENESS OF BAAQMD BY STUDY YEAR (N = 1,300)

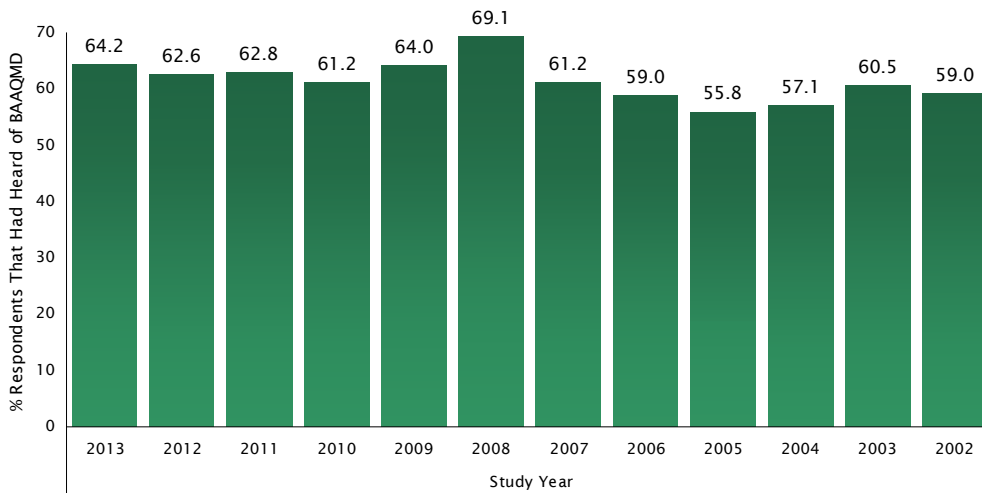
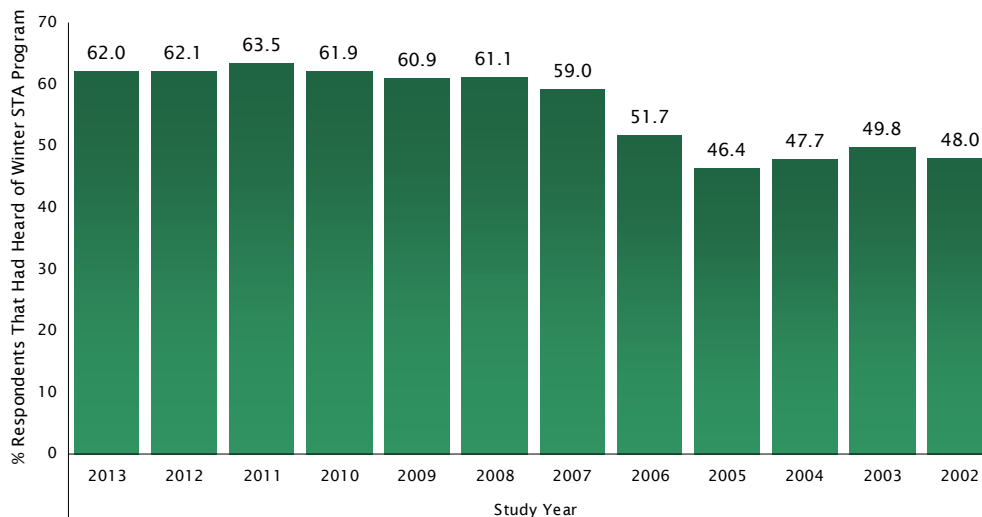
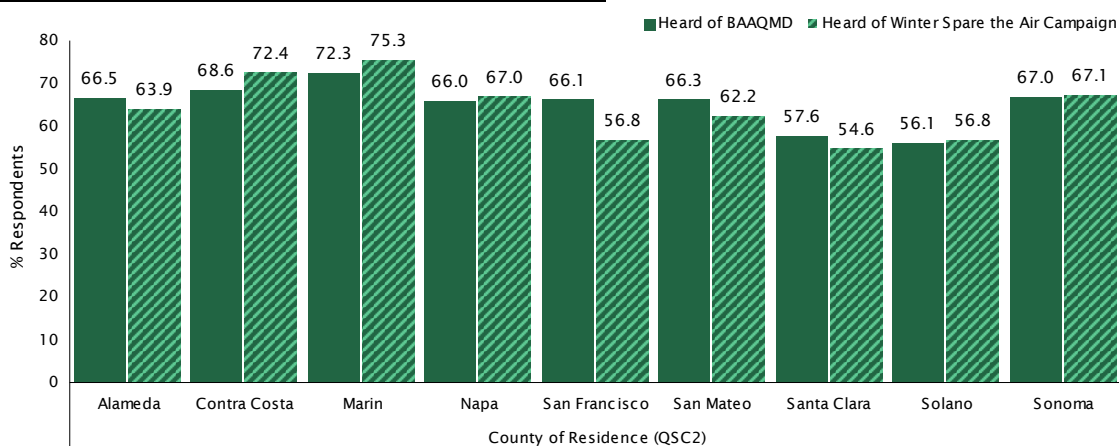


FIGURE 79 AWARENESS OF WINTER SPARE THE AIR ALERT PROGRAM BY STUDY YEAR (N = 1,300)



Across the nine member counties, awareness of the District was highest in Marin County (72%) and lowest in Solano County (56%). Awareness of the Program ranged from a high of 75% in Marin County to a low of 57% in San Francisco and Solano counties (see Figure 80).

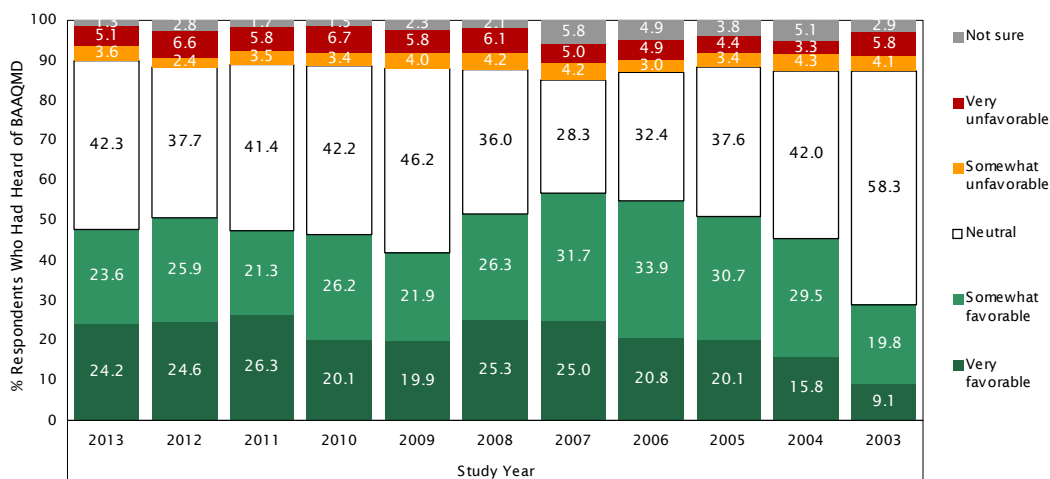
FIGURE 80 AWARENESS OF BAAQMD & WINTER SPARE THE AIR ALERT PROGRAM BY COUNTY OF RESIDENCE (N = 1,300)



OPINIONS Respondents who had heard of an entity were next asked whether their opinion of the entity was favorable, unfavorable, or neutral. Figures 81 and 82 display the findings of these questions in 2013, as well as the findings from the prior studies.¹² Of those who received the question in 2013, 48% held a favorable opinion of the District, whereas 42% held a neutral opinion and just 9% held an unfavorable opinion. Perceptions of the Program were more positive, with 64% holding a favorable opinion. Compared with 2012, there was a statistically significant increase in the percentage who had a very favorable opinion of the Program.

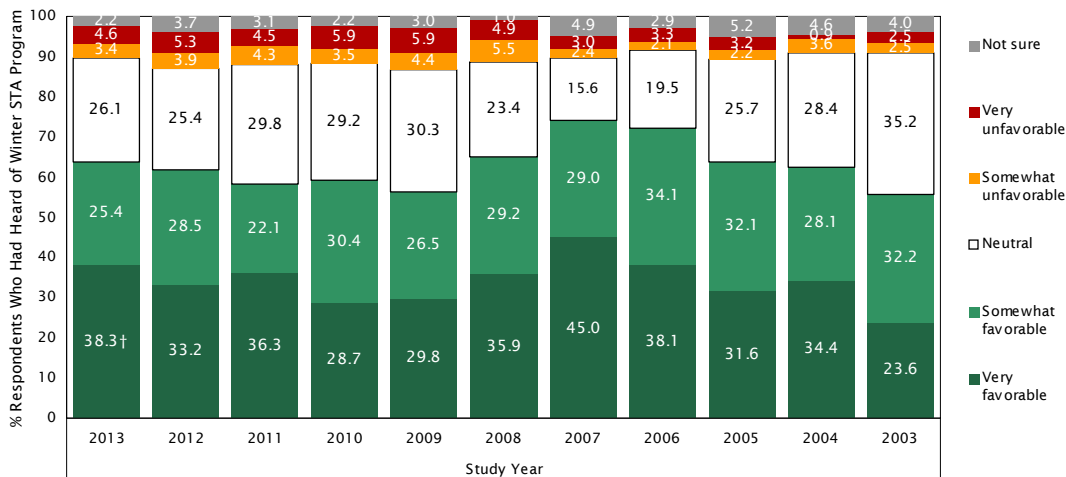
Question 42 *Generally speaking, would you say you have a favorable or unfavorable opinion of the _____, or do you have no opinion either way?*

FIGURE 81 OPINIONS OF BAAQMD BY STUDY YEAR (N = 835)



12. The response options for these questions were more limited in the 2002 study, so comparisons are not provided in Figure 81.

FIGURE 82 OPINIONS OF WINTER SPARE THE AIR ALERT PROGRAM BY STUDY YEAR (N = 806)



† Statistically significant change (p < 0.05) between the 2012 and 2013 studies.

EXPOSURE TO INFORMATION The last question in this series asked respondents whether they recalled hearing, reading, or seeing any news stories, advertisements or public service announcements about the BAAQMD and/or the Winter Spare the Air Alert Program in the six months prior to the interview. As shown in Figure 83, the proportion of respondents who recalled being exposed to information about the BAAQMD during this period was 51%, statistically similar to the 48% found in the prior study. However, the percentage of respondents who recalled exposure to the Winter Spare the Air Alert Program was also significantly higher in 2013 (66%) when compared with 2012 (60%).

Question 43 *In the past six months, have you heard, read, or seen any news stories, advertisements, or public service announcements about the _____?*

FIGURE 83 ENCOUNTERED INFORMATION ABOUT BAAQMD IN PAST SIX MONTHS BY STUDY YEAR (N = 835)

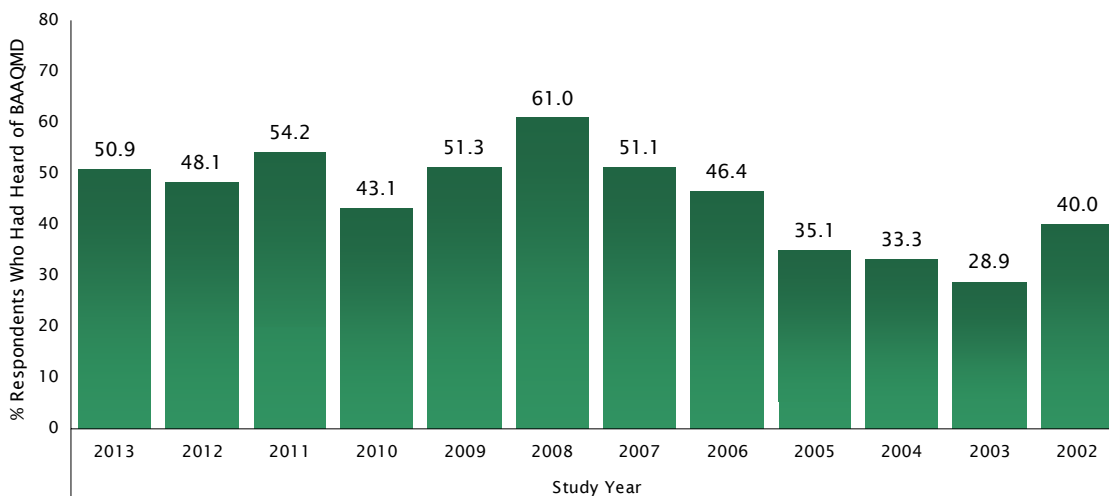
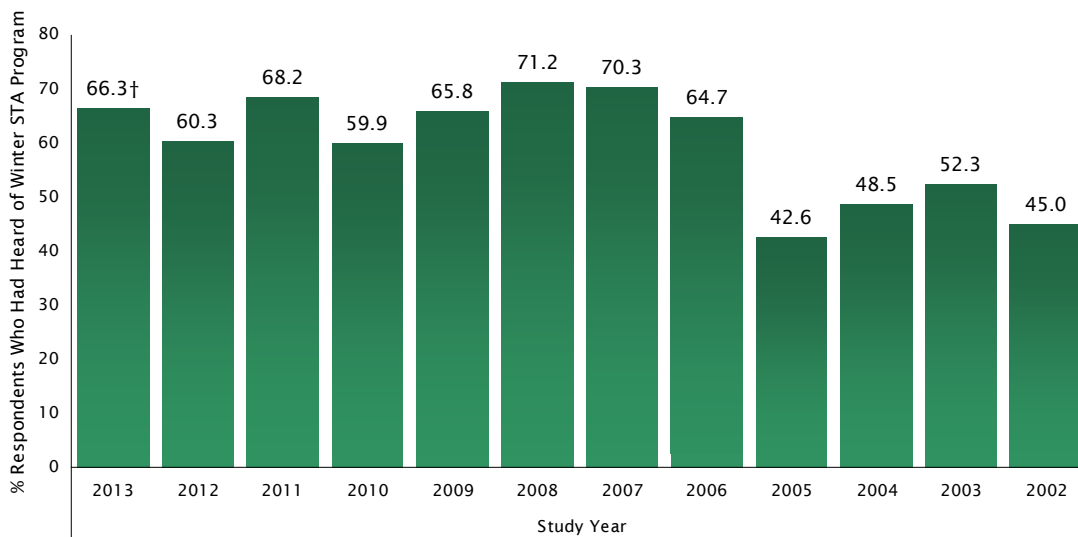


FIGURE 84 ENCOUNTERED INFORMATION ABOUT WINTER SPARE THE AIR ALERT PROGRAM IN PAST SIX MONTHS BY STUDY YEAR (N = 807)



† Statistically significant change (p < 0.05) between the 2012 and 2013 studies.

For the interested reader, figures 85 and 86 display the percentage of all respondents who recalled hearing, reading, or seeing information about the BAAQMD and the Winter Spare the Air Alert Program—not just among those who had heard of the agency or program as shown in Figure 83. Among all respondents, recalled exposure was greatest for the District among Napa County residents, those with wood-burning heating devices in the home, and respondents between 45 and 54 years of age. Awareness of the Program, meanwhile, was greatest among Contra Costa County residents, those with wood-burning heating devices in the home, and respondents between 45 and 54 years of age.

FIGURE 85 ENCOUNTERED INFORMATION ABOUT BAAQMD & WINTER SPARE THE AIR ALERT PROGRAM IN PAST SIX MONTHS BY COUNTY OF RESIDENCE (N = 1,300)

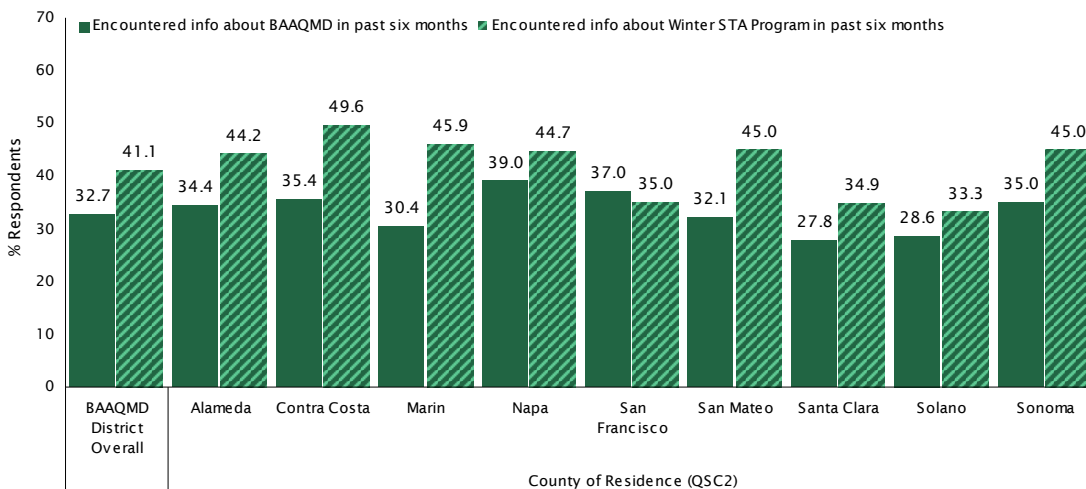
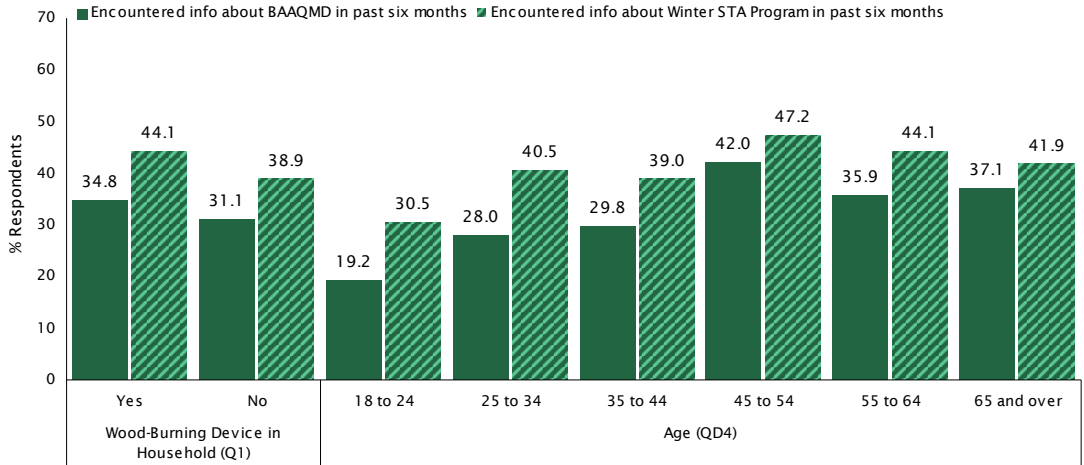


FIGURE 86 ENCOUNTED INFORMATION ABOUT BAAQMD & WINTER SPARE THE AIR ALERT PROGRAM IN PAST SIX MONTHS BY WOOD-BURNING DEVICE IN HOUSEHOLD & AGE (N = 1,300)



BACKGROUND & DEMOGRAPHICS

Table 8 displays the demographic and background information collected during the survey. The demographic and background information was used to monitor the sample during data collection, as well as provide insight into how the results of the substantive questions of the survey vary across important subgroups of adults.

TABLE 8 DEMOGRAPHICS OF SAMPLE BY STUDY YEAR

	Study Year											
	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Total Respondents	1,300	1,300	1,305	1,300	3,000	1,200	1,200	988	2,625	700	400	400
Age												
18 to 29	19	18	18	19	18	15	19	19	20	11	16	15
30 to 39	20	20	19	21	21	23	21	25	22	19	19	18
40 to 49	20	18	17	21	18	19	20	18	20	23	21	18
50 to 64	25	27	26	23	19	22	19	21	19	18	25	27
65 and over	16	16	15	15	13	14	15	14	14	21	13	18
Refused	0	0	6	0	10	7	6	3	5	8	7	5
Home Type												
Apartment	18	17	16	19	19	16	20	20	21	20	21	16
Condo	5	7	5	7	7	4	6	5	6	4	5	2
Town home	7	5	8	6	6	4	6	7	8	8	5	4
Single-family detached	63	61	62	60	61	68	63	63	60	63	66	73
Mobile home	2	2	3	2	2	3	2	3	2	2	2	4
Refused	5	8	6	6	5	4	3	2	4	3	3	1
Age of Home												
0 to 10 years	10	9	8	13	12	15	13	12	11	10	14	20
11 to 20 years	12	12	13	11	12	12	12	10	14	10	9	18
21 to 30 years	12	13	12	13	13	16	14	12	13	12	14	20
31 to 40 years	14	14	15	14	14	12	16	15	13	13	15	10
41 to 50 years	10	12	9	10	11	13	10	13	10	11	14	8
Over 50 years	30	27	27	24	23	23	26	28	27	30	18	10
Not sure / Refused	12	14	17	15	16	9	11	11	13	14	16	15
Gender												
Male	52	52	50	51	50	44	50	52	48	43	45	44
Female	48	48	50	49	50	56	50	48	52	57	55	56
County												
Alameda	21	21	20	21	20	21	21	21	21	23	22	-
Contra Costa	14	14	14	14	14	14	14	13	14	15	14	-
Marin	4	4	4	4	5	4	4	4	4	4	4	-
Napa	2	2	2	2	3	2	3	2	2	2	2	-
San Francisco	13	12	12	13	13	12	12	13	13	14	14	-
San Mateo	10	10	10	10	11	10	10	11	11	10	11	-
Santa Clara	25	24	24	25	24	25	24	24	24	23	23	-
Solano	5	5	6	5	6	6	5	6	6	3	5	-
Sonoma	5	7	7	5	5	5	5	6	5	5	6	-



M E T H O D O L O G Y

This section of the report outlines the methodology and protocols used when conducting this study, as well as the motivation for employing certain techniques.

QUESTIONNAIRE Dr. McLarney of True North Research worked with the BAAQMD and O’Rorke to develop and refine the survey instrument for the 2013 study. In the interest of improving the *validity* and *reliability* of select opinion and behavior measures, the 2013 study continued several questionnaire changes that were first implemented in the 2004 season. The most notable of these early changes addressed how the questionnaire measured the impacts of the Winter Spare the Air Alert Program. The changes were made so that impacts of the winter program on wood burning behavior would be measured using the same methodology employed by the BAAQMD—and recommended by CARB and EPA¹³—to measure the impacts of the summer Spare the Air Program on driving behavior. The final questionnaire used in this study can be found at the back of this report (see *Questionnaire & Toplines* on page 67).

CATI & PRE-TEST Before fielding the survey, the questionnaire was CATI (Computer Assisted Telephone Interviewing) programmed to assist interviewers when conducting the interviews. The CATI program automatically navigates the skip patterns, randomizes the appropriate question items, and alerts the interviewer to certain types of keypunching mistakes should they occur during the interview. The integrity of the questionnaire was pre-tested internally by True North and by dialing into random homes within the District prior to formally beginning the survey. Two training sessions were conducted to familiarize interviewers with the study and to answer questions and clarify details of the study.

SAMPLE & WEIGHTING Because the primary focus of the study was to gather information from adults who reside within the District, households were chosen for this study using a random digit dial (RDD) sampling method. An RDD sample is drawn by first selecting all of the active phone exchanges (first three digits in a seven-digit phone number) and working blocks that service the area. After estimating the number of listed households within each phone exchange that are located within the area, a sample of randomly selected phone numbers is generated with the number of phone numbers per exchange being proportional to the estimated number of households within each exchange in the area. This method ensures that both listed and unlisted households are included in the sample. It also ensures that new residents and new developments have an opportunity to participate in the study, which is not true if the sample were based on a telephone directory. In addition, 15% of the sample was dedicated to cell phone numbers so that those who rely on cell phones were represented in the study.

13. The CARB/EPA Method is summarized in the Transportation Research Board’s (TRB) journal—*Transportation Research Record*—for 2004 in an article entitled *Development of a Quantification Method for Measuring the Travel and Emissions Impacts of Episodic Ozone Alert Programs* (pages 153-159). It is described in detail in the following air resources guidance report: CARB, “Quantification Method Reference Manual: A Method to Measure Travel and Emissions Impacts of Ozone Action Public Education Programs,” April 2003. In addition to Eric Schreffler, Dr. Timothy McLarney and Richard Sarles, the TRB paper and guidance report were co-authored by Joann Lu and Jeff Weir of CARB, and Thomas Higgins and Dr. Will Johnson of K.T. Analytics.

Although the RDD method is widely used for local and regional surveys, the method also has several known limitations that must be adjusted for to ensure representative data. Research has shown, for example, that individuals with certain demographic profiles (e.g., older women) are more likely to be at home and are more likely to answer the phone even when other members of the household are available. If this tendency is not adjusted for, the RDD sampling method will produce a survey that is biased in favor of women—particularly older women. To adjust for this behavioral tendency, the survey included a screening question which initially asked to speak to the youngest male adult available in the home. If a male adult was not available, then the interviewer was instructed to speak to the youngest female adult currently available. This protocol was followed to the extent needed to ensure a representative sample of adults. In addition to following this protocol, the sample demographics were monitored as the interviewing proceeded to make sure they were within certain tolerances. Because the District is composed of seven complete counties and two partial counties, respondents were initially asked the ZIP code of their residence so that only those within the District’s boundaries were included in the study. The final raw data were weighted by age groups within each county to match Census 2010 estimates. The results presented in this report are the weighted results, which are representative at the District-wide level, as well as within the nine member counties.

MARGIN OF ERROR By using an RDD probability-based sample and monitoring the sample characteristics as data collection proceeded, True North ensured that the sample was representative of adults and households in the District. The results of the sample can thus be used to estimate the opinions of *all* adults—and characteristics of *all* households—in the District. But because not every adult or household in the District participated, the results have what is known as a statistical margin of error due to sampling. For household characteristics, the margin of error refers to the difference between what was found in the survey of 1,300 households for a particular question and what would have been found if all of the estimated 2,608,023 households in the District had been interviewed.

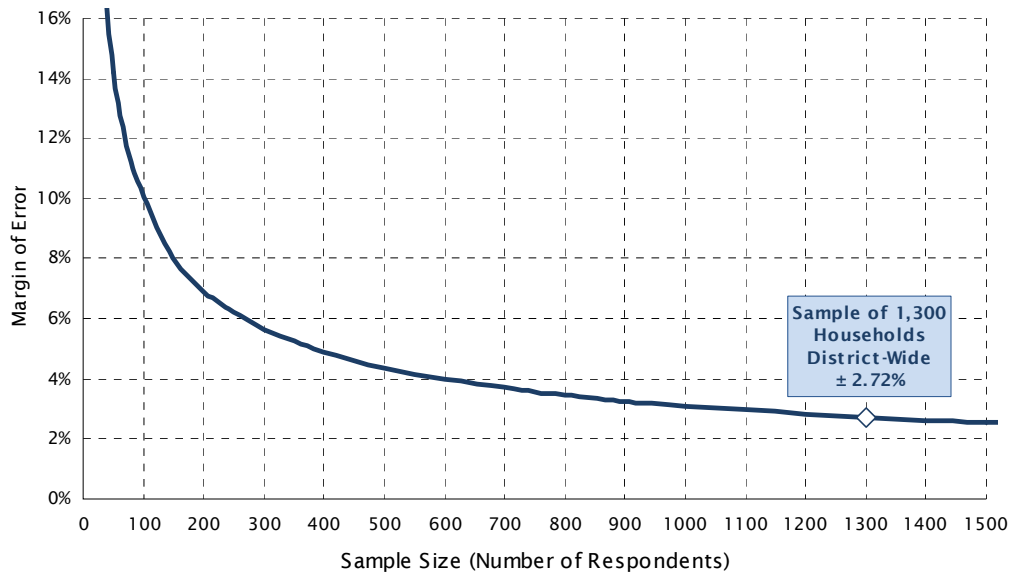
For example, in estimating the percentage of District households that have a wood stove (Question 1), the margin of error can be calculated if one knows the number of households, the size of the sample, a chosen confidence level, and the distribution of responses to the question. The appropriate equation for estimating the margin of error, in this case, is shown below.

$$\hat{p} \pm t \sqrt{\left(\frac{N-n}{N}\right) \frac{\hat{p}(1-\hat{p})}{n-1}}$$

where \hat{p} is the proportion of households that indicated they possess a wood stove (0.079 for 7.9% in this example), N is the total number of households in the District (2,608,023), n is the sample size that received the question (1,300), and t is the upper $\alpha/2$ point for the t-distribution with $n - 1$ degrees of freedom (1.96 for a 95% confidence interval). Solving this equation using these values reveals a margin of error of $\pm 1.47\%$. This means that with 7.9% of sampled households surveyed indicating they own a wood stove, one can be 95 percent confident that the actual percentage of all households in the District with a wood stove is between 6.4% and 9.4%.

Figure 87 provides a graphic plot of the *maximum* margin of error in this study. The maximum margin of error for a dichotomous percentage result occurs when the answers are evenly split such that 50% provide one response and 50% provide the alternative response (i.e., $\hat{p} = 0.5$). For this survey, the maximum margin of error is 2.72% for District-wide estimates.

FIGURE 87 MAXIMUM MARGIN OF ERROR PLOT



Within this report, figures and tables show how responses to certain questions varied by county, as well as by demographic characteristics such as presence of a heating device in the home, respondent age, and education level. Because the margin of error grows exponentially as the sample size decreases (see the left side of Figure 87), the reader should use caution when generalizing and interpreting the results of questions received by only a small percentage of the sample or when comparing results within subgroups of respondents.

DATA COLLECTION A total of 1,300 randomly selected residents within the District’s boundaries participated in the survey on weekday evenings (5:30PM to 9PM) and on weekends (10AM to 5PM) between November 22, 2013 and January 31, 2014. It is standard practice not to call during the day on weekdays because most working adults are unavailable and thus calling during those hours would bias the sample. Interviewing was also suspended for the Christmas and New Year’s holidays.

Sampled respondents were offered the option of participating by telephone or online at a secure, password-protected website hosted by True North. Interviews were conducted on randomly selected dates throughout the season ($n = 525$), as well as 27 targeted for evenings following Winter Spare the Air Alert episodes ($n = 775$). The average interview was 14 minutes.

DATA PROCESSING Data processing consisted of checking the data for errors or inconsistencies, coding and recoding responses, categorizing open-end responses, and preparing frequency analyses and crosstabulations. Because the research objectives involved comparing the 2013 results with those of prior studies, where appropriate, True North also accessed and processed data from the 2012 through 2002 winter season surveys to allow for comparisons.

STATISTICAL SIGNIFICANCE Many of the figures and tables in this report present the results of questions asked in 2013 alongside the results found in prior years for identical questions. In such cases, True North conducted the appropriate tests of statistical significance to identify changes that likely reflect actual changes in public opinion or behavior over time—as opposed to being due to chance associated with selecting two cross-sectional samples independently and at random. Differences between studies are identified as *statistically significant* if we can be 95% confident that the differences reflect an actual change in public opinion or behavior between the two studies. Statistically significant differences within response categories over time are denoted by the † symbol which appears in the figure next to the appropriate response value for 2013.

ROUNDING Numbers that end in 0.5 or higher are rounded up to the nearest whole number, whereas numbers that end in 0.4 or lower are rounded down to the nearest whole number. These same rounding rules are also applied, when needed, to arrive at numbers that include a decimal place in constructing figures and charts. Occasionally, these rounding rules lead to small discrepancies in the first decimal place when comparing tables and pie charts for a given question.

QUESTIONNAIRE & TOPLINES



*Winter 13-14 Spare the Air Alert Survey
Designed by True North Research
Final Toplines
1,300 Respondents*

Section 1: Introduction to Study

Hi, my name is _____ and I'm calling on behalf of TNR, a public opinion research firm. We're conducting a survey concerning issues of importance to residents in the Bay Area region and we'd like to get your opinions.

If needed: This is only a survey about important issues in the Bay Area. I'm NOT trying to sell anything.

If needed: The survey should take about 12 minutes to complete.

If needed: If now is not a convenient time, can you let me know a better time so I can call back?

If the person says they are an elected official or is somehow associated with the survey, politely explain that this survey is designed to measure the opinions of those not closely associated with the study, thank them for their time, and terminate the interview.

Section 2: Screener for Inclusion in the Study

For statistical reasons, I would like to speak to the youngest adult male currently at home that is at least 18 years of age. *If there is no male currently at home that is at least 18 years of age, then ask:* Ok, then I'd like to speak to the youngest female currently at home that is at least 18 years of age.

If there is no adult currently available, then ask for a callback time.

NOTE: Adjust this screener as needed to match sample quotas on gender & age

The number of respondents that received each question is shown in brackets following the question wording.

SC1	To begin, what is the ZIP code of your residence? <i>Read zip code back to respondent to confirm before submitting. Terminate those that fall outside District.</i> [1,300]	
	Record 5-digit ZIP code	Data on file
SC2	What county do you live in? [1,300]	
	1	Alameda 21%
	2	Contra Costa 14%
	3	Marin 4%
	4	Napa 2%
	5	San Francisco 13%
	6	San Mateo 10%
	7	Santa Clara 25%
	8	Solano 5%
	9	Sonoma 5%

Section 3: Heating Device Use

I'd like to begin by asking you a few questions about heating devices that you may have in your home.

Q1 Do you have a: _____ in your home? *If yes, ask: How many: _____s do you have in your home?*

A	Wood-burning fireplace* [1,300]	
	None	63%
	One	32%
	Two	3%
	Three or more	1%
	Not sure / Refused	0%
B	Natural gas or propane fireplace [1,300]	
	None	77%
	One	16%
	Two	5%
	Three or more	1%
	Not sure / Refused	2%
C	Pellet stove* [1,300]	
	None	90%
	One	3%
	Two	0%
	Three or more	1%
	Not sure / Refused	5%
D	Woodstove or woodstove insert* [1,300]	
	None	90%
	One	6%
	Two	1%
	Three or more	0%
	Not sure / Refused	3%

If Q1.1a, Q1.1b, Q1.1c AND Q1.1d = (2, 98), skip to Q23.

Only ask Q2 if Q1.1a = 1 OR Q1.1d = 1, otherwise skip to instructions preceding Q4.

*43% of households reported at least one wood-burning device.

Q2 What type of wood do you primarily use in your wood burning fireplace or woodstove: Natural wood logs, manufactured logs such as Duraflame or Presto, scrap wood, pallets, or some other fuel? If 'other', ask: what type? [522]				
	1	Natural wood log	42%	Ask Q4
	2	Manufactured log/Duraflame/Presto	16%	Skip to Q8
	3	Scrap wood	3%	Skip to Q8
	4	Pallets (not pellets)	1%	Skip to Q8
	5	Never use fireplace	21%	Skip to Q8
	6	Other	3%	Skip to Q8
	98	Not sure	11%	Skip to Q8
	99	Refused	3%	Skip to Q8
Q3 Do you also ever burn: _____?				
<i>Do not read option below that was chosen in Q2.</i>				
	<i>Randomize</i>		Yes	No
			Not Sure/Doesn't Apply	
A	Natural wood logs [228]		32%	66%
B	Manufactured logs such as Duraflame or Presto [367]		30%	69%
C	Scrap wood [433]		17%	81%
D	Pallets (not pellets) [446]		3%	95%
<i>Only ask Q4 if Q2 = 1 OR Q3a=1, otherwise skip to introduction preceding Q8.</i>				
Q4 What type of natural wood do you typically burn? [295]				
	1	Ash	2%	
	2	Eucalyptus	2%	
	3	Oak	45%	
	4	Pine (Cedar)	5%	
	5	Almond	5%	
	6	Fruitwood	0%	
	7	Hardwood (general)	14%	
	8	Other wood	3%	
	98	Not sure	24%	
	99	Refused	0%	

Q5	Do you typically purchase your wood from a wood supplier, the local store, or do you gather your own wood? [295]				
	1	Wood supplier	18%		
	2	Local store	23%		
	3	Gather own wood	51%		
	4	Other source	6%		
	98	Not sure	2%		
	99	Refused	0%		
Q6	At the point that you acquire your wood, is it fresh-cut and somewhat moist or is it already dry and seasoned? [295]				
	1	Fresh-cut & moist	18%		
	2	Dry & seasoned	73%		
	3	Depends/mixed	4%		
	98	Not sure	5%		
	99	Refused	0%		
Q7	When you use your fireplace or woodstove, which of the following would you say is the primary reason you do so? For heating your home, or for the ambiance of having a fire? [295]				
	1	Heat	39%		
	2	Ambiance	57%		
	98	Not sure	4%		
	99	Refused	0%		
For the next series of questions, when I refer to "winter" I mean the months of November through February.					
<i>Only ask Q8 for each appliance where Q1.1 = 1.</i>					
Q8	Will you use your: _____ this winter?				
<i>Do Not Randomize</i>		Yes	No	Not Sure	Refused
A	Wood-burning fireplace [471]	49%	49%	2%	0%
B	Natural gas or propane fireplace [286]	63%	35%	2%	0%
C	Pellet stove [56]	63%	26%	10%	1%
D	Woodstove [103]	51%	41%	6%	2%

<i>Only ask Q9 for each appliance where Q8 = 2.</i>					
Q9	Why do you not expect to use your _____ this winter? <i>Do Not Read Responses. Multiple Responses OK.</i>				
<i>Do Not Randomize</i>		Air Quality Reasons	Too Much Hassle	Health Reasons	Other
A	Wood-burning fireplace [230]	17%	24%	16%	46%
B	Natural gas or propane fireplace [100]	8%	18%	8%	68%
C	Pellet stove [15]	17%	28%	3%	52%
D	Woodstove [42]	9%	24%	10%	57%
<i>Read the following instruction if Q1.1c = 1.</i>					
For the remainder of this interview, when I refer to 'burning wood' I mean burning any type of wood product, including wood pellets for a pellet stove.					
<i>Only ask Q10 if Q8a = 1, Q8c = 1 or Q8d = 1. Otherwise, skip to Q23.</i>					
Q10	How often do you expect to burn wood this winter? At least once per week or less often than that? <i>If unsure, ask them to estimate.</i> [295]				
	1	At least once per week	46%	<i>Skip to Q12</i>	
	2	Less often than once per week	51%	<i>Ask Q11</i>	
	98	Not sure	3%	<i>Skip to Q13</i>	
	99	Refused	0%	<i>Skip to Q13</i>	
Q11	Would you say that you will burn wood about two to three times per month, once per month, or less often than once per month? <i>If unsure, ask them to estimate.</i> [151]				
	1	Two to three times per month	26%	<i>Skip to Q13</i>	
	2	Once per month	41%	<i>Skip to Q13</i>	
	3	Less often than once per month	28%	<i>Skip to Q13</i>	
	98	Not sure	1%	<i>Skip to Q13</i>	
	99	Refused	4%	<i>Skip to Q13</i>	

Q12	In a typical winter week, how many days do you expect to burn wood? <i>If unsure, ask them to estimate.</i> [135]		
	1	One day	22%
	2	Two days	23%
	3	Three days	24%
	4	Four days	2%
	5	Five days	12%
	6	Six days	1%
	7	Seven days	13%
	98	Not sure	2%
	99	Refused	0%
Q13	Did you burn wood in the past seven days? [295]		
	1	Yes	32%
	2	No	68%
	98	Not sure	0%
	99	Refused	0%
Q14	Did you burn wood yesterday or last night? [95]		
	1	Yes	44%
	2	No	56%
	98	Not sure	0%
	99	Refused	0%
Q15	In a typical day that you burn wood, how many hours of the day do you have a fire burning? <i>If unsure, ask them to estimate.</i> [295]		
	One		5%
	Two		26%
	Three		24%
	Four		18%
	Five or more		19%
	Not sure		8%

<i>Only ask Q16 if Q8a = 1 or Q8d = 1.</i>		
Q16	In a typical day that you burn wood, how many logs do you burn throughout the entire day? <i>If unsure, ask them to estimate.</i> [260]	
	One	14%
	Two	8%
	Three	10%
	Four	10%
	Five	14%
	Six	10%
	Seven or more	21%
	Not sure	13%
Q17	Thinking back to your most recent fire, approximately what time of the day did you first light the fire? <i>If unsure, ask to estimate.</i> [295]	
	1 4AM to 8:59AM	9%
	2 9AM to 11:59AM	5%
	3 Noon to 2:59PM	2%
	4 3PM to 5:59PM	18%
	5 6PM to 8:59PM	54%
	6 9PM to 11:59PM	4%
	7 Midnight to 3:59AM	1%
	99 Not sure / Refused	7%

Section 4: Changes in Wood Burning Behavior

Only ask Q18 if Q8a = 1, Q8c = 1 or Q8d = 1. Otherwise, skip to Q23.

Q18	This winter, do you expect that you will burn wood more often, less often, or about the same frequency as you did last winter? [295]	
	1 More often	9%
	2 Less often	27%
	3 About the same	58%
	98 Not sure	5%
	99 Refused	0%

Q19	Were there occasions this winter when you normally would have burned wood, but decided not to? [295]		
	1	Yes	51% Ask Q20
	2	No	47% Skip to Q23
	98	Not sure	2% Skip to Q23
	99	Refused	0% Skip to Q23
Q20	Why did you decide not to burn wood on these occasions? <i>Do NOT Read Response Options. Multiple Responses OK.</i> [151]		
	1	Winter Spare the Air Alert Program/ Advertisements and notices asking people not to burn wood/Laws against burning wood	61% Ask Q21
	2	Air quality reason/health reason	16% Ask Q21
	3	Other reason	21% Skip to Q23
	98	Not sure	4% Skip to Q23
	99	Refused	0% Skip to Q23
Q21	So far this winter, how many times did you choose not to burn wood because of air quality alerts or health-related reasons? <i>If unsure, ask respondent to estimate.</i> [112]		
	One		8%
	Two		20%
	Three		11%
	Four		9%
	Five or more		38%
	Not sure		16%
<i>Only ask Q22 if Q14 = 2.</i>			
Q22	You previously indicated that you chose not to burn wood yesterday or last night. Why did you decide not to burn wood yesterday or last night? <i>Do NOT Read Response Options. Multiple Responses OK.</i> [53]		
	1	Winter Spare the Air Alert Program/ Advertisements and notices asking people not to burn wood/Laws against burning wood	15%
	2	Air quality reason/health reason	5%
	3	No need/not cold	32%
	4	Other reason	42%
	98	Not sure	8%
	99	Refused	3%
30.3% of households with at least one wood-burning device reported not burning wood this winter (Q9) or a reduction in burning wood this winter (Q20,Q22) because of Winter STA Program / Air quality info, or because of health concerns paired with encountering Winter STA Program / Air quality info (Q23).			

Section 5: Awareness of Campaign					
Q23	During this winter, have you heard, read, or seen any news stories, advertisements, or public service announcements about the Winter Spare the Air Alert Program, poor air quality, or requests not to use your fireplace, pellet stove, or woodstove? [1,300]				
	1	Yes	65%	Ask Q24	
	2	No	34%	Skip to Q26	
	98	Not sure	0%	Skip to Q26	
	99	Refused	0%	Skip to Q26	
Q24	During this winter, do you recall encountering information about the Bay Area Air Quality Management District or the Winter Spare the Air Program: _____? [849]				
	Randomize		Yes	No	Not Sure/Doesn't Apply
A	On television		71%	28%	1%
B	On the radio		57%	42%	1%
C	In a newspaper		34%	64%	2%
D	On a website		22%	76%	2%
E	On a billboard		12%	84%	4%
F	On social media like Facebook or Twitter		13%	83%	4%
Ask Q25 if Q24a = 1.					
Q25	Information about the Winter Spare the Air program is carried on television in a number of ways. Do you recall encountering information about Winter Spare the Air on television in: _____? [602]				
	Randomize		Yes	No	Not Sure/Doesn't Apply
A	An advertisement or public information announcement that talks about fires, woodsmoke, air quality and the Winter Spare the Air program		48%	50%	2%
B	A news program		84%	14%	2%
C	A weather alert		60%	39%	1%
D	An interview with an air quality expert or representative		16%	81%	3%

<i>Only ask Q26 if interviewing the day after a Winter STA Alert. Otherwise, skip to Q27.</i>			
Q26	Prior to taking this survey, were you aware that there was a "Winter Spare the Air Alert" yesterday? [823]		
	1	Yes	44%
	2	No	55%
	98	Not sure	1%
	99	Refused	0%

Section 6: Attitudes about Wood Smoke			
Q27	Do you think there are any negative health effects associated with breathing wood smoke? [1,300]		
	1	Yes	70% Ask Q28
	2	No	23% Skip to Q29
	98	Not sure	7% Skip to Q29
	99	Refused	0% Skip to Q29
Q28	What are the negative health effects associated with breathing wood smoke? <i>Don't read options. Multiple response OK.</i> [916]		
	1	Lung Disease (general reference)	44%
	2	Asthma	35%
	3	Allergies	6%
	4	Bronchitis	4%
	5	Cancer	12%
	6	Emphysema	3%
	7	Chemicals/Carcinogens/Toxins in wood	8%
	8	Carbon monoxide	4%
	9	Other health issue	8%
	98	Not sure	14%
	99	Refused	0%
Q29	Different neighborhoods in the Bay Area experience different levels of air pollution from wood smoke. In your opinion, does your neighborhood periodically experience air pollution from wood smoke? [1,300]		
	1	Yes	19% Ask Q30
	2	No	74% Skip to Q31
	98	Not sure	7% Skip to Q31
	99	Refused	0% Skip to Q31

Q30	Would you say that periodic air pollution from wood smoke in your neighborhood is a big problem, medium problem or a small problem? [242]		
	1	Big problem	14%
	2	Medium problem	23%
	3	Small problem	61%
	98	Not sure	3%
	99	Refused	0%

Section 8: Policy Attitude

Q31	Prior to taking this survey, were you aware that several years ago the Bay Area Air Quality Management District passed a rule that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels? [1,300]		
	1	Yes, was aware	66%
	2	No, was not aware	32%
	98	Not sure	1%
	99	Refused	0%
Q32	Overall, how informed do you feel about the rules that are part of this new wood-burning policy? Would you say you feel well informed, somewhat informed, slightly informed, or not at all informed? [1,300]		
	1	Well informed	29%
	2	Somewhat informed	29%
	3	Slightly informed	21%
	4	Not at all informed	19%
	98	Not sure	2%
	99	Refused	0%
Q33	In general, do you support or oppose a policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels? [1,300]		
	1	Support	75%
	2	Oppose	17%
	3	Depends	3%
	98	Not sure	4%
	99	Refused	0%

Q34	Should people be allowed to burn wood on holidays like Christmas and New Years even if air pollution is expected to reach unhealthy levels that day? [1,300]							
	1	Yes				34%		
	2	No				61%		
	98	Not sure				5%		
	99	Refused				0%		
Q35	Does your household normally burn wood on holidays like Christmas and New Years day? [1,300]							
	1	Yes	16%	Ask Q36				
	2	No	81%	Skip to Q37				
	3	Depends	2%	Ask Q36				
	98	Not sure	1%	Skip to Q37				
	99	Refused	0%	Skip to Q37				
Q36	If air pollution levels were high and a 'no burn' day was set on Christmas or New Years day, would you still burn wood? [235]							
	1	Yes				29%		
	2	No				68%		
	98	Not sure				3%		
	99	Refused				0%		
<i>Split-Sample. Sample A (half) gets Q37.</i>								
Q37	Next, I'm going to read a series of statements. For each statement, I'd like to know whether you think the statement is true or false. Here is the first one: _____. Do you think this statement is true or false? Would that be definitely (true/false) or probably (true/false)? [678]							
	<i>Randomize</i>		Definitely True	Probably True	Probably False	Definitely False	Not sure	Refused
A	No households are allowed to burn wood on designated 'no burn' days. There are no exceptions.		28%	26%	18%	22%	6%	1%
B	Households for which wood burning is their only source of heat are still allowed to burn wood on designated 'no burn' days.		31%	32%	15%	10%	10%	2%
C	Households that use natural gas or propane fireplaces are still allowed to use them on 'no burn' days.		32%	32%	14%	9%	10%	2%
D	Households that have EPA certified woodstoves or pellet stoves are still allowed to use them on 'no burn' days.		12%	30%	25%	15%	16%	2%

E	People who violate the 'no burn' policy will receive a warning first, and then citations for future violations.	39%	38%	7%	4%	10%	1%
F	Between November and February, residents are required to check the status of air quality prior to burning wood.	33%	34%	14%	8%	11%	1%
G	On days that have clean air, it's OK to burn different types of wood, including driftwood, treated wood, wood that is still a bit wet, and used pallets.	9%	23%	26%	28%	12%	2%
H	At any time of the year, I can receive a citation if there is a lot of visible smoke coming from my chimney.	26%	36%	16%	10%	11%	1%
I	Burning wood is a major source of air pollution in the Bay Area, contributing up to one-third or more of airborne particle pollution on many winter days.	17%	31%	28%	12%	11%	2%
Q38	Do you know how you could find out whether today is a 'no burn' day? [1,300]						
	1	Yes	50%		Ask Q39		
	2	No	44%		Skip to Q40		
	98	Not sure	5%		Skip to Q40		
	99	Refused	0%		Skip to Q40		
Q39	How can you find out? <i>Probe:</i> Are there any other ways to find out? <i>Do NOT read options. Check all mentions.</i> [656]						
	1	Check the newspaper	22%				
	2	Listen to radio	21%				
	3	Call a hotline	12%				
	4	Check the Air District's website	12%				
	5	Check a website (general reference)	62%				
	6	Sign-up for email alerts	4%				
	7	Sign-up for text message alerts	1%				
	8	Sign-up for automated telephone calls/robo-call notification	1%				
	98	Not sure	6%				
	99	Refused	0%				

Section 9: Fireplace & Pollution Knowledge							
Split-Sample. Sample B (half) gets Q40, but only ask Q40 if Q1.1a = 1. Otherwise, skip to Q41.							
Q40 Next, I'm going to read a series of statements. For each statement, I'd like to know whether you think the statement is true or false.							
Here is the first one: ----- Do you think this statement is true or false? Would that be definitely (true/false) or probably (true/false)? [194]							
	Randomize	Definitely True	Probably True	Probably False	Definitely False	Not sure	Refused
A	A fireplace is an efficient source of heat	17%	16%	20%	38%	9%	1%
B	All fires in my fireplace should produce visible smoke from the chimney	16%	24%	26%	17%	15%	3%
C	It is okay to burn materials other than firewood in my fireplace	8%	8%	13%	64%	5%	1%
D	Manufactured logs burn cleaner than seasoned firewood	14%	31%	21%	13%	19%	2%

Section 10: BAAQMD and Winter Spare the Air Alert Program Recognition							
Q41 Let's change gears a bit. Have you ever heard of the -----? Code 'Not sure' as 'No'.							
	Randomize	Yes	No				
A	Bay Area Air Quality Management District [1,300]	64%	36%				
B	Winter Spare the Air Alert Program [1,300]	62%	38%				
Only ask Q42 and Q43 for each item in Q41 that respondent had heard of.							
Q42 Generally speaking, would you say you have a favorable or unfavorable opinion of the -----, or do you have no opinion either way? Get answer and ask: Would that be very or somewhat favorable / unfavorable?							
		Very Favorable	Somewhat Favorable	Neutral/ No Opinion Either Way	Somewhat Unfavorable	Very Unfavorable	Not sure
A	Bay Area Air Quality Management District [835]	24%	24%	42%	4%	5%	1%
B	Winter Spare the Air Alert Program [806]	38%	25%	26%	3%	5%	2%

Q43		In the past six months, have you heard, read, or seen any news stories, advertisements, or public service announcements about the _____?		
		Yes	No	Not sure
A	Bay Area Air Quality Management District [835]	51%	46%	3%
B	Winter Spare the Air Alert Program [806]	66%	30%	3%

Section 12: Background & Demographics

Thank you so much for your participation. I have just a few background questions for statistical purposes.

D1		Including yourself, how many adults live in your household? [1,300]		
	One		16%	
	Two		48%	
	Three or more		35%	
	Refused		2%	
D2		Do you have children in your home that are in elementary or middle school? [1,300]		
	1	Yes	27%	Ask D3
	2	No	71%	Skip to D4
	99	Refused	2%	Skip to D4
D3		Have your children ever raised the topic or brought home information about air pollution or the Spare the Air program? [346]		
	1	Yes	20%	
	2	No	79%	
	99	Refused	1%	
D4		In what year were you born? Year recoded into age categories shown below. [1,300]		
	18 to 24		12%	
	25 to 34		19%	
	35 to 44		19%	
	45 to 54		19%	
	55 to 64		15%	
	65 and over		16%	
	Refused		0%	

D5	Do you live in an apartment, condo, townhome, single-family detached home, or mobile home? [1,300]		
	1	Apartment	18%
	2	Condo	5%
	3	Townhome	7%
	4	Single-family detached home	63%
	5	Mobile home	2%
	99	Refused	5%
D6	Approximately how many years ago was your home built? [1,300]		
	1	0 to 10 years	10%
	2	11 to 20 years	12%
	3	21 to 30 years	12%
	4	31 to 40 years	14%
	5	41 to 50 years	10%
	6	Over 50 years	30%
	98	Not sure	10%
	99	Refused	2%
<i>Only ask D7 if Q1d = 1. Otherwise skip to instructions preceding D8.</i>			
D7	Is your woodstove or woodstove insert EPA certified? <i>If not sure, clarify: Most woodstoves manufactured after 1992 are EPA certified, while older ones are not.</i> [103]		
	1	Yes, EPA certified	38%
	2	No, not EPA certified	17%
	98	Not sure	42%
	99	Refused	3%
<i>Only ask D8 to D10 if ((Q1a = 1, Q1c = 1, or Q1d = 1) and (Q1b = (2, 98))). Otherwise skip to D11.</i>			
D8	Do you have natural gas service at your home? [453]		
	1	Yes	86% <i>Skip to D10</i>
	2	No	10% <i>Ask D9</i>
	98	Not sure	3% <i>Ask D9</i>
	99	Refused	2% <i>Ask D9</i>

D9	Do you pay for propane delivery at your home? [65]		
	1	Yes	14%
	2	No	73%
	98	Not sure	2%
	99	Refused	12%
D10	Besides your fireplace, do you have any other form of permanently installed devices to heat your home, such as a gas furnace, radiator, propane heater, or electric heaters? [453]		
	1	Yes	76%
	2	No	19%
	98	Not sure	3%
	99	Refused	2%
D11	Do you have an outdoor fireplace, firepit or chiminea (chim-uh-nay-uh)? [1,300]		
	1	Yes	21%
	2	No	76%
	98	Not sure	1%
	99	Refused	3%
D12	What is the last grade or level you completed in school? [1,300]		
	1	Elementary (8 or fewer years)	0%
	2	Some high school (9 to 11 years)	2%
	3	High school graduate (12 years)	16%
	4	Technical / Vocational school	1%
	5	Some college	19%
	6	College graduate	31%
	7	Some graduate school	2%
	8	Graduate, professional, doctorate degree (DDS, DVM, JD, LLM, MA, MS, MBA, MD, PhD)	23%
	99	Refused	5%

Those are all of the questions that I have for you. Thanks very much for participating. This survey is sponsored by the Bay Area Air Quality Management District.

Post-Interview Items			
D13	Gender [1,300]		
	1	Male	52%
	2	Female	48%
D14	Interview month [1,300]		
	11	November	15%
	12	December	54%
	01	January	31%