



**Washoe County
Health District
Air Quality Management Division**

**2012-13 Residential
Wood Use Survey**

May 2013

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**2012-13 RESIDENTIAL WOOD USE SURVEY
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OBJECTIVES AND METHODOLOGY

Objectives

Residential wood combustion is a significant contributor to air pollution in Washoe County, Nevada. In order to estimate the residential wood combustion contribution to particulate and carbon monoxide (CO) concentrations, several surveys of the region's residential wood use patterns have been conducted over the past two decades.

The Washoe County Health District, Air Quality Management Division, has contracted with market research companies to conduct wood use surveys of area residents. The primary objectives of the current 2012-2013 survey were to:

- Identify the percentage of residents who have one or more wood burning devices in their homes and, of those, the percentage who used a wood burning device during the prior winter;
- Identify the types of wood burning devices used and the ages of those devices (relative to the EPA Phase I and Phase II rules);
- Identify the amount and types of wood/pellets burned, as well as whether coal, scrap wood, or pallets were burned;
- Identify how many days and hours, on average, the wood burning devices were used, the months that they were first started during the prior winter, and the time of day the devices were usually started;
- Identify the perception of the overall air quality in Washoe County, which season has the worst air quality, whether their neighborhood experiences air pollution from wood smoke, and the health effects, if any, that are associated with breathing wood smoke;
- Identify whether people who have a wood burning device have heard of: (1) the Washoe County Air Quality Management Division, (2) public service announcements about the division, (3) the Green-Yellow-Red Burn Code Program, and/or (4) the Keep It Clean, Know the Code program.
- Identify through which media channel residents most often heard about these programs, whether they either reduced or stopped wood burning during yellow or red days during the prior winter, and whether they feel they receive enough information from the division;
- Identify whether residents would support additional wood burning controls to improve air quality, as well as whether fireplace and wood stove users would be likely to replace or exchange their wood burning devices for cleaner devices;
- Identify whether there were significant differences between subgroups based on either type of residence or the geographic region of residence; and
- Provide trending over time and comparisons with previous study results.

Methodology

MarkeTec conducted the surveys in 1992-93, 1994-95, 1995-96, 1999-00, 2001-02, 2003-04, and 2005-06. InfoSearch International, in partnership with MarkeTec, conducted the survey in 2007-08. InfoSearch International conducted both the 2009-2010 and 2012-13 surveys.

The original questionnaire for the first 1992-1993 survey was designed by MarkeTec through discussions with the Washoe County Air Quality Management Division. Over the ten study periods to date, the same basic questionnaire has been used, but with some modifications to keep the content current and relevant. For the 2012-13 study, four questions were added and four were deleted.

To qualify for the 2012-13 study, respondents had to reside in one of the 22 Washoe County zip codes included in the Green-Yellow-Red Burn Code Program. The zip codes and distribution of respondents by geographic area are listed on page 33.

A minimum of 400 respondents with wood burning devices in their homes were interviewed in each wave. In 2012-13, the total sample was 1,130 respondents; 400 (35%) had a wood burning device and 212 (19%) used the wood burning device during the prior winter season.

Based on a 95% confidence level, the total sample of 1,130 has a confidence interval of $\pm 2.9\%$; the main sample of 400 has a confidence interval of $\pm 4.9\%$; while the sub-sample of 212 wood device users has a confidence interval of $\pm 6.7\%$.

In 2012-13, InfoSearch sub-contracted with a third party telephone research center, NSON, to conduct the interviews. InfoSearch oversaw and monitored the process to ensure that the interviews were conducted per the specifications of this study. The source was based on a listed sample in combination with a "raised integer" method, by which interviewers added "one" to each base number until an eligible household with a working phone number was reached. As before, the final source included both listed and unlisted numbers. The number of cell phone numbers reached was negligible. Telephone interviews were conducted on weekdays between 4:00 p.m. and 9:00 p.m. and on weekends between 9 a.m. and 6:00 p.m.

The study was in the field from April 8 to 30, 2013. On average, the interviews took 6 to 7 minutes for respondents who had a wood burning device and less than 3 minutes for those who did not.

Results in the current report are for the 2012-13 study unless otherwise noted. Totals may be affected by rounding (generally $\pm 1\%$).

EXECUTIVE SUMMARY

Use of Wood Burning Devices

- About 35% of all respondents had a wood burning device in their homes: 12% indicated, unaided, that they used wood to heat their residence and another 24% indicated, aided, that they had a wood burning device.
- Among respondents who had a wood burning device, 53% reported using it in the 2012-13 winter, as compared to 59% in 2009-10, 55% in 2007-08, and 63% in 2005-06.
- Half the respondents (50%) who used a wood burning device had a fireplace, one out of three (33%) had a wood stove/insert, and about one out of five (22%) had a pellet stove (with multiple responses allowed).
- In 2012-13, 90% of pellet stoves in the study were made after 1990, compared to 59% of wood stoves/inserts and just 16% of the wood burning fireplaces. Among respondents with wood stoves, the percentages that were made prior to 1988 decreased significantly from 44% in 2009-10 to just 24% in 2012-13.
- On average, respondents who used a wood stove burned more wood (1.85 cords) than those who used a fireplace (0.68 cords). Additionally, respondents who used a pellet stove burned, on average, 1.1 tons of pellets during the season. In 2012-13, wood stove users burned, on average, slightly more wood during the season than in the prior wave (2009-10), while fireplace and pellet stove users burned, on average, slightly less overall.
- Among respondents who used a wood burning device, the most common type of wood used in 2012-13 was “mixed wood” (36%) followed by hard wood (27%), and soft wood (18%). Compared to the prior wave, the use of hard wood increased from 17% to 27%, while the use of soft wood decreased from 25% to 18%. In 2012-13, one out of five (20%) burned other fuels such as scrap wood, pallets, or coal.
- The most common month for first starting wood stoves and pellet stoves was October or earlier; the most common month for first starting wood burning fireplaces was November. The percentage of wood stove users who started their device in October or earlier has increased from 36% to 41% to 50% over the three most recent waves of the study.
- On average, respondents who used a pellet stove burned wood on more days (125) than did those who used a wood stove (88) who, in turn, burned wood on more days than did respondents who used a fireplace (33).
- Pellet stove users averaged 12.6 hours of use per occasion, compared to 8.9 hours for wood stove users, and 4.8 hours for fireplace users.
- Two out of three respondents (65%) started their wood burning devices in the evening hours, between 5:00 p.m. and midnight. Early morning start times between midnight and 8:00 a.m. were more common among pellet stove users (28%) than either wood stove users (19%) or fireplace users (4%).

Air Quality and Health Issues

- In 2012-13, 18% of respondents who had a wood burning device rated the overall air quality in Washoe County as excellent, 57% said it was good, 20% rated the air quality as fair, 4% said poor, and 2% did not know.
- The majority of respondents with a wood burning device (63%) reported that the season with the worst air quality in Washoe County is winter. About 12% perceived that summer is the worst season, 10% said fall, and 5% said spring, with 10% indicating that they did not know.
- Overall, 20% reported that their neighborhood periodically experienced air pollution from wood smoke. Only 6% of those in neighborhoods that experienced air pollution from wood smoke (or 1% of all respondents with wood burning devices) indicated that it was “a big problem.”
- In 2012-13, 50% of all respondents (including those that do not have a wood burning device) named at least one negative health effect associated with breathing wood smoke, compared to 56% in 2009-10 and 42% in 2007-08. Among those who named a health effect, the most common ones were asthma (23%), general respiratory problems (21%), and lung disease (14%). The percentages who named general respiratory problems increased from 3% to 13% to 21% over the three most recent waves of the study
- Respondents who used a wood burning device were less likely to name a health effect from breathing wood smoke than were respondents who did not use or have one. At the same time, the percentage of respondents who used a wood burning device and named at least one negative health effect from wood smoke increased from 30% to 38% to 43% over the three most recent waves.

Washoe County Air Quality Management Division

- Among respondents who used a wood burning device, 66% had heard of the Washoe County Air Quality Management Division (WCAQMD) and 44% had heard a public service announcement about the division. Among those who had but did not use a wood burning device, 59% had heard of the division and 35% had heard a public service announcement about the division.
- In 2012-13, about 88% of respondents who had a wood burning device had heard of the Green-Yellow-Red Burn Code Program, similar to 85% in 2009-10 and 87% in 2007-08. Additionally, 39% had heard of the Keep It Clean, Know the Code Program. Only 10% had not heard of either program.
- Among those who used a wood burning device and were aware of either program, 74% reduced or stopped their wood burning during yellow or red days, down from 86% in 2009-10 and similar to 75% in 2007-08. One out of three pellet stove users (34%) did not reduce or stop wood burning during yellow or red days, compared to 18% of wood stove users, and 14% of fireplace users.
- The primary media source for information about these programs was television (70%). Three out of four respondents (77%) with a wood burning device reported

that they received or had access to enough information from the WCAQMD. Overall 63% of wood device users who did not stop or reduce wood burning on yellow or red days (or who were unsure if they did) reported that they had enough information; this finding suggests that access to information is not sufficient for adhering to the burn code guidelines and restrictions.

- Respondents who used a wood burning device were less likely to support additional wood burning controls (41% support) than were those who had one but did not use it (54%). The lower the rating for overall air quality, the more support there was for additional controls to improve air quality. Nearly half of fireplace users (48%) would support additional controls to improve air quality, compared to about one out of three wood stove users (32%) and pellet stove users (36%).
- About 28% of fireplace users and 36% of wood stove users indicated that they would be at least somewhat likely to replace or exchange their current wood burning device for a cleaner device if an incentive to do so were to become available. Neither the age of the device nor the frequency of use was a factor in respondents' willingness to consider replacing or exchanging the device.

Differences by Type of Residence and Geographic Area

- Among respondents who lived in single-family homes, 41% had wood burning devices and 22% used them. Among those in mobile homes, 24% had and 16% used wood burning devices. Additionally, among respondents in condos to four-plex buildings, 25% had and 7% used wood burning devices, while among those in apartments with 5 or more units, 9% had and 3% used wood burning devices. These percentages are similar to those found in the prior two studies.
- By the 6 geographic areas, respondents from the South Reno/Washoe Valley/Incline area were the most likely to have used a wood burning device (25%); respondents from Spanish Springs/Pyramid were the least likely (10%). Respondents from Sun Valley/North Valleys were the most likely to report – unaided – that they used wood to heat their residence (18%).
- Among respondents who used wood burning devices, fireplaces were dominant in North/Northwest Reno (59%), Central Reno (77%), and Central Sparks (78%), while wood stoves were dominant in Sun Valley/North Valleys (40%) and South Reno/Washoe Valley/Incline (47%), and pellet stoves were dominant in the Spanish Springs/Pyramid area (53%).
- Respondents from South Reno/Washoe Valley/Incline provided the highest rating for air quality (85% excellent or good), while those from the North/Northwest Reno area provided the lowest (61%). Additionally, respondents from Central Sparks had the highest percentage of support (62%) for additional wood burning controls to improve air quality; the Spanish Springs/Pyramid area had the lowest (28%).
- Respondents from the Spanish Springs/Pyramid area were the most likely (86%) to reduce or stop wood burning during yellow or red days; those from the Sun Valley/North Valleys area were the least likely (65%).

DETAILED FINDINGS

Section A – Use of Wood Burning Devices

Screening for Wood Use to Heat Residence

Question: What types of fuel or energy are used to heat this residence?
(Unaided, multiple responses allowed)

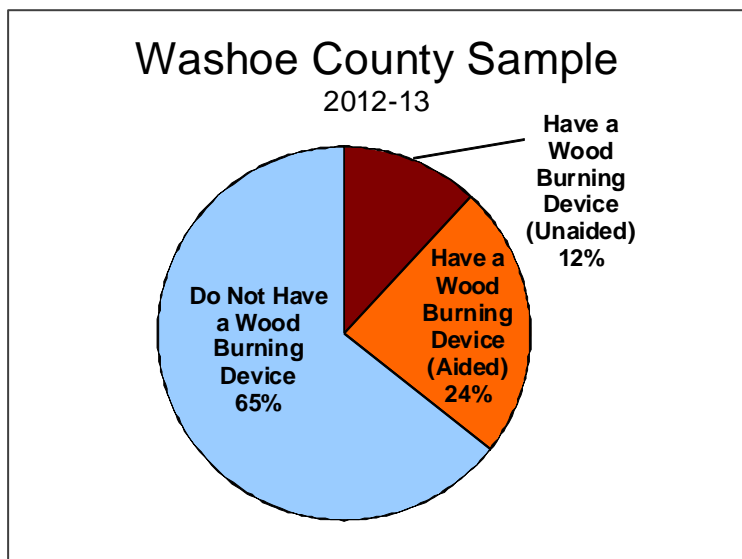
General Energy Usage	1992-93 (n=1,024)	1994-95 (n=1,023)	1995-96 (n=669)	1999-00 (n=1,131)	2001-02 (n=1,262)	2003-04 (n=1,473)	2005-06 (n=1,241)	2007-08 (n=1,130)	2009-10 (n=1,166)	2012-13 (n=1,130)
Natural Gas	64%	65%	67%	75%	75%	67%	75%	77%	72%	70%
Electricity	9%	11%	15%	18%	18%	24%	18%	16%	23%	25%
Wood	7%	2%	8%	6%	4%	6%	6%	9%	11%	12%
Bottled Gas /Propane	3%	3%	5%	5%	6%	6%	7%	5%	5%	7%
Oil	16%	7%	7%	2%	4%	3%	4%	6%	5%	4%

In 2012-2013, 130 out of 1,130 total respondents (12%) indicated, unaided, that they used wood to heat their residence. With multiple responses allowed, 70% reported that they used natural gas, 25% used electricity, 7% used bottled gas/propane, and 4% used oil. The percentages were statistically stable from 2009-10 to 2012-13.

Question: (Aided, if wood was not mentioned above) Do you have any type of wood burning device in your home, such as a fireplace, wood stove, or pellet stove?

If respondents did not mention wood on the unaided question, they were then asked (aided) if they had any type of wood burning device in their home. An additional 270 respondents (24% of the total sample) reported that they did.

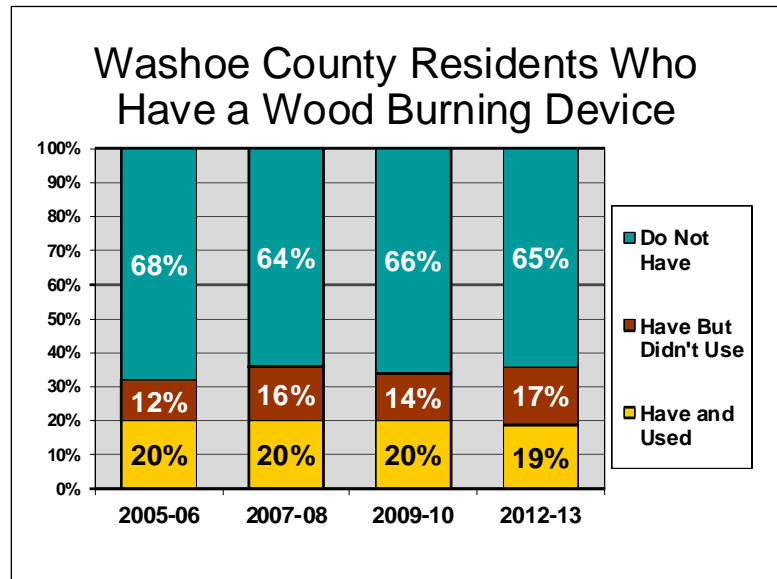
Altogether, 400 respondents, or **35% of the total sample, had a wood burning device** in their homes; these percentages were statistically stable compared to 2009-10 (34%) and 2007-08 (37%).



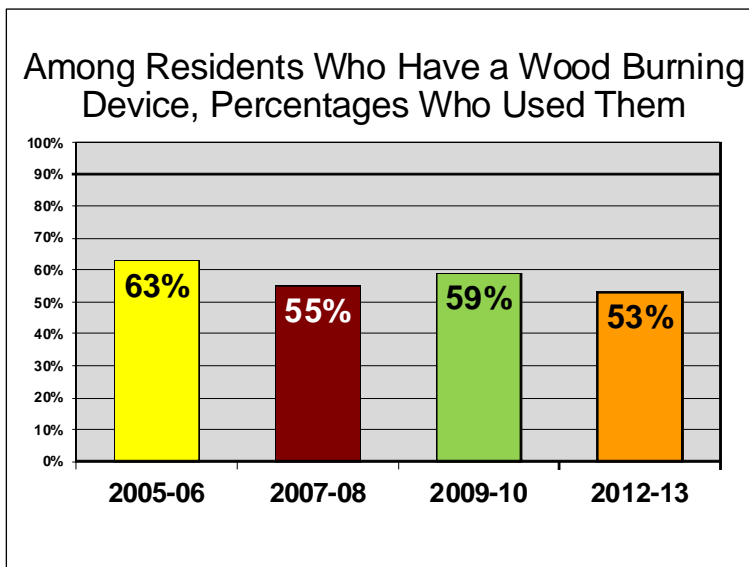
Use of Wood Burning Devices

Question: Did you use your wood burning device this past winter (2012-2013)?

All respondents who had a wood burning device in their home were asked if they had used it over the past winter. Out of the total sample, 19% to 20% of respondents in each of the last four waves of the study reported that they had used a wood burning device during the prior winter. The percentage who had a wood burning device but did not use it varied slightly from 12% in 2005-06 to 16% in 2007-08 to 14% in 2009-10 and 17% in 2012-13; this variation is within the margin of error and is not statistically significant.



Among the 400 respondents in 2012-13 who had a wood burning device, 212 (53%) used it over the past winter. The percentage of respondents with wood burning devices who used them in 2012-13 (53%) was similar to the percentage who used them during the winter of 2007-08 (55%), and down from the percentages who used them during the winters of 2009-10 (59%) and 2005-06 (63%).



Differences over time in the usage of wood burning devices may reflect changes in winter weather patterns, as well as heating preferences or options.

Types of Wood Burning Devices

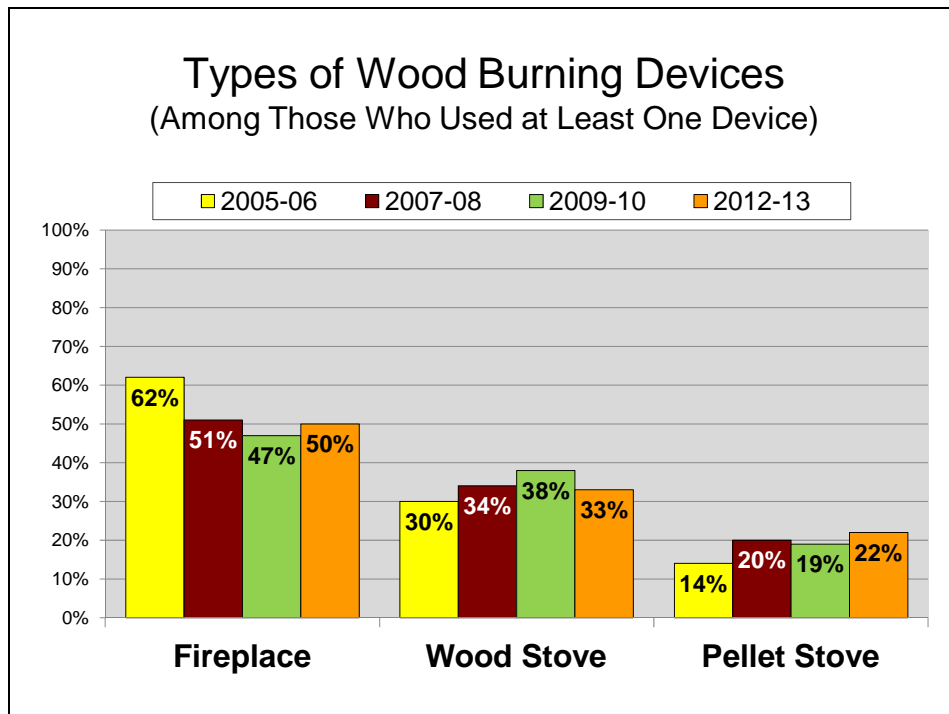
Question: What types of wood burning devices do you have in your home?
(Among those who used wood burning devices; multiple responses allowed)

Types of Wood Burning Devices (2012-2013)	Total (n=212)
Fireplace	50%
Wood stove or insert	33%
Pellet stove	22%

In 2012-2013, half (50%) of the 212 respondents who used a wood burning device reported having a fireplace, and 18 of these respondents (8%) had two or more wood burning fireplaces at their residence. Additionally, one out of three respondents (33%) had a wood stove or insert, while one out of five (22%) had a wood burning pellet stove.

Overall, 96% of respondents who had used a wood burning device this past winter had one type of device, while 4% had two types. (No respondents had all three types.)

Among respondents who used a wood burning device, the percentages who used each type of device has been statistically stable over the three most recent waves.

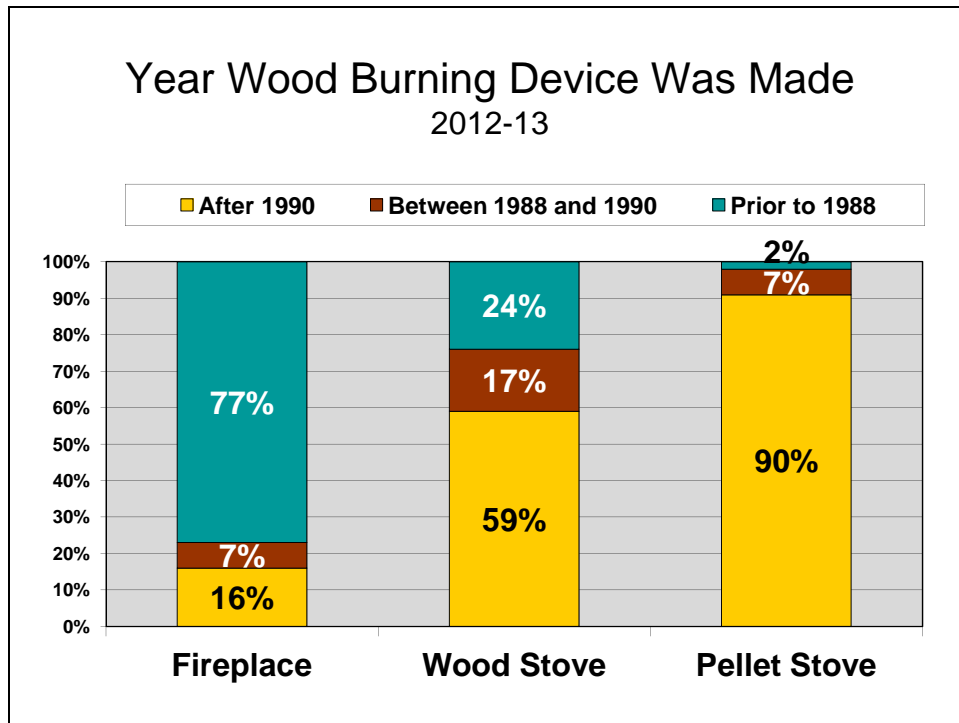


Age of Wood Burning Devices

Question: Was your fireplace (or wood stove or pellet device) made prior to 1988, between 1988 and 1990, or after 1990?

In general, wood burning devices made “prior to 1988” were non-certified devices, while those made “between 1988 and 1990” generally fell under EPA Phase I rules, and those made “after 1990” fell under EPA Phase II rules.

In 2012-13, 16% of wood burning fireplaces, 59% of wood stoves, and 90% of pellet stoves in the study were made after 1990. As was found in previous studies, the majority of wood burning fireplaces were relatively old, while the majority of pellet stoves were relatively new.



Additionally, the percentage of respondents who had older wood stoves made prior to 1988 decreased significantly from 44% in 2009-10 to 24% in 2012-13. Similarly, the percentage of respondents who had older pellet stoves made prior to 1988 decreased from 7% in 2009-10 to just 2% in 2012-13.

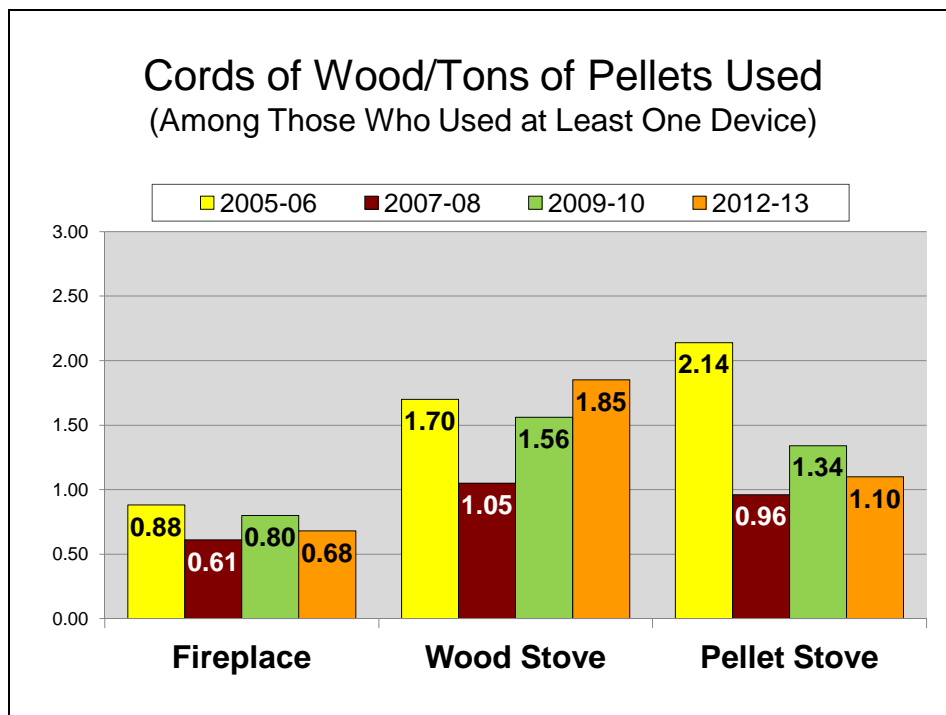
Quantity of Wood/Pellets Used

Question: How many cords of wood (or tons of pellets) did you burn during the 2012-2013 winter?

The respondents who had used a wood burning device over the past winter were asked to estimate the amount of wood consumed during the 2012-13 season. Interviewers had a list of designated unit sizes to assist in identifying the amount of wood consumption, if needed.

Cords of Wood/Tons of Pellets Used (2012-2013)	Fireplace (n=99)	Wood Stove (n=62)	Pellet Stove (n=41)
Under 0.5 cord/ton	51%	10%	27%
0.5 but under 1.0 cord/ton	18%	15%	17%
1.0 but under 2.0 cords/tons	20%	26%	24%
2.0 or more cords/tons	11%	50%	32%
Average by Device	0.68	1.85	1.10

In the 2012-13 season, respondents who used a wood stove burned, on average, more cords of wood (1.85 cords) during the season than did those who used a wood burning fireplace (0.68 cords). Respondents who used a pellet stove burned, on average, over one ton of pellets (1.10 tons) during the season.

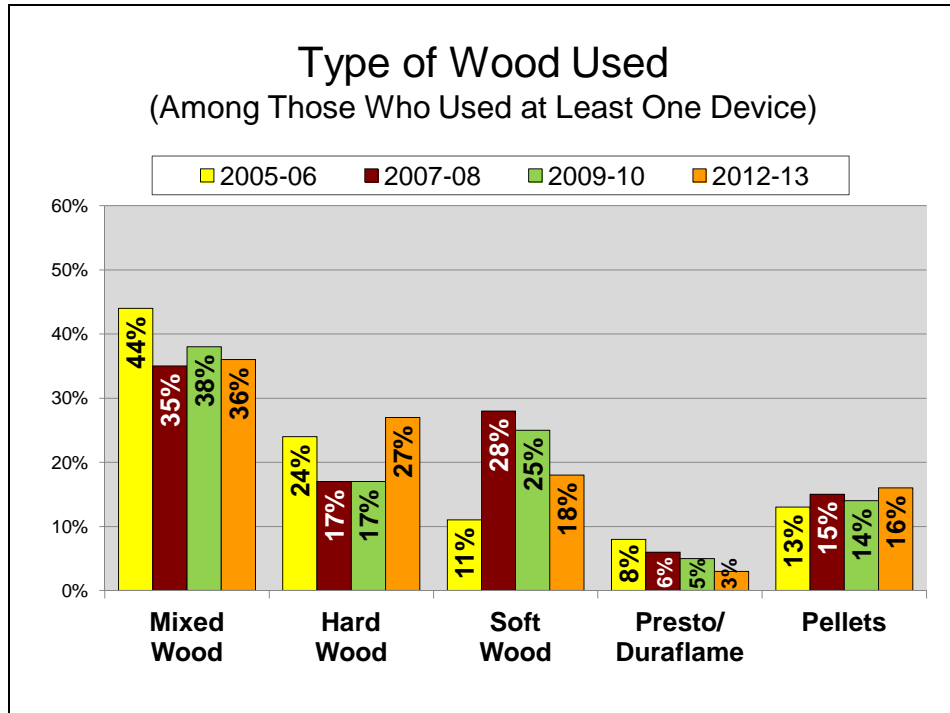


In 2012-13, wood stove users burned, on average, slightly more wood during the season than in the prior wave (2009-10), while fireplace users and pellet stove users burned, on average, slightly less wood than in the prior wave.

Types of Wood/Pellets or Fuel Used

Question: What kind of wood (or pellets) did you burn?

Among respondents who used a wood burning device, the most common type of wood used in 2012-13 was “mixed wood” (36%), followed by hard wood such as oak or fruitwood (27%), and soft wood such as fir or pine (18%). Compared to 2009-10, the percentage who used hard wood increased from 17% to 27%, while the percentage who used soft wood decreased from 25% to 18%.



Question: Did you burn coal, scrap wood, or pallets in your fireplace (or wood stove or pellet stove) during the 2012-2013 winter?

In 2012-13, one out of five respondents (20%) who used a wood burning device had used fuels other than wood, similar to 15% in 2009-10, 17% in 2007-08, and 18% in 2005-06. More specifically, 11% had burned scrap wood, 8% had burned pallets, and two respondents (<1%) had burned coal in 2012-13.

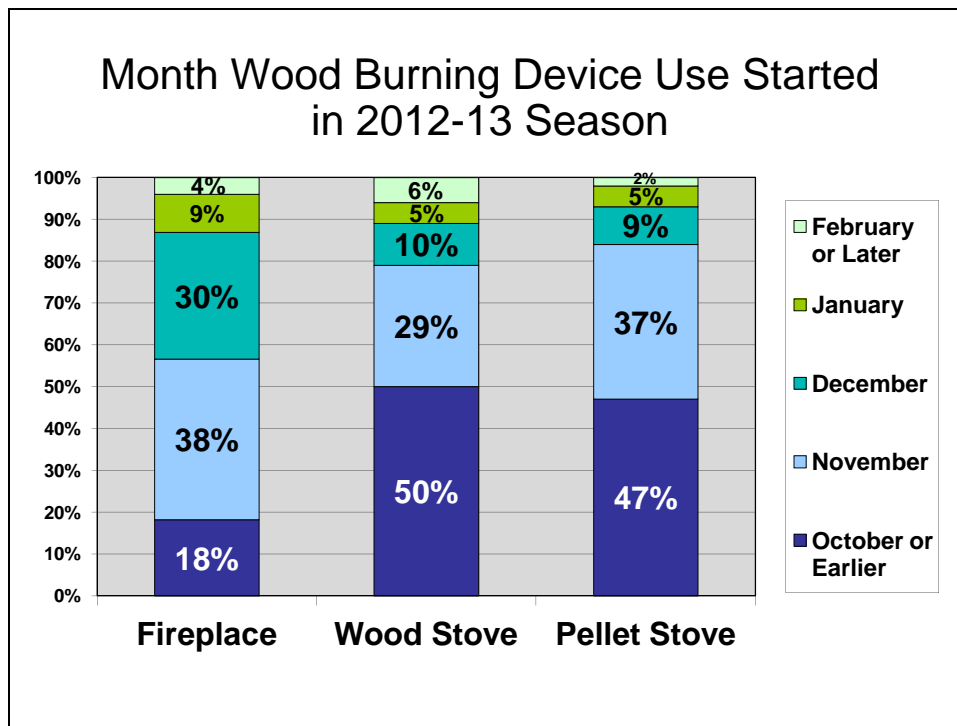
Burned Other Fuels	2005-06	2007-08	2009-10	2012-13
Burned scrap wood	13%	7%	11%	11%
Burned pallets	5%	10%	4%	8%
Burned coal	0%	0%	0%	<1%
Total - Burned other fuels	18%	17%	15%	20%

Month Wood Burning Device Use Started

Question: What month did you use your fireplace (or wood stove or pellet stove) for the first time during the 2012-2013 winter?

In general, the respondents who had used a wood stove or pellet stove started using it sooner in the season than did respondents who had used a wood burning fireplace.

In 2012-13, half the wood stove users (50%) and nearly half the pellet stove users (47%) started their devices in October or earlier, compared to just 18% of wood burning fireplace users. Additionally, over 85% of respondents who used any type of wood burning device first used it before January.



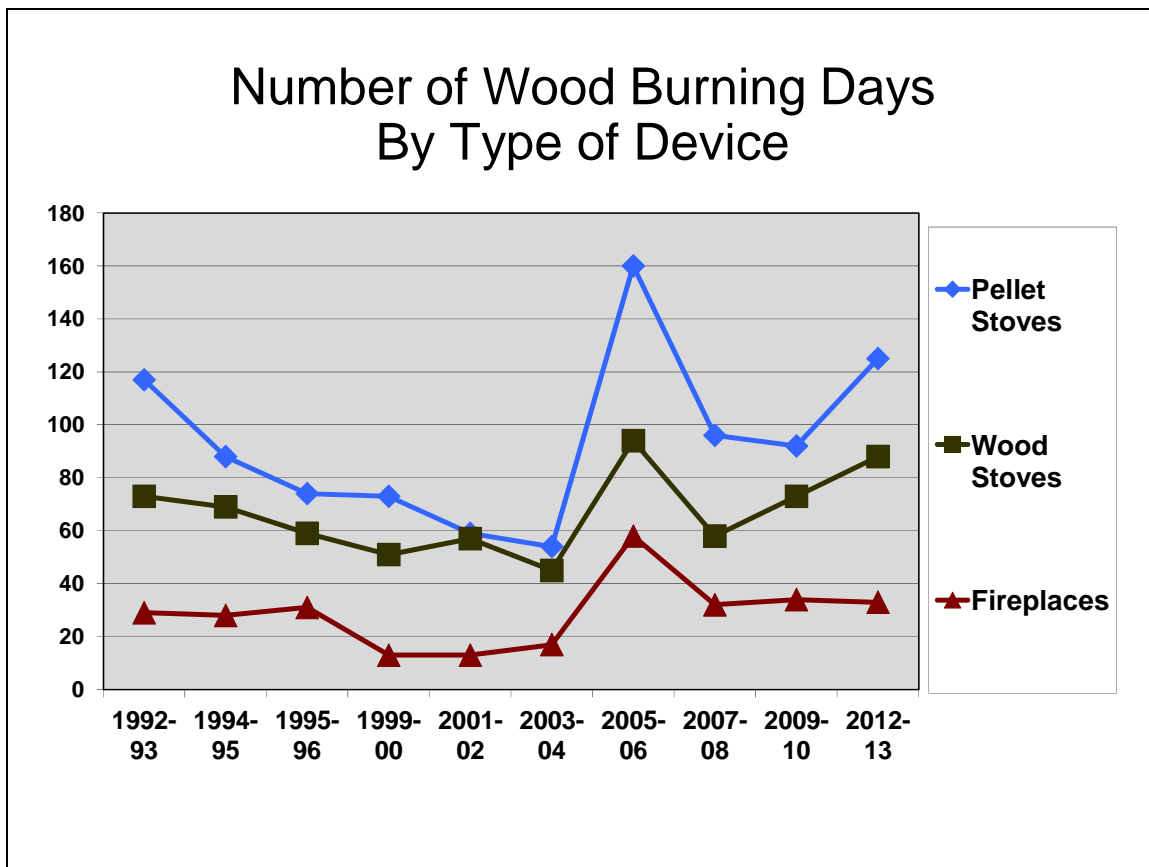
The percentage who started their wood stove in October or earlier has increased over time, from 36% in 2007-08 to 41% in 2009-10 to 50% in 2012-13.

Frequency of Wood Burning Device Use

Question: How many days did you burn wood or other items in your fireplace (or wood stove or pellet stove) during the 2012-2013 winter?

In 2012-13, respondents with pellet stoves burned wood on more days (125 days, on average) than did those with wood stoves (88 days) who, in turn, burned wood on more days than did those with fireplaces (33 days). The pattern of pellet stoves being in use at least twice as many days as fireplaces has been consistent over time.

Over the past 10 waves of the study (dating back to 1992-93), usage of both pellet stoves and wood stoves in 2012-13 was at the second highest level, second only to 2005-06 levels.



Number of Days	1992-93	1994-95	1995-96	1999-00	2001-02	2003-04	2005-06	2007-08	2009-10	2012-13
Pellet stoves	117	88	74	73	59	54	160	96	92	125
Wood stoves	73	69	59	51	57	45	94	58	73	88
Fireplaces	29	28	31	13	13	17	58	32	34	33

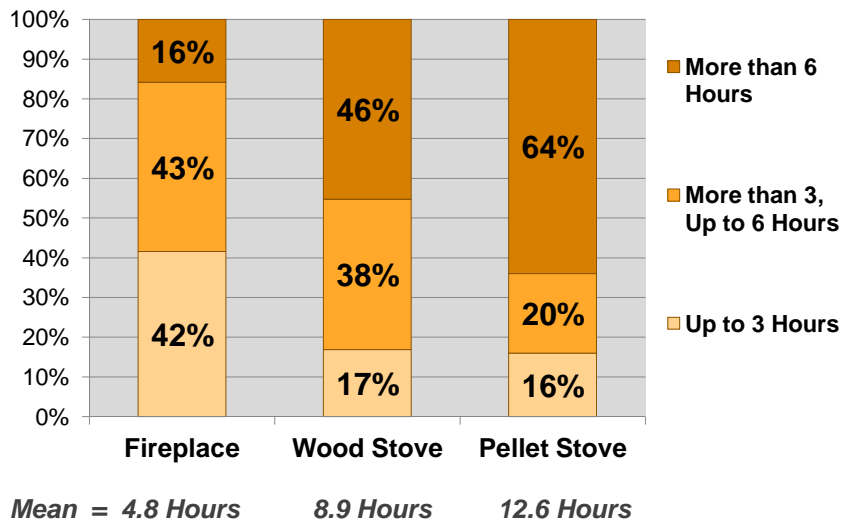
Question: How many hours, on average, did you use your fireplace (or wood stove or pellet stove) per occasion? (New question in 2012-13.)

On average, two out of three pellet stove users (64%) used the device for more than 6 hours per occasion, compared to about half (46%) of wood stove users, and just 16% of fireplace users.

Pellet stove users averaged 12.6 hours of use per occasion, compared to 8.9 hours for wood stove users, and 4.8 hours for fireplace users.

This was a new survey item in 2012-13, so trending over time is not available.

**Average Hours of Use Per Occasion
2012-13**



Proportion of All Wood Burning Hours in County by Type of Device

Even though relatively few respondents who used wood burning devices had pellet stoves (22%), those who did have them used them frequently (125 days) and for relatively long periods per occasion (12.6 hours) to account for half (51%) of all wood burning hours in the county (within the zip codes studied).

Conversely, even though half (50%) of the respondents who used wood burning devices had a fireplace, those fireplaces were used relatively infrequently (33 days) and for relatively few hours per occasion (4.8 hours), and so fireplaces, collectively, accounted for just 12% of all wood burning hours in the county.

Wood stoves were used by one-third (33%) of wood burning device users, with mid-level frequency (88 days) and for mid-level hours per occasion (8.9 hours); wood stoves accounted for 38% of all wood burning hours in the county.

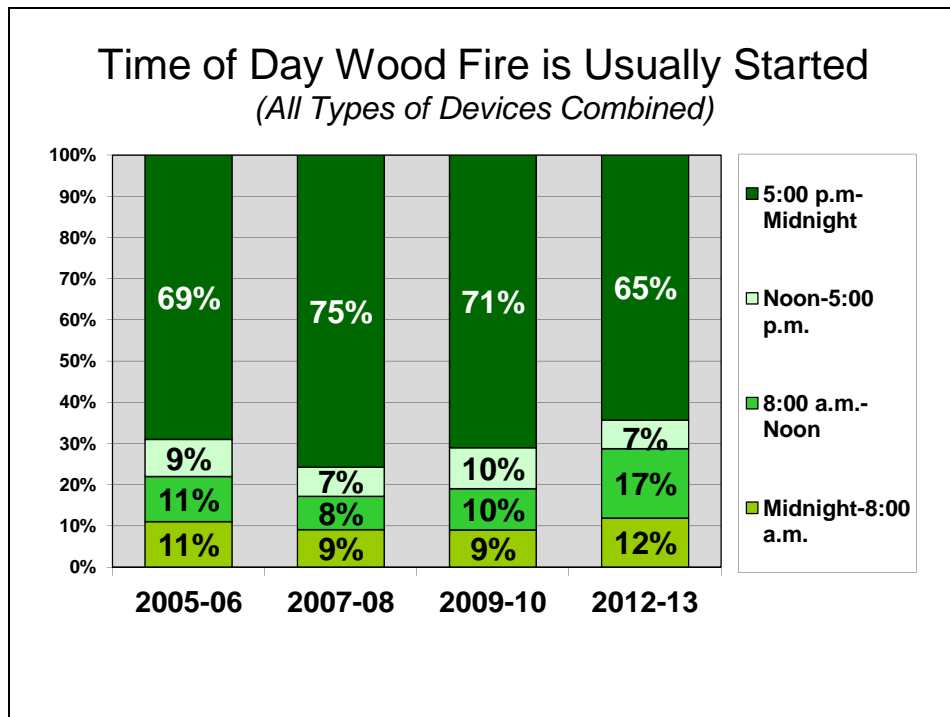
Type of Device	Percentage of Wood Burners Who Used Type of Device <i>(Multiple Responses Allowed)</i>	Average Number of Days Device Was Used	Average Number of Hours Device Burned Per Day	Proportion of All Wood Burning Hours in County
Pellet Stove	22%	125	12.6	51%
Wood Stove	33%	88	8.9	38%
Fireplace	50%	33	4.8	12%
Total				100%

Time of Day Wood Burning Device Was Started

Question: What best describes the time of day you usually started your fire (or pellet stove)?

In 2012-13, about two out of three respondents (65%) started using their wood burning devices in the evening hours, between 5:00 p.m. and midnight.

The percentage who started their wood burning device prior to 5 p.m. increased from 25% in 2007-08 to 29% in 2009-10 to 35% in 2012-13.



In 2012-13, although early morning start times (between midnight and 8:00 a.m.) were relatively uncommon, they were more common among respondents who used a pellet stove (28%) than those who used either a wood stove (19%) or fireplace (4%).

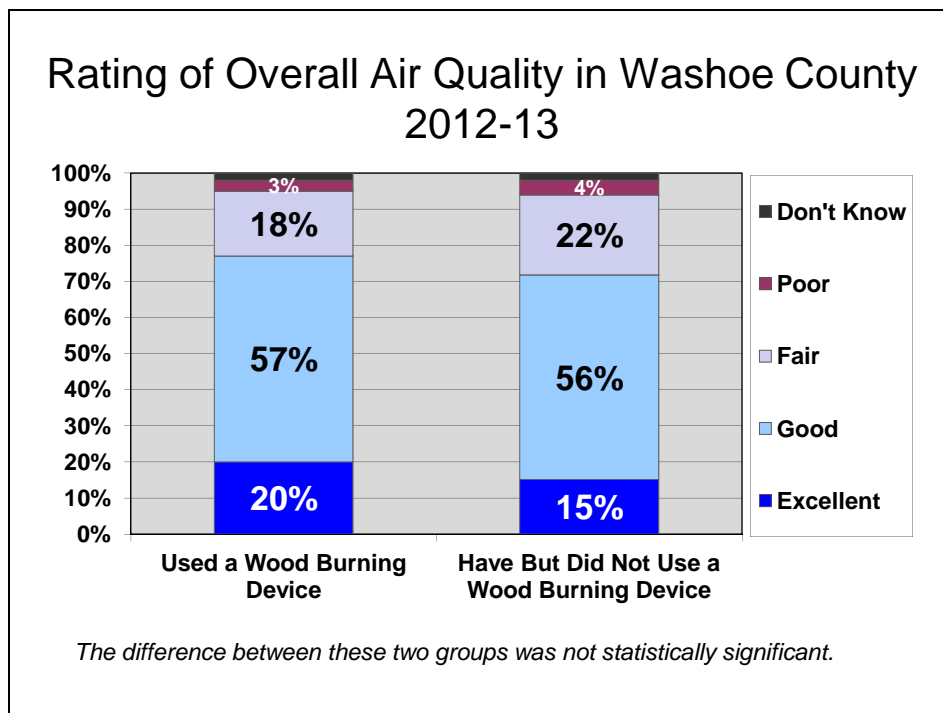
Section B – Air Quality and Health Issues

Air Quality and Air Pollution

Question: How would you rate the overall air quality in Washoe County?

In 2012-13, about 18% of all respondents who had a wood burning device rated the overall air quality in Washoe County as excellent, 57% said it was good, 20% rated the air quality as fair, 4% said poor, and 2% did not know.

The ratings for air quality in Washoe County were similar regardless of whether respondents used or did not use their wood burning devices.

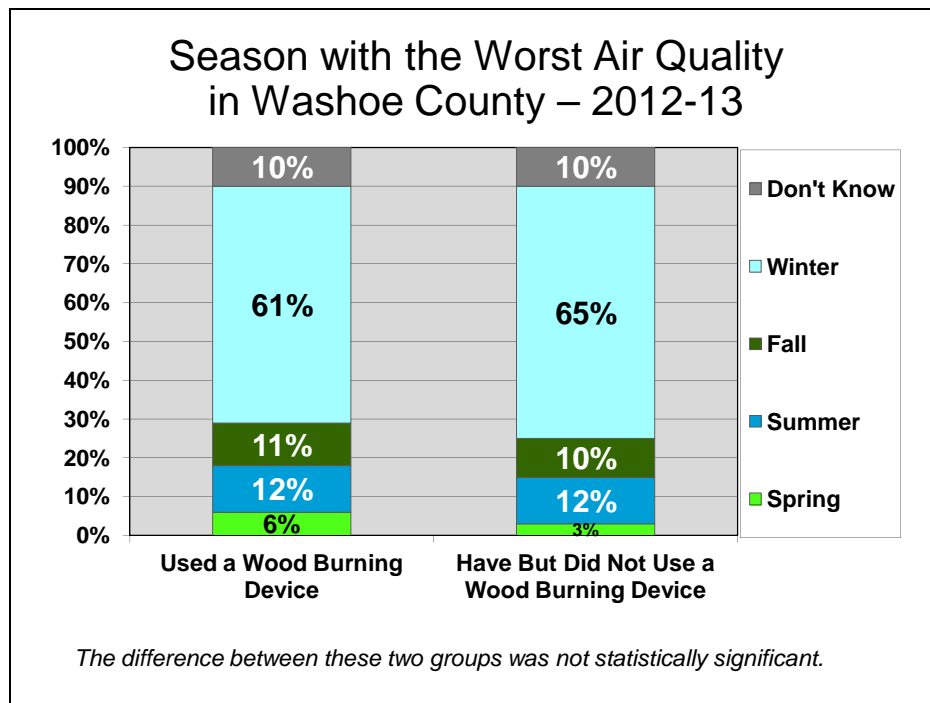


Air quality ratings have been statistically stable over the three most recent waves for both those who used a wood burning device and those who had but did not use a wood burning device.

Question: In your opinion, in which season is the air quality worst within Washoe County?

The majority of respondents with a wood burning device (63%) reported that the winter season has the worst air quality in Washoe County. About 12% perceived that summer is the worst season, 10% said fall, and 5% said spring, with 10% indicating that they did not know.

The ratings for the worst season for air quality were similar regardless of whether respondents used or did not use their wood burning devices.

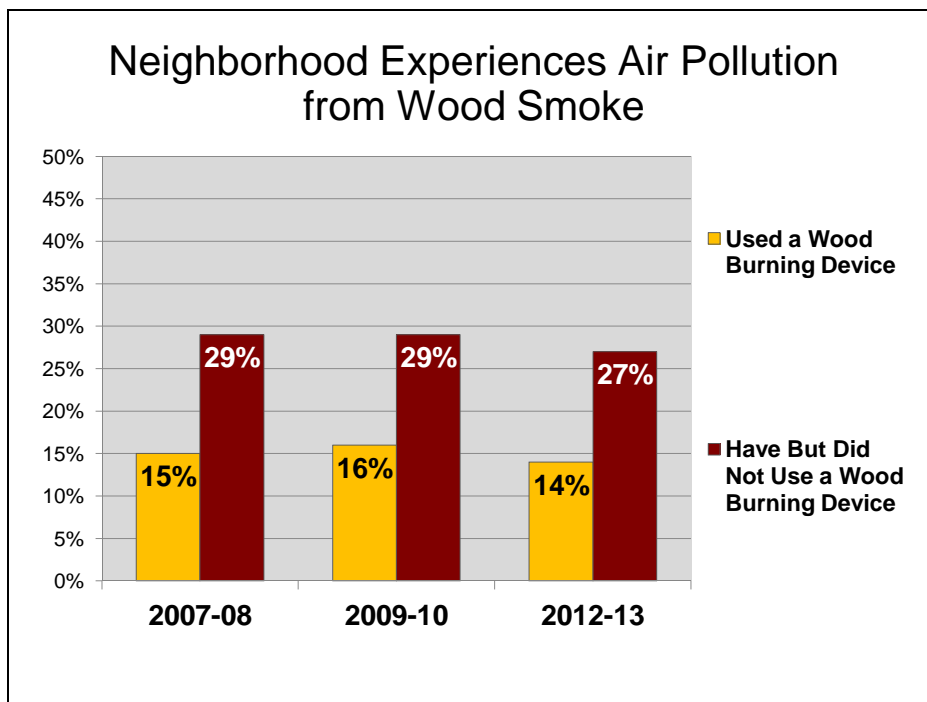


Prior surveys asked about the “best” rather than the “worst” season for air quality in Washoe County, so the results are not directly comparable over time. But whereas respondents with wood burning devices previously expressed mixed opinions about which season has the best air quality (with 38% saying spring, 30% summer, 10% fall, and 9% winter in 2009-10), the 2012-13 study found substantially more agreement about which season is perceived to have the worst air quality, namely winter.

Question: In your opinion, does your neighborhood periodically experience air pollution from wood smoke?

One out of five respondents (20%) with wood burning devices reported that their neighborhood periodically experiences air pollution from wood smoke.

In 2012-13, respondents who used a wood burning device were significantly less likely to report that their neighborhood periodically experiences air pollution from wood smoke than were those who have but did not use a wood burning device (27%). This same pattern has been found over the three most recent waves of the study, with a consistent 13 to 14 point percentage gap between the two groups.



Question: (Asked only if yes to neighborhood experiencing air pollution from wood smoke) In your opinion, is periodic air pollution from wood smoke in your neighborhood a big problem, medium problem, or small problem?

The 20% of respondents who indicated that their neighborhood periodically experiences air pollution from wood smoke were asked how much of a problem it is. Only 6% of this sub-group said it was a big problem, 25% described it as a medium problem, and 66% said it was a small problem, with 3% saying they did not know.

In total, less than 2% of all respondents with wood burning devices considered air pollution from wood smoke to be a “big problem” in their neighborhood, as was the case in both 2007-08 and 2009-10.

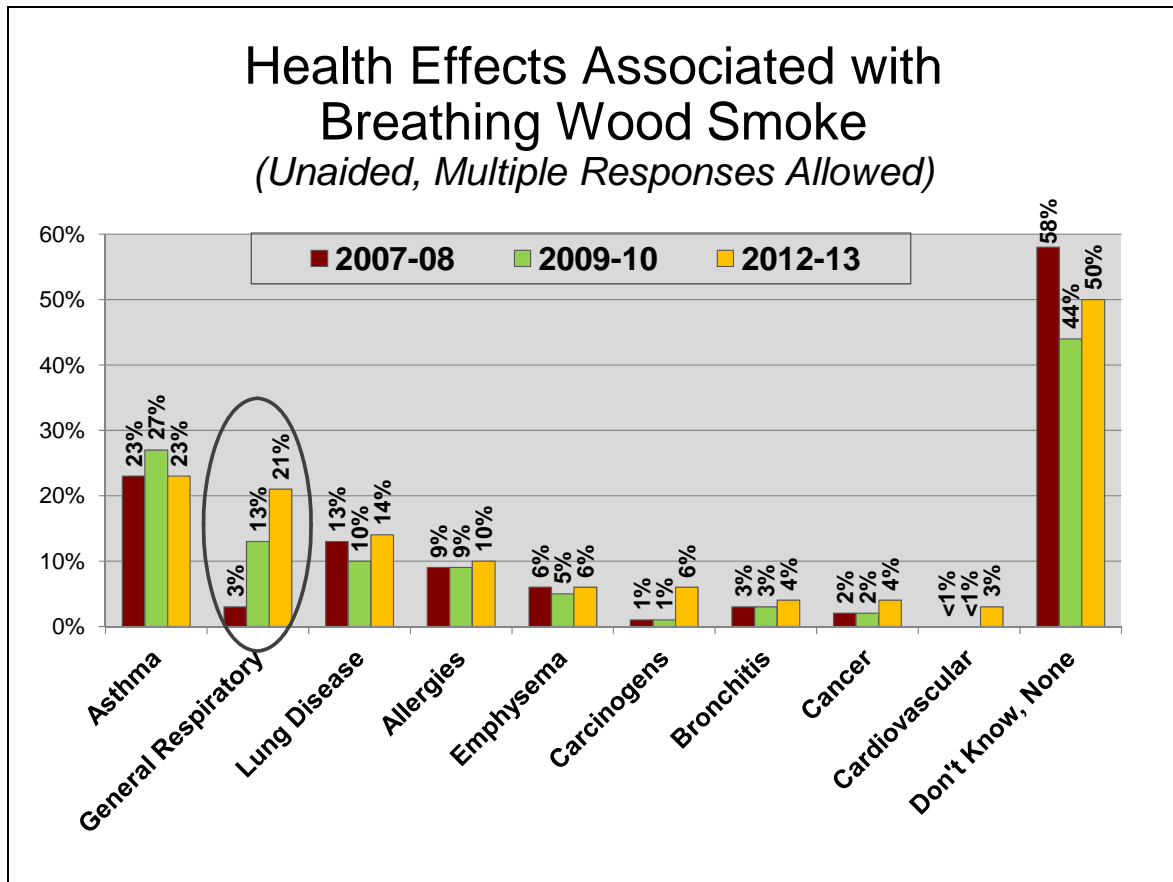
Health Effects of Breathing Wood Smoke

Question: What health effects, if any, do you think are associated with breathing wood smoke? *(Unaided, multiple responses allowed – asked of all potential respondents including those who did not have a wood burning device)*

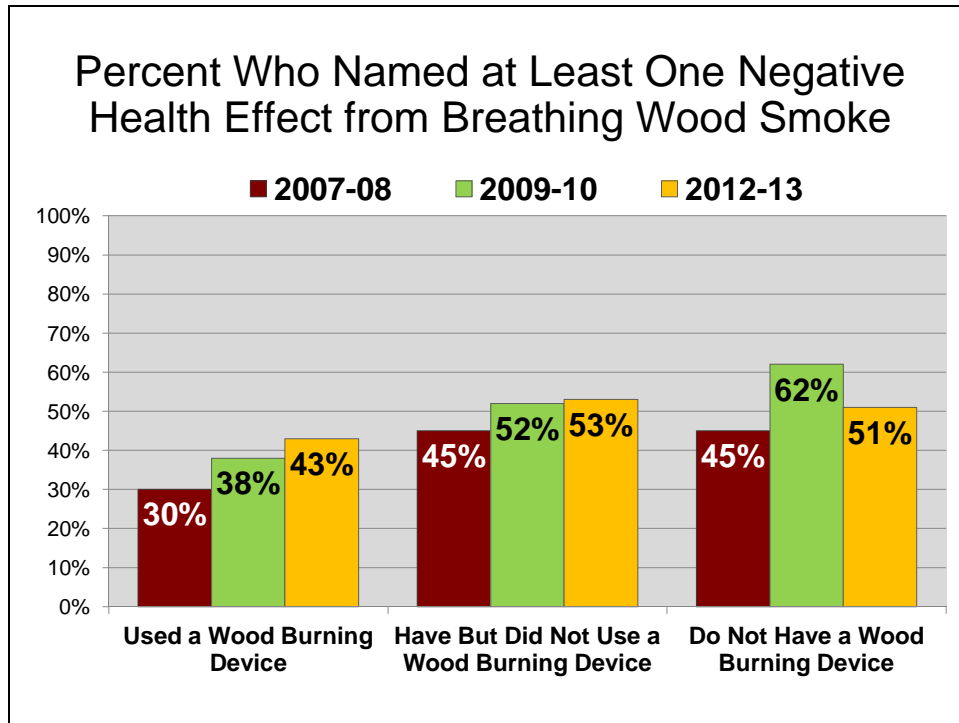
In 2012-13, 50% of all 1,130 respondents named at least one negative health effect associated with breathing wood smoke, compared to 56% of all respondents in 2009-10 and 42% in 2007-08.

In 2012-13, 28% of respondents named one effect, 12% named two effects, and 10% named three or more effects (with multiple responses allowed). Among those who named a health effect, the most common one was asthma (23%), followed by general respiratory issues such as coughing or breathing problems (21%), lung disease (14%), and allergies (10%). Less than 10% mentioned emphysema (6%), carcinogens, chemicals, or toxins (6%), bronchitis (4%), cancer (4%), cardiovascular issues (3%), or other health issues (3%).

While the percentages who named most types of health effects have remained stable over time, the percentages who named general respiratory issues have significantly increased from 3% to 13% to 21% in the three most recent waves.



In 2012-13, about 51% of respondents who did not have a wood burning device named at least one negative health effect from breathing wood smoke, compared to 53% of those who have but did not use a wood burning device, and 43% of respondents who used a wood burning device this past winter.



In terms of result patterns, respondents who used a wood burning device tended to be less likely to name a health effect than did respondents who either have but did not use or did not have a wood burning device.

Among respondents who used a wood burning device, the percentage who named at least one negative health effect from breathing wood smoke increased from 30% in 2007-08 to 38% in 2009-10 to 43% in 2012-13.

Section C – Washoe County Air Quality Management Division

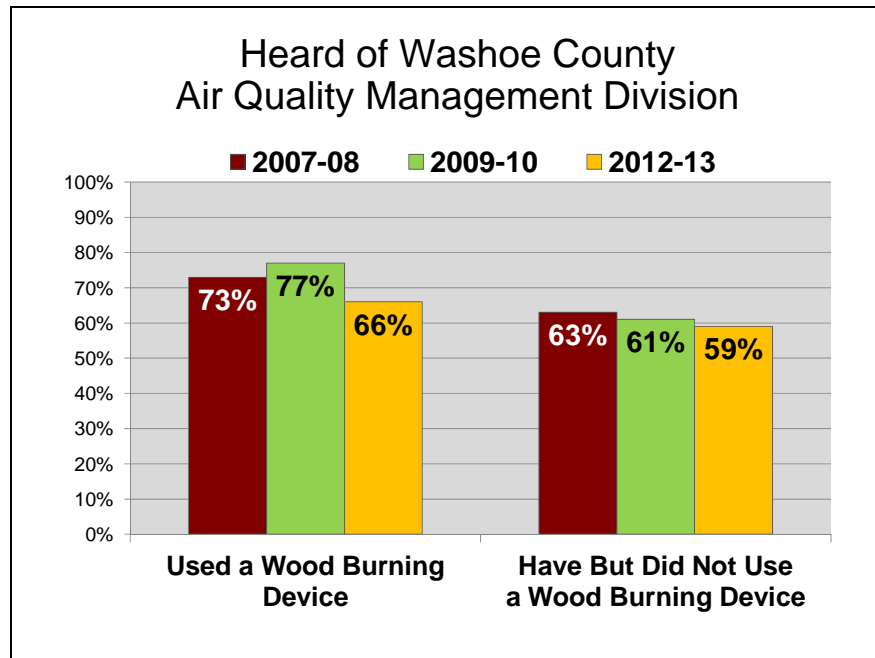
Awareness of WCAQMD and Programs

Question: Have you heard of the Washoe County Air Quality Management Division?

Overall, 63% of respondents with a wood burning device reported that they had heard of the Washoe County Air Quality Management Division.

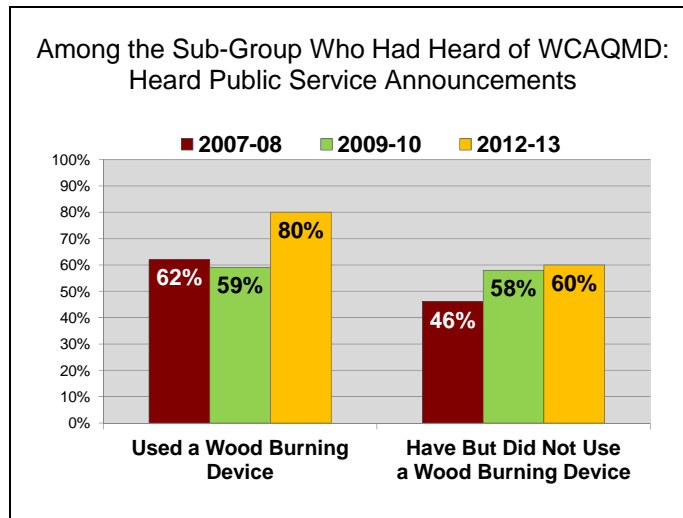
In 2012-13, two out of three respondents (66%) of those who used a wood burning device this past winter had heard of the Washoe County Air Quality Management Division, compared to 59% of those who had but did not use a wood burning device. The difference between the two groups was not statistically significant.

Although the majority of respondents with a wood burning device had heard of Washoe County Air Quality Management Division, awareness of the division (at least by name) may be waning. Among respondents who used a wood burning device, the percentage who had heard of the division declined from 73% in 2009-10 to 66% in 2012-13.

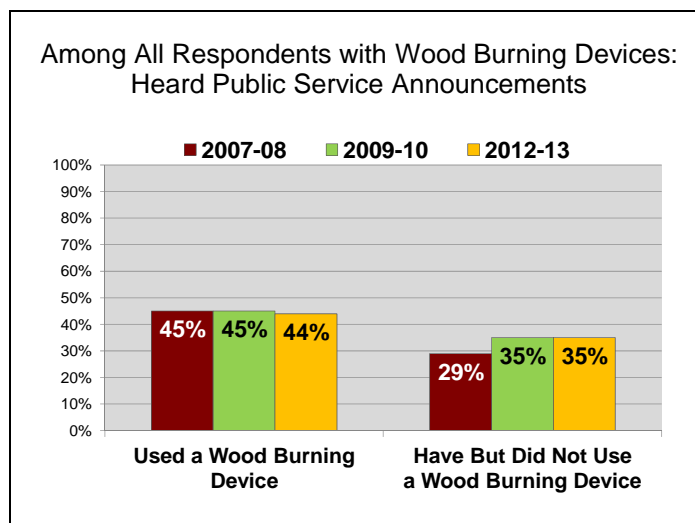


Question: Have you ever heard any public service announcements about the Washoe County Air Quality Management Division?

Among the sub-group of respondents who had heard of the Washoe County Air Quality Management Division (WCAQMD), 80% of those who used a wood burning device had heard a public service announcement about the division in 2012-13, up from 59% in 2009-10 and 62% in 2007-08. Additionally, 60% of those who had a wood burning device but did not use it had heard a public service announcement about the division in 2012-13, which is similar to the 58% in 2009-10, and up from 46% in 2007-08.



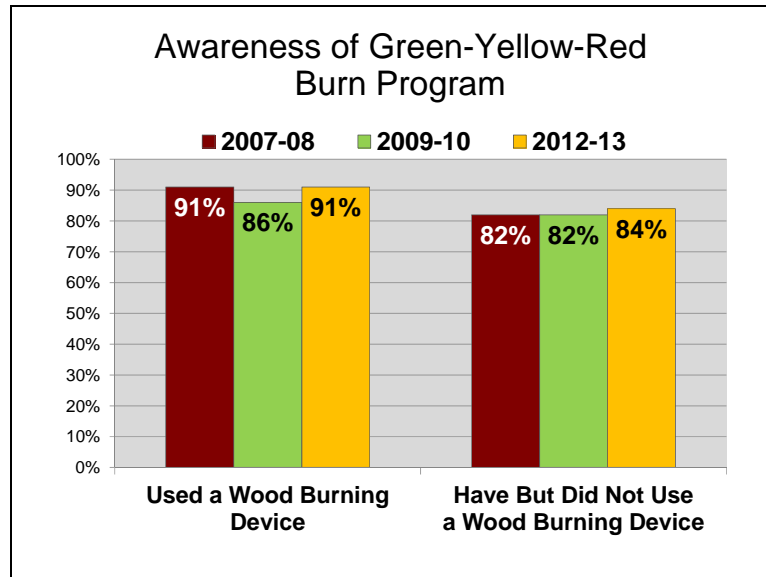
Overall, with the general awareness of WCAQMD down slightly (as shown on the previous page) but the awareness of public service announcements up among those who had heard of the division (as shown above), the percentages of all respondents with wood burning devices who had heard a public service announcement about the WCAQMD was actually stable over time (as shown below).



Question: Have you ever heard of the Green-Yellow-Red Burn Program?

Regardless of whether respondents had heard of the Washoe County Air Quality Management Division, all respondents with wood burning devices were asked if they had heard of specific programs initiated by the division.

In 2012-13, 88% of all respondents with a wood burning device had heard of the Green-Yellow-Red Burn Code Program, similar to 85% in 2009-10 and 87% in 2007-08. In 2012-13, 91% of those who used a wood burning device were aware of the program, compared to 84% who had a wood burning device but did not use it. The 2012-13 results were similar to those found in 2009-10 and 2007-08.



Awareness of the Green-Yellow-Red Burn Code Program was above 90% in the early 1990s and has been above 80% since the 1999-2000 study, with one exception when awareness was at 78% in 2005-06.

Awareness of Green-Yellow-Red Burn Code Program	1992-93	1994-95	1995-96	1999-00	2001-02	2003-04	2005-06	2007-08	2009-10	2012-13
Yes, aware	97%	94%	93%	89%	87%	81%	78%	87%	85%	88%
No, not aware	3%	6%	7%	11%	13%	19%	22%	13%	15%	12%

Nearly all (94%) of those who had heard of the Washoe County Air Quality Management Division had also heard of the Green-Yellow-Red Burn Code Program. Even among those who had not heard of the division or were unsure if they had, three out of four (77%) had nonetheless heard of the Green-Yellow-Red Burn Code Program.

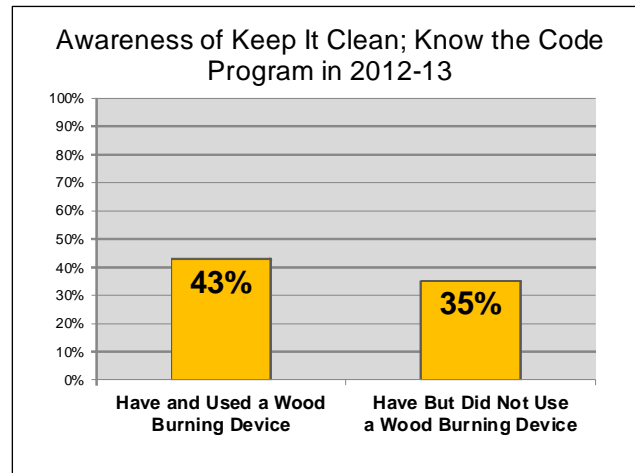
Question: Have you ever heard of the Keep It Clean; Know the Code Program? (New question in 2012-13.)

In 2012-13, 39% of all respondents with a wood burning device had heard of the Keep It Clean; Know the Code Program, which is substantially less than the 88% who had heard of the Green-Yellow-Red Burn Code Program.

About 43% of those who used a wood burning device were aware of the Keep It Clean; Know the Code Program, compared to 35% of those who had a wood burning device but did not use it.

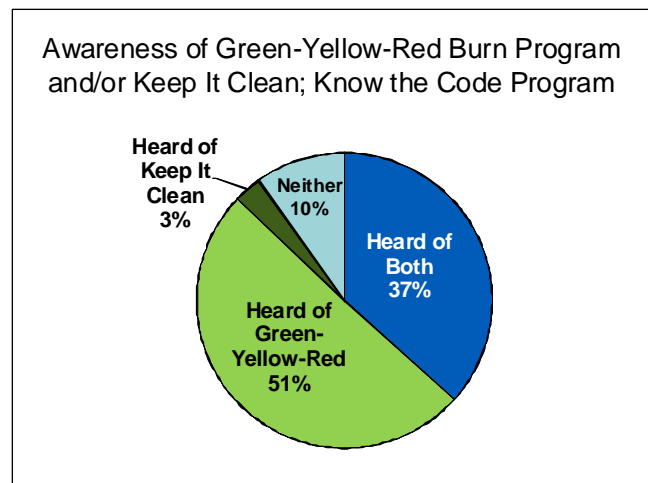
Half (50%) of those who had heard of the Washoe County Air Quality Management Division had also heard of the Keep It Clean; Know the Code, compared to just 22% of those who had not heard of the division or were unsure if they had heard of it.

This was a new survey item in 2012-13, so trending over time is not available.



Out of all respondents with wood burning devices:

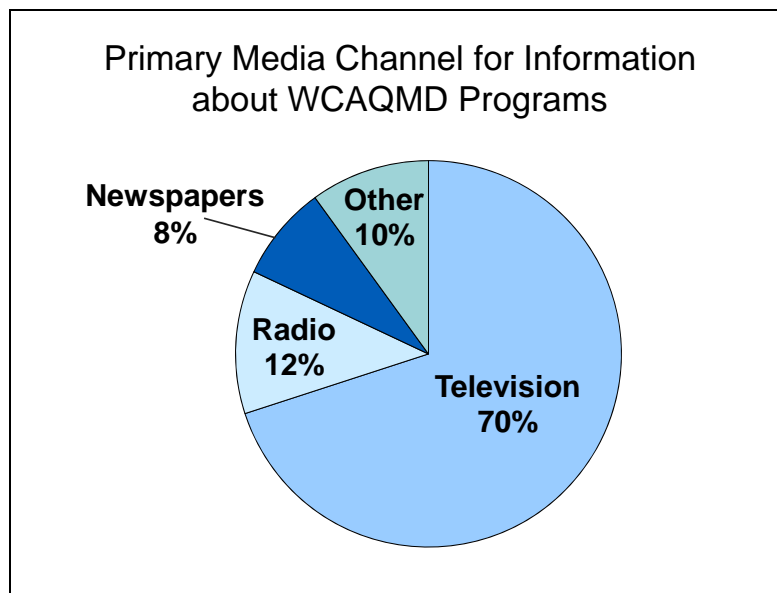
- 37% had heard of both the Green-Yellow-Red Burn Code Program and the Keep It Clean; Know the Code Program,
- 51% had heard of the Green-Yellow-Red Burn Code Program but not the Keep It Clean; Know the Code Program,
- 3% had heard of the Keep It Clean; Know the Code Program but not the Green-Yellow-Red Burn Code Program, and
- 10% had not heard of either program (including “don’t know” responses).



Question: Through which one media channel did you most often hear about either the “Green-Yellow-Red Burn Program” and/or the “Keep It Clean; Know the Code Program” in the past year?

The respondents who were aware of at least one of these two programs were asked their primary media source for information about the program(s). Overall seven out of ten (70%) indicated that they most often heard about these programs on the television.

Other media sources for this information included the radio (12%), newspapers (8%), social media (2%), WCAQMD’s website (2%), WCAQMD’s telephone hotline (1%), and other sources (1%), with 4% indicating that they did not know.



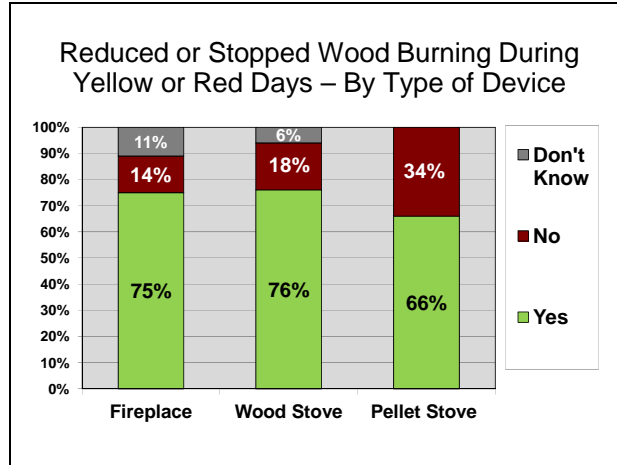
The media sources for information were similar regardless of whether or not respondents used their wood burning devices.

Additionally, television was the primary source for information among 61% of fireplaces users, 74% of wood stove users, and 84% of pellet stove users.

Question: Did you reduce or stop your wood burning during yellow or red days this past winter?

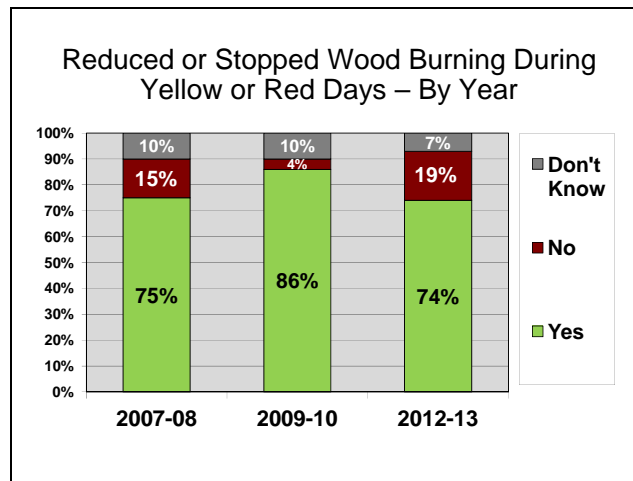
In 2012-13, 74% of those who used a wood burning device reduced or stopped their wood burning during yellow or red days, 19% did not, and 7% did not know.

About one out of three pellet stove users (34%) reported that they did not reduce or stop wood burning during yellow or red days, compared to 18% of wood stove users and 14% of fireplace users.



There were no significant differences between groups based on which specific program(s) they had heard of, in terms of whether they reduced or stopped wood burning on yellow or red days.

While the percentage who reduced or stopped wood burning on yellow or red days had increased from 75% in 2007-08 to 86% in 2009-10, it rebounded back down in to 74% in 2012-13, which is similar to the 2007-08 level.



Question: In general, do you feel you receive, or have access to, enough information from the Air Quality Management Division? (New question in 2012-13.)

In 2012-13, 77% of those with a wood burning device indicated that they received or had access to enough information from the Washoe County Air Quality Management Division, 18% did not, and 5% did not know.

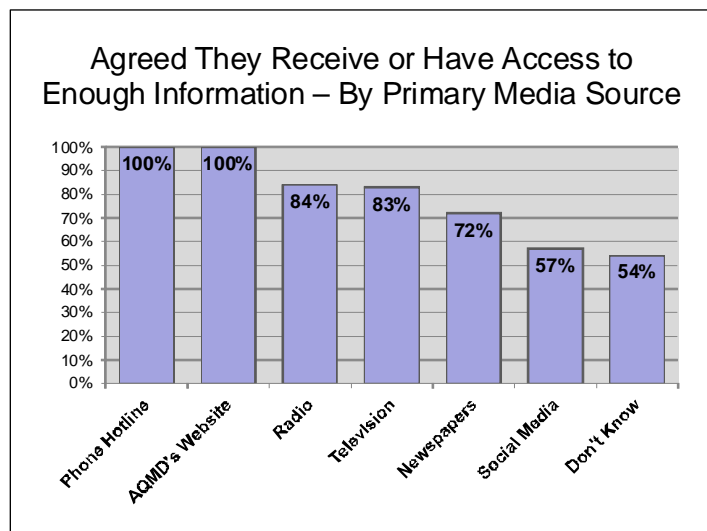
The percentage who agreed that they had enough information was the same regardless of whether they had used a wood burning device (77%) or had not (77%).

Pellet device users were somewhat more likely to agree that they had enough information (87%) than were fireplace users (76%) or wood stove users (73%).

About 79% of those who had heard only of the Green-Yellow-Red Burn Code Program agreed that they had enough information, which is similar to 80% of those who had heard only of the Keep It Clean; Know the Code Program, and 85% of respondents who had heard of both programs. Only 40% of those who had not heard of either program agreed that they had enough information.

Among wood burning device users, 87% of those who stopped or reduced their wood burning on yellow or red days agreed that they received or had access to enough information, as did 63% of those who did not stop or reduce wood burning on yellow or red days or who were unsure if they did. This finding suggests that receiving or having access to enough information about the programs is not sufficient for adhering to the programs guidelines and restrictions.

All respondents (100%) who reported that either the Air Quality Management Division's telephone hotline or website were their primary media source of information about the programs agreed that they received enough information, compared to 84% for radio, 83% for television, 73% for newspapers, 57% for social media, and 54% for those who do not know their primary media source. *Note that all media sources except television had relatively small sample sizes, so the data, though statistically significant, is suggestive in nature.*

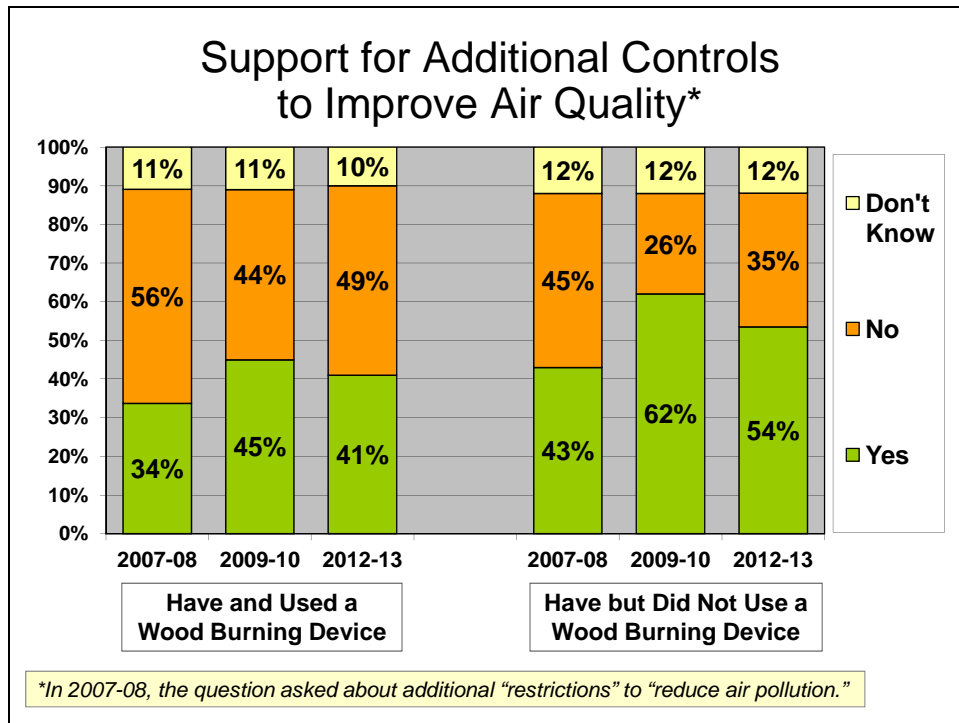


Support for Additional Controls and/or Replacing Devices

Question: In general, would you support additional wood burning controls to improve air quality? *[In the 2007-08 survey, the question was worded, “Would you support additional restrictions on wood burning as a means to reduce air pollution?”]*

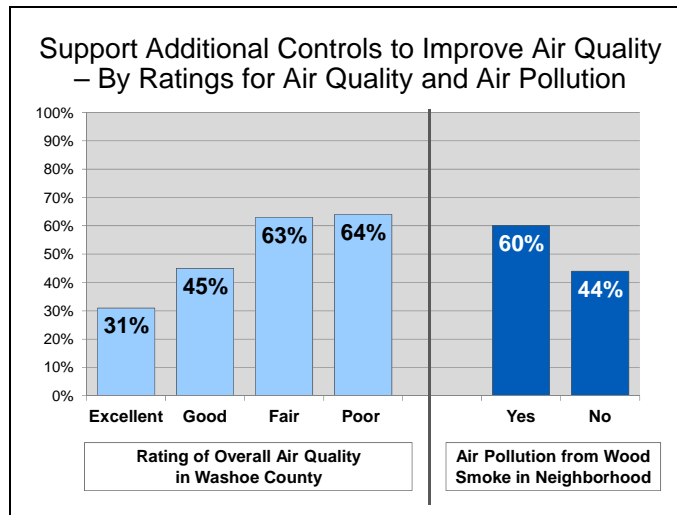
In 2012-13, nearly half (47%) of respondents who had a wood burning device indicated that they would support additional wood burning controls to improve air quality, while 42% said they would not and 11% did not know.

In general, respondents who used wood burning devices have been less supportive of additional controls. In 2012-13, 41% of respondents who used a wood burning device indicated they would support additional controls, compared to 54% of respondents who have but did not use a wood burning device.

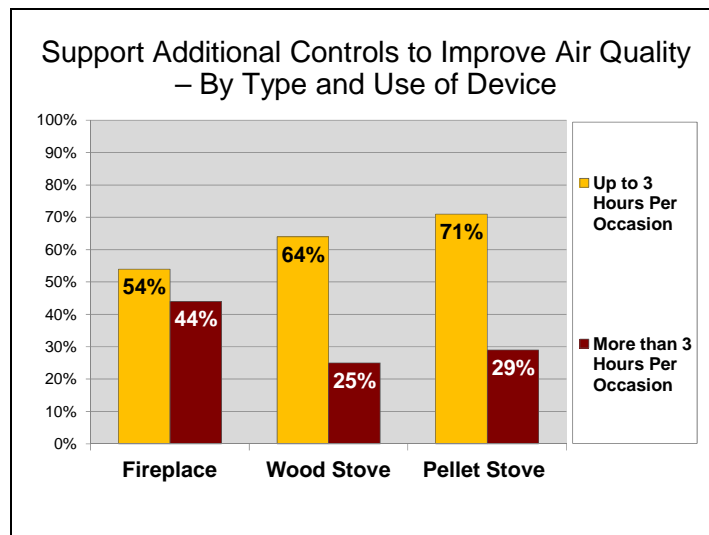


The lower the rating for air quality, the more support there was for additional controls to improve air quality. About 64% of respondents who rated the air quality as poor and 63% who rated it as fair would support additional controls, compared to 45% who rated the air quality as good, and just 31% who rated the air quality as excellent.

Similarly, the higher the rating for air pollution, the more support there was for additional controls. Three out of five respondents (60%) who reported that their neighborhood periodically experiences air pollution from wood smoke would support additional controls, compared to less than half (44%) of those who reported that their neighborhood does not experience air pollution from wood smoke.



Fireplaces users were more likely to support additional controls to improve air quality (48%) than were either wood stove users (32%) or pellet stove users (36%). Additionally, respondents who used their devices up to 3 hours per occasion were significantly more supportive of additional controls than were those who used them for longer periods of time per occasion.



[If used a wood burning fireplace or wood stove] **Question: In general, how likely would you be to replace or exchange your current wood fireplace [or wood stove] for a cleaner burning device, if an incentive to do so were to become available?** *[New question in 2012-13.]*

About 28% of wood burning fireplace users and 36% of wood stove users indicated that they would be at least somewhat likely to replace or exchange their current wood burning devices for a cleaner device if an incentive to do so were to become available. About 56% of wood burning fireplace users and 42% of wood stove users indicated that they were not at all likely.

	Used a Wood Burning Fireplace	Used a Wood Stove
Extremely Likely	7%	12%
Very Likely	3%	10%
Somewhat Likely	18%	14%
Not at All Likely	56%	42%
Depends, Need More Info <i>(Volunteered, Not asked)</i>	14%	17%
Don't Know	3%	4%

About 29% of wood burning fireplace users and 31% of wood stove users whose devices were made prior to 1988 would be at least somewhat likely to replace or exchange their current device; this is statistically similar to the 27% of fireplace users and 41% of wood stove users with newer devices.

Additionally, there was not a clear pattern between frequency of use and the likelihood of replacing or exchanging their current wood burning device for a cleaner device.

Section D – Differences by Type of Residence & Geographic Area

Type of Residence

Question: Which [description] best describes the building in which you live?

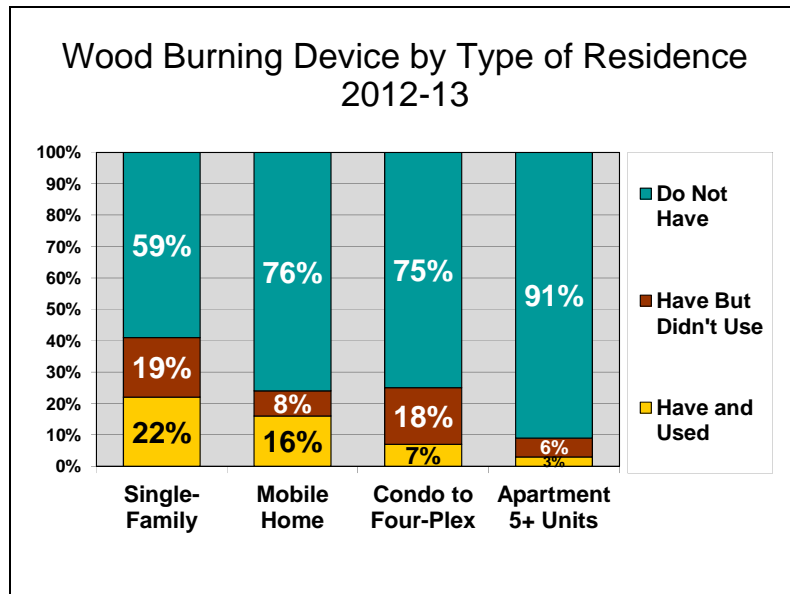
In 2012-13, three out of four respondents (77%) reported living in a single-family, free-standing home; another 10% lived in an apartment complex with 5 or more units, 6%

Type of Residence	2007-08 (n=1,130)	2009-10 (n=1,166)	2012-13 (n=1,130)
Single-family, free-standing	77%	75%	77%
Apartment complex 5+ units	10%	10%	10%
Mobile home	7%	8%	6%
Condo, duplex, triplex, 4-plex	5%	7%	6%
Other	1%	<1%	<1%

lived in a mobile home, and 6% lived in a condominium, duplex, triplex or four-plex. The percentages are similar to those found in the 2007-08 and 2009-10 studies.

In 2012-13, 16% of respondents who lived in mobile homes reported – unaided – that they used wood to heat their residence, compared to 13% for single-family, 6% for condos/duplex/triplex/flour-plex buildings, and 2% for apartment complexes.

Overall, 41% of respondents who lived in a single-family home reported that they had (but did not necessarily use) a wood burning device, compared to 24% of those in mobile homes, 25% of those in condos/duplex/triplex/four-plex buildings, and just 9% in apartments with 5 or more units.



Moreover, in the 2012-13 season, about 22% of respondents who lived in a single-family home used a wood burning device, compared to 16% of those in mobile homes, 7% in condos/duplex/triplex/four-plex buildings, and 3% in apartments with 5 or more units. These percentages are within $\pm 3\%$ of those found in the 2007-08 and 2009-10 studies.

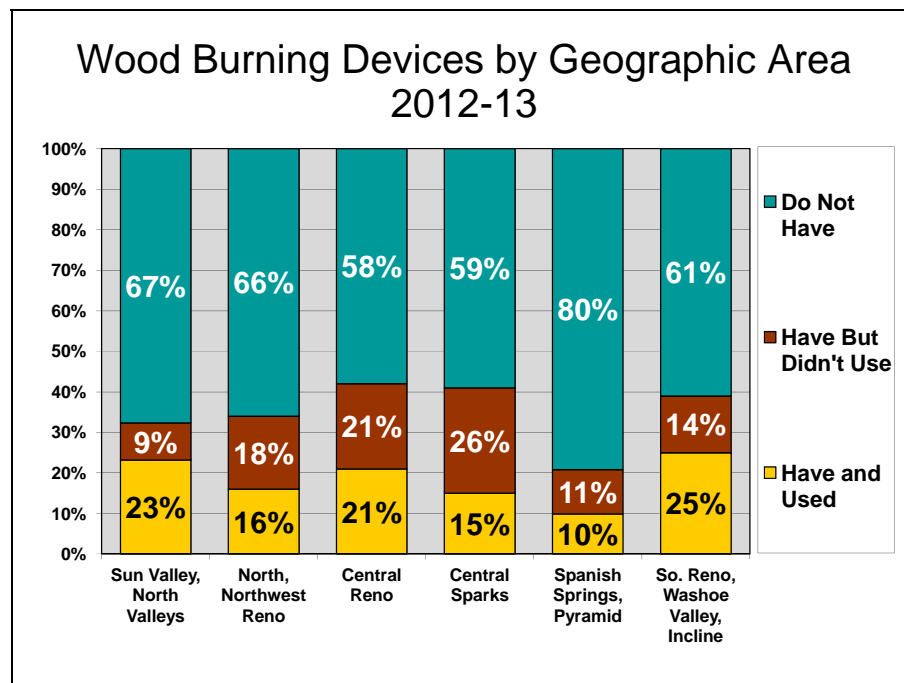
Geographic Area of Residence

Question: What is your home zip code? (Asked during screening questions.)

In 2012-13, respondents from 22 different Washoe County zip codes were eligible to participate. Respondents were grouped into 6 main geographic areas for this analysis.

Distribution by Geographic Areas	Zip Codes	Had Wood Burning Device (n=400)	Total Sample (n=1,130)	Population 2012 Estimate (n=421,000)
Sun Valley, North Valleys	89433, 89506, 89508	17%	18%	17%
North Reno, Northwest Reno	89439, 89503, 89512, 89523	18%	18%	20%
Central Reno	89501, 89502, 89509, 89519, 89595	22%	18%	21%
Central Sparks	89431, 89434	16%	13%	15%
Spanish Springs, Pyramid	89436, 89441, 89510	8%	14%	12%
So. Reno, Washoe Valley, Incline	89451, 89511, 89521, 89701, 89704	21%	18%	15%
Total		100%	100%	100%

By the 6 geographic areas, respondents from the South Reno/Washoe Valley/Incline area were the most likely to have used a wood burning device (25%); respondents from Spanish Spring/Pyramid were the least likely (10%). Additionally, respondents from Central Sparks were the most likely to have, but not use, a wood burning device (26%), respondents from Sun Valley/North Valleys were the least likely (9%).

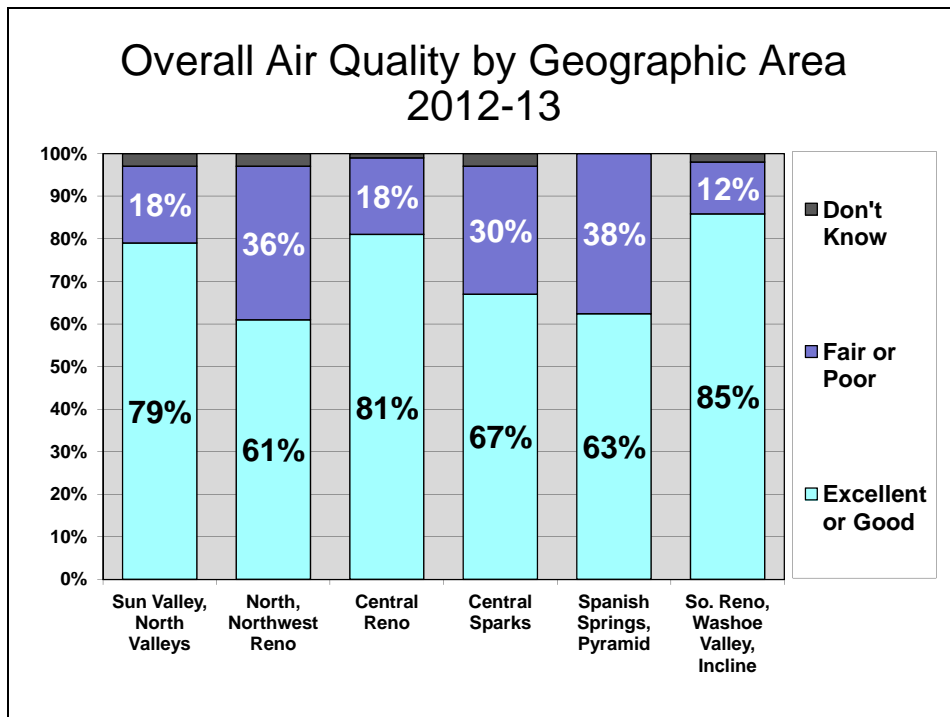


About 18% of respondents from Sun Valley/North Valleys reported – unaided – that they used wood to heat their residence, as did 14% of respondents from the South Reno/Washoe Valley/Incline geographic area, compared to 7 to 11% of respondents from the other four geographic areas.

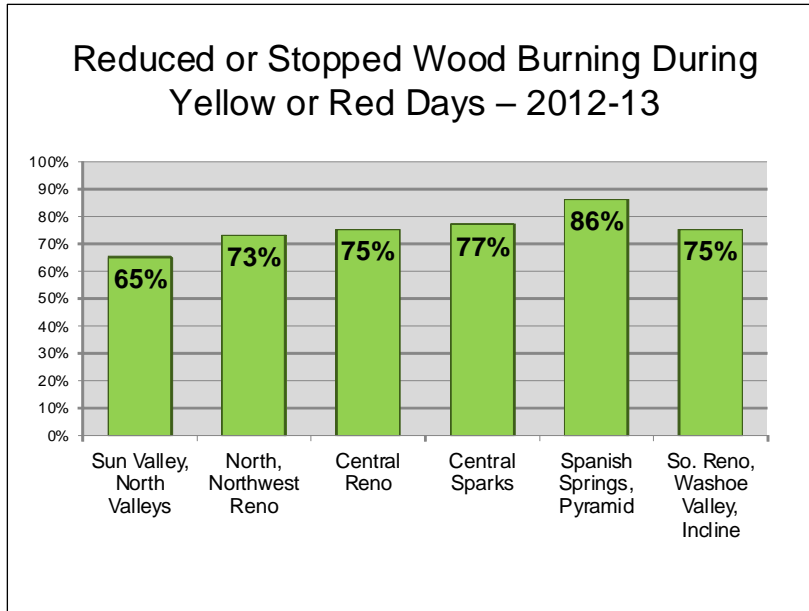
Type of Wood Burning Devices Used 2012-13 (Multiple responses allowed)	Sun Valley, North Valleys	North, NW Reno	Central Reno	Central Sparks	Spanish Springs, Pyramid	So. Reno, Washoe Valley, Incline
Fireplace	26%	59%	77%	78%	20%	40%
Wood stove or insert	40%	22%	19%	22%	40%	46%
Pellet stove	34%	19%	7%	4%	53%	21%

The primary type of wood burning device varied by geographic region. Among respondents who used wood burning devices, fireplaces were dominant in North/Northwest Reno (59%), Central Reno (77%), and Central Sparks (78%), while wood stoves were dominant in Sun Valley/North Valleys (40%) and South Reno/Washoe Valley/Incline (47%), and pellet stoves were dominant in Spanish Springs/Pyramid (53%).

By geographic area, the highest ratings for general air quality were in the South Reno/Washoe Valley/Incline area (85% excellent or good) and Central Reno (81%); the lowest were in Spanish Springs/Pyramid (63%) and North/Northwest Reno (61%). Respondents, however, did not differ significantly by geographic area in perceptions of whether their neighborhoods periodically experience air pollution from wood smoke.



Among those who used wood burning devices, respondents from the Spanish Springs/Pyramid area were the most likely to report that they reduced or stopped wood burning during yellow or red days (86%); respondents from the Sun Valley/North Valleys area were the least likely (65%).



Among respondents with wood burning devices, respondents from Central Sparks were the most likely to support additional wood burning controls to improve air quality (62%); respondents from the Spanish Springs/Pyramid area were the least likely (28%).

