Residential Wood Burning, Lawn Care, and Commuting Survey

Final Report

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Submitted to:

San Joaquin Valley Air
Pollution Control District

Submitted by:

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EXECUTIVE SUMMARY

As part of its mission to bring the San Joaquin Valley into compliance with federal and state clean air standards, the San Joaquin Valley Air Pollution Control District contracted with Gomez Research, an independent research and consulting firm, to conduct a survey of residents to help evaluate residential wood burning, lawn care, and commuting patterns. The purpose of the study was to gauge residents' activity levels as well as to document public awareness and understanding of the District's programs. The study was designed to measure: (1) residential wood-burning frequency; (2) the use of gas-powered lawn equipment and professional lawn care services; (3) personal commuting behavior and student transportation; and (4) perceptions of the District, its programs, and the local air quality. Findings will be used to gauge the effectiveness of the District's outreach programs, inform future outreach strategies, and provide data for estimating the emissions produced from these three sources.

A total of 1,000 telephone surveys were conducted with owners and renters of single-family homes[1] in San Joaquin, Stanislaus, Merced, Kings, Fresno, Madera, Tulare Counties and the Valley portion of Kern County, yielding an overall margin of error of +/-3 percent. The survey was conducted in English and Spanish and 40 percent of all telephone interviews were conducted on cell phones, ensuring that residents without landlines would be included in the study. Gomez Research used random-digit dialing (RDD) techniques whereby telephone prefixes were matched to zip codes for the San Joaquin Valley geographical area, and the remaining four digits were randomly generated. The surveys were conducted between January 3 and January 19, 2014. The average length of the survey was 9 minutes in English and 12 in Spanish. Results were weighted to ensure that the sample reflected U.S. Census data. All statements presented here refer to the region as a whole, unless otherwise indicated. In addition, all differences between demographic groups presented here are statistically significant at the 95 percent confidence level, unless otherwise noted. Key findings are presented by topic area for respondents overall, followed by any differences among sub-groups.

Key Findings

Residential Wood Burning

a. **Nearly one-third (32 percent) of all residents surveyed reported have a wood-burning device in their home.** Among those residents with wood-burning devices, 13 percent were identified as exempt from mandatory no-burn restrictions.

b. **Nearly one-quarter of residents who use their devices (23 percent) reported lighting their fireplace or stove once a week or more.** Once started, fires burn for six hours on average.

c. **Respondents who reported using their devices weekly reported burning fires for longer periods of time.** Residents who used their devices once a week or more reported burning their fires for 8.3 hours on average compared to 3.5 hours among those who used their devices less frequently.

[1] The sample is limited to single-family units to ensure that the greatest number of respondents would be able to answer questions regarding wood combustion and lawn care. Based on U.S. Census data, we estimate that more than 80 percent of housing units in the San Joaquin Valley service are single-family units. In some communities, such as Madera, nearly 90 percent of the units are single family.

d. **Just under three-fourths of residents surveyed (71 percent) burn seasoned firewood, followed by a third (32 percent) who use manufactured logs, such as Duraflame, and 13 percent who use pellets.** A total of 11 percent of residents surveyed reported that they burn trash, magazines, newspapers and/or other household materials as fuel.

e. **The study found significant differences by region in the proportion of residents with wood-burning devices in their homes.** Residents in the Northern Region, including San Joaquin, Stanislaus, and Merced Counties, were more likely to own wood-burning devices compared to other residents. A total of 37 percent of residents from the Northern region reported having a wood-burning fireplace or stove in their homes, compared to 28 percent among residents in the Central region (Fresno, King, and Madera Counties) and the Southern region (Kern and Tulare Counties), a statistically significant difference.

f. English speakers (defined as those who chose to conduct the survey in English) were more likely to report that they had a wood-burning fireplace or stove compared to Spanish speakers. Specifically, 37 percent of all English speakers reported having a wood-burning device at their residence compared to 15 percent among Spanish speakers.

g. Residents above median income were also more likely to report that they had wood-burning devices compared to those below-median income (41 percent compared to 26 percent, respectively). In addition, homeowners were more likely to report having a wood-burning device compared to renters.

h. **Residents who are exempt from mandatory wood-burning regulations were more likely to own a wood-burning device compared to other residents (45 percent of exempt residents compared to 29 percent of non-exempt residents).**

i. **The Check Before you Burn Program continues to be widely recognized by Valley residents.** There were no statistical changes in the proportion of residents who reported hearing of the program (80 percent in 2014 compared to 83 percent in 2010, statistically equivalent).

j. In addition, more than three-fourths (78 percent) of residents with wood-burning devices who had heard of the Check Before You Burn Program reported that they had reduced their wood-burning as a result.

k. **Less than a quarter of all residents surveyed (17) were familiar with the Burn Cleaner Program.**

l. Just under one-third (29 percent) of residents surveyed reported that they would be willing to replace their traditional wood-burning fireplace or stove if they could use it on some No-Burn days.

m. **A total of 12 percent of all residents with traditional wood-burning devices reported that they would be willing to make the purchase if given a 15 percent discount.**

n. **Findings suggest that approximately 24 percent of residents with wood-burning devices would participate in the program if the rebate were increased to 50 percent** (combined totals for residents who would participate at 15, 25, and 50 percent levels.)

o. **More than half of all residents surveyed (55 percent) reported that they believe wood smoke is a significant source of air pollution in their neighborhoods.** Residents living in the Central Region (Fresno, Madera, and Kings County) were more likely to report that wood smoke was a problem (63 percent) compared to residents from the Northern and Southern regions (49 percent and 53 percent, respectively).

Residential Lawn Care

a. **The majority of San Joaquin Valley residents (61 percent) tend to their own lawns rather than hire a service.** One quarter of residents use a lawn service to handle all of their yard work and another 3 percent use a lawn service for a portion of the work.

b. **Nearly three-fourths of residents (73 percent) who care for their own lawns and gardens use gas-powered equipment**, most frequently walk-behind lawn mowers (84 percent), lawn edgers (39 percent), string trimmers (38 percent), and leaf blowers (35 percent).

c. **Most residents (54 percent) use a service four times a month during the summer followed 22 percent who use a service every other week.** Fewer than 10 percent of residents use a service more than once a week. The average number of times a lawn service was used in the summer was four times. Approximately half (46 percent) of residents who use a lawn service reported that their lawn service comes as frequently during the winter months.

d. **A total of 84 percent of all residents surveyed reported that they were not aware of the Clean Green Yard Machines Rebate Program.** Spanish speakers were much less likely than English speakers to report that they had heard of the Rebate Program (5 percent of Spanish speakers compared to 18 of English speakers). In addition, results suggest that Spanish speaking residents are more likely to care for their own lawns. More than two-thirds of Spanish speakers (69 percent) reported that they or others in their household do all the yard work, compared to 58 percent among English speakers, a statistically significant difference.

Commuting Patterns

a. **Half of the residents surveyed reported that they drive alone to work, followed by 30 percent who do not work outside of the home.** A total of 12 percent reported that they drive in a carpool or vanpool. Only 2 percent of respondents reported that they take public transportation.

b. **Approximately half of commuters surveyed reported that they would consider carpooling if their employer provided a more flexible work schedule, financial incentives, assistance with coordinating carpool partners, or free parking.**

c. **Among residents with school-age children (42 percent of all residents surveyed) nearly half reported that they drive their children to school.** Approximately one-quarter of residents reported that their children take the school bus or walk/bike to school. Less than 3 percent of all residents reported that their children take public transportation or carpool with other students.

d. The most frequently cited reasons for not allowing children to walk or bike to school were distance and concerns about safety.

e. More than two-thirds (69 percent) of residents with school-age children agreed that idling cars are a significant source of air pollution.

General Beliefs and Awareness

a. **Findings indicate that the majority of residents believe the air quality in the San Joaquin Valley has improved or stayed the same compared to three years ago (similar to results from the 2010 survey)**. There was, however, a 5 percentage-point decrease this year in the proportion of residents who believe the air quality has gotten "somewhat worse" over time.

b. **Awareness of the District remains high among residents.** A total of 57 percent of residents this year reported that they had heard of the District, unchanged from 2010.

c. **More than two-thirds (68 percent) of all residents familiar with the District reported that they had a "very favorable" or "somewhat favorable" view of the District.**

Conclusions

Overall, study findings suggest that past outreach efforts have helped raise public awareness about the District and its programs, but further outreach is still needed. The Check Before You Burn Program continues to be recognized by eight-out-of-ten residents, and those residents aware of the Program report that they have reduced their wood burning in response to the outreach. In contrast, awareness of the Burn Cleaner and Clean Green Yard Machines Rebate Programs could be improved. Less than 20 percent of residents are aware of either the Burn Cleaner or Clean Green Yard Machines Rebate Programs. Spanish speakers, who are more likely to care for their own lawns compared to other residents, had particularly low awareness levels. In addition, findings suggest that more residents would consider carpooling to work if their employers offered a flexible schedule, financial incentives, free parking or other programs. These findings suggest that efforts to build more employer programs and outreach to increase awareness of the District's rebate programs may be helpful in promoting changes in personal behavior and improving air quality.

INTRODUCTION

The San Joaquin Valley Air Basin, which spans 250 miles and is home to three million residents, is unusually susceptible to air pollution. The Valley's surrounding mountain topography, hot summers, foggy winters and frequent temperature inversions help form and retain a variety of air pollutants. While air quality in the Valley has improved significantly over the past 15 years, the Valley continues to be one of the more polluted regions in the nation.

As part of its mission to bring the San Joaquin Valley into compliance with federal and state clean air standards, the San Joaquin Valley Air Pollution Control District contracted with Gomez Research to conduct a survey of residents to help evaluate residential wood burning, lawn care, and commuting patterns. The purpose of the study was to gauge residents' activity levels as well as to document public awareness and understanding of the District's programs. The study was designed to measure: (1) residential wood-burning frequency; (2) the use of gas-powered lawn equipment and professional lawn care services; (3) personal commuting behavior and student transportation; and (4) perceptions of the District, its programs, and the local air quality. Findings will be used to gauge the effectiveness of the District's outreach programs, inform future outreach strategies, and provide data for estimating the emissions produced from these three sources.

The remainder of this report presents the survey methodology and findings that emerged from the data analyses and is organized as follows:

- The **Methodology** section, which describes data collection and statistical methods;
- The **Findings** section, documenting awareness and behaviors;
- **Conclusions**; and,
- The **Appendices,** which include the survey instrument, frequencies for each question, and a demographic profile of residents surveyed compared to known population estimates.

METHODOLOGY

Overview

A total of 1,000 telephone surveys were conducted with owners and renters of single-family homes[2] in San Joaquin, Stanislaus, Merced, Kings, Fresno, Madera, and Tulare Counties and the Valley portion of Kern County, yielding an overall margin of error of +/-3 percent. The survey was conducted in English and Spanish and 40 percent of all telephone interviews were conducted on cell phones, ensuring that residents without landlines would be included in the study. Gomez Research used random-digit dialing (RDD) techniques whereby telephone prefixes were matched to zip codes for the San Joaquin Valley geographical area, and the remaining four digits were randomly generated. All respondents were 18 years or older. (For a copy of the survey, including frequencies overall see **Appendix A.)** The surveys were conducted between January 3 and January 19, 2014 using a computer-assisted telephone interview (CATI) system in which interviewers read questions from a computer screen and typed respondents' answers directly into a database. The average length of the survey was 9 minutes in English and 12 in Spanish.

[2] The sample is limited to single-family units to ensure that the greatest number of respondents would be able to answer questions regarding wood combustion and lawn care. Based on U.S. Census data, we estimate that more than 80 percent of housing units in the San Joaquin Valley service are single-family units. In some communities, such as Madera, nearly 90 percent of the units are single-family.

Caveats

It should be noted that the residential survey, like all surveys, has self-reporting bias and should be used in conjunction with results from air pollution reports to determine the extent to which residents are participating in activities that reduce air pollution. Survey research depends on respondents providing truthful and accurate reports of their activities. In addition, caution should be taken in comparing data from 2014 with responses from the 2010 survey. The 2010 survey included all residents, whereas the 2014 survey focused on residents living in single-family homes and duplexes to ensure a sufficient sample of residents with wood-burning devices and private lawns.

Weighting

The sample was weighted to reflect the population based on the following dimensions: age, race/ethnicity, gender, telephone use, and county of residence. Data were not weighted on income due to non-response bias. Weighting target values were based on the average (population-adjusted) characteristics of the eight-county area. Characteristics were derived from the U.S. Census. Telephone use data were obtained from the U.S. Center for Disease Control. Weighting was conducted through iterative proportional fitting, also known as raking.

Statistical Comparisons

Statistical tests were conducted for all comparative analyses to identify whether observed differences among demographic groups or categories were statistically significant.[3] All reported differences were statistically significant at the 95 percent confidence level unless otherwise noted.

Report Organization

This report has been organized around the following topical areas:

- Residential Wood Burning;
- Residential Lawn Care;
- Commuting Patterns; and,
- General Beliefs and Awareness.

The next section of this report presents study findings.

[3] A statistically significant difference means that the difference between years or among groups is not by chance, and that a real difference exists.

FINDINGS

Residential Wood Burning

A key objective of the research was to gauge the use of wood-burning devices in the San Joaquin Valley and to measure public awareness of outreach campaigns designed to reduce wood-smoke pollution. Results are presented for residents overall, followed by demographic and regional differences.

Presence of Wood-Burning Devices

Respondents were first asked if they had a wood-burning fireplace, wood stove, or pellet stove in their home. **As seen in Figure 1, nearly one-third (32 percent) of all residents surveyed reported having a wood-burning device in their home.** Among those residents with wood-burning devices, 13 percent were identified as exempt from mandatory no-burn restrictions.[4]

Figure 1: Proportion of Residents with a Wood-Burning Fireplace, Wood Stove or Pellet Stove
Respondents Overall (n=1,000)

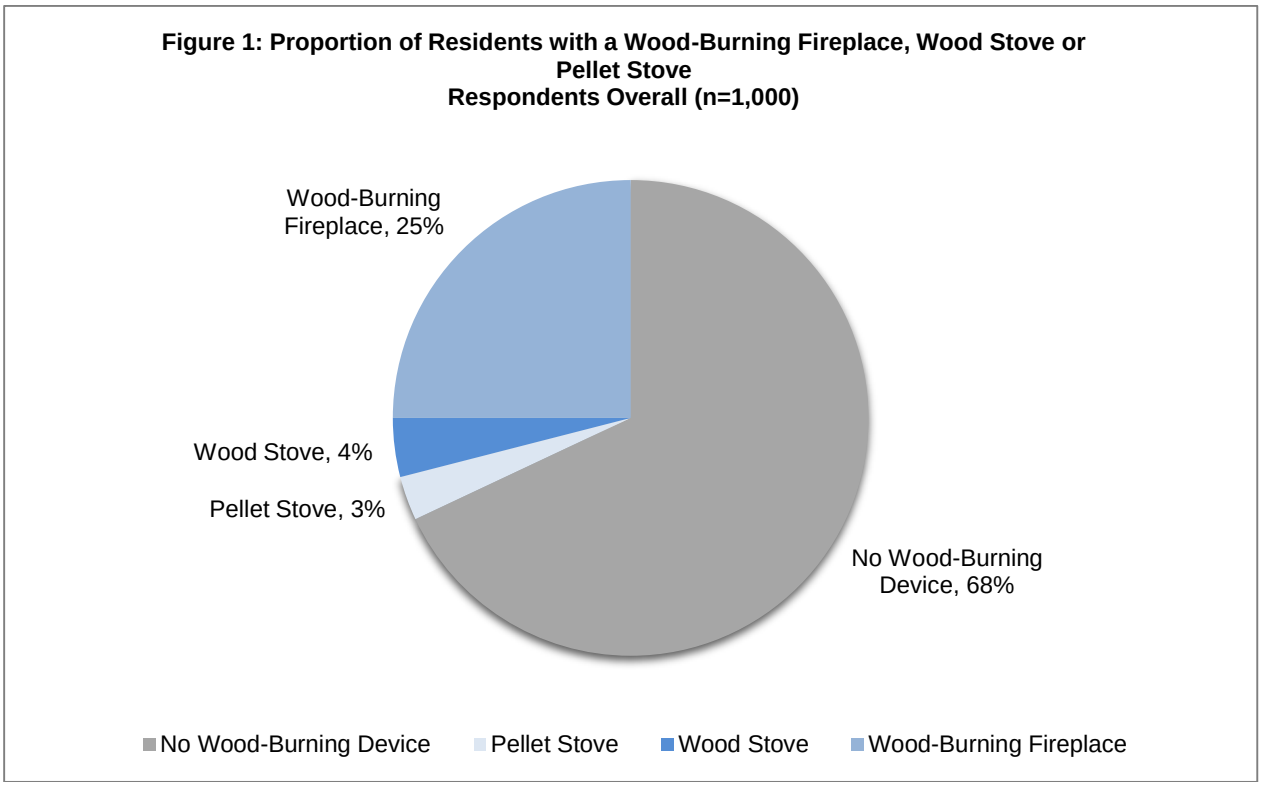

*Figure based on Q2: I'd like to ask you about the heating devices you may have in your home. Do you have a wood-burning fireplace, wood stove, or pellet stove in your home?

Use of Wood-Burning Devices

Respondents who reported having a wood-burning device were asked how often they use their fireplace or stove during the winter months. Results are presented in **Figure 2**. **In 2014, more than half of all residents with a wood-burning fireplace or stove reported that they do not use their**

[4] Exempt residents were defined as those living in areas where no natural gas connections are available or in cases where the wood-burning device is the sole source of heat at a residence.

devices (59 percent), up from 49 percent in 2010. Despite an apparent drop in the use of wood-burning devices overall, nearly one-quarter of residents who use their devices (23 percent) reported lighting their fireplace or stove once a week or more. A total of 8 percent of residents reported using their fireplace or stove nearly every day.

Figure 2: How Often Residents use their Fireplace/Stove in the Winter Months, Among Respondents Who Use Their Wood-Burning Device (n=330)

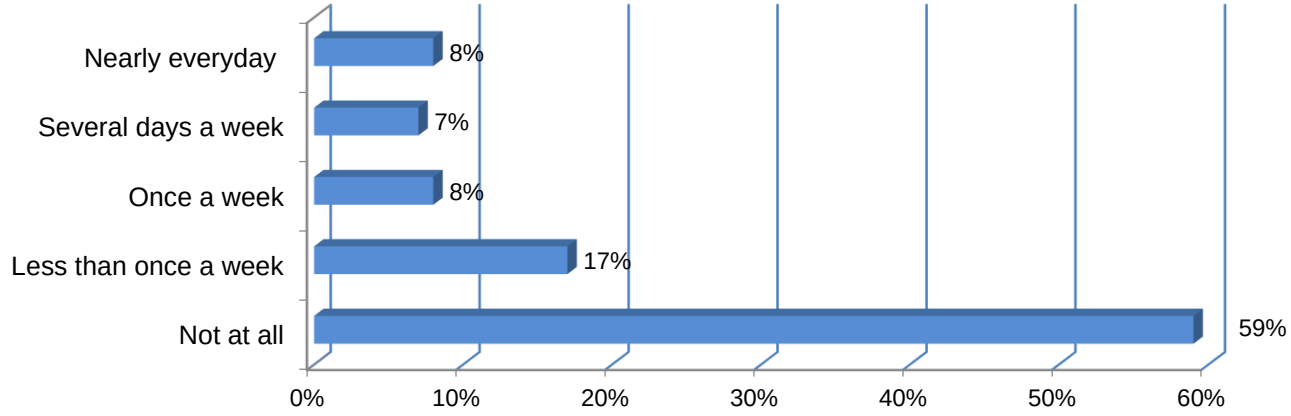

*Figure based on Q5: How often do you use your fireplace/stove in the winter? Nearly every day, several days a week, once a week, less than once a week, or not at all?

To help estimate the volume of wood-smoke produced during the winter season, residents who reported using their fireplaces or stoves were asked how many hours they typically burn a fire once started. **As seen in Figure 3, nearly two-thirds of residents (65 percent) burn their devices for four hours or less.** Once started, fires were burned for six hours on average (the median was four hours).

Respondents who reported using their devices weekly reported burning fires longer each time. Residents who used their devices once a week or more reported burning their fires for 8.3 hours on average compared to 3.5 hours among those who used their devices less frequently (no chart).

Figure 3: Number of Hours Residents Reported Burning a Fire, Once Started Among Respondents Who Use Wood-Burning Devices (n=133)

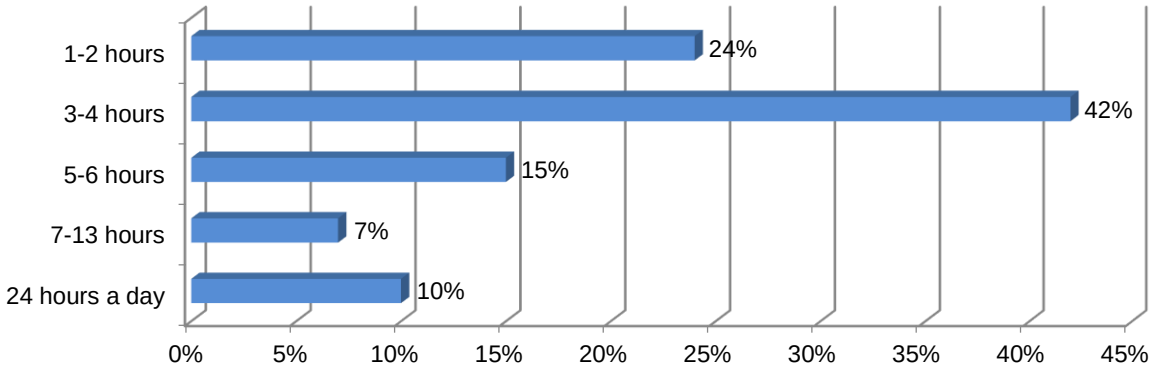

*Figure based on Q6: "Once started, how many hours does your fire usually burn?"

Next, respondents who use their wood-burning devices were asked what type of fuel they typically burn. **As seen in Figure 4, nearly three-fourths of residents surveyed (71 percent) burn seasoned firewood, followed by a third (32 percent) who use manufactured logs, such as Duraflame and 13 percent who use pellets.** A total of 11 percent of residents surveyed reported that they burn trash, magazines, newspapers and/or other household materials.

Figure 4: Type of Fuel Burned
Among Respondents Who Use Wood-Burning Devices (n=133)

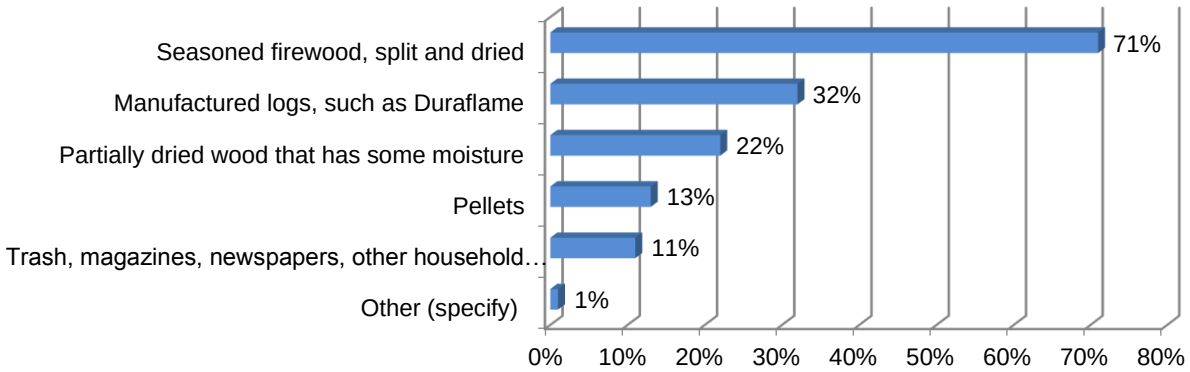

*Figure based on Q7: "Which of the following types of fuel do you typically burn?"

Regional/Demographic Difference in Use of Wood-Burning Devices

The study found significant differences by region in the proportion of residents with wood-burning devices in their homes. **As seen in Figure 5, residents in the Northern Region, including San Joaquin, Stanislaus, and Merced Counties, were more likely to own wood-burning devices compared to other residents.** A total of 37 percent of residents from the Northern region reported having a wood-burning fireplace or stove in their homes, compared to 28 percent among residents in the Central region (Fresno, King, and Madera Counties) and the Southern region (Kern and Tulare Counties), a statistically significant difference.

Figure 5: Proportion of Residents with Wood-Burning Devices
Respondents Overall, by Region

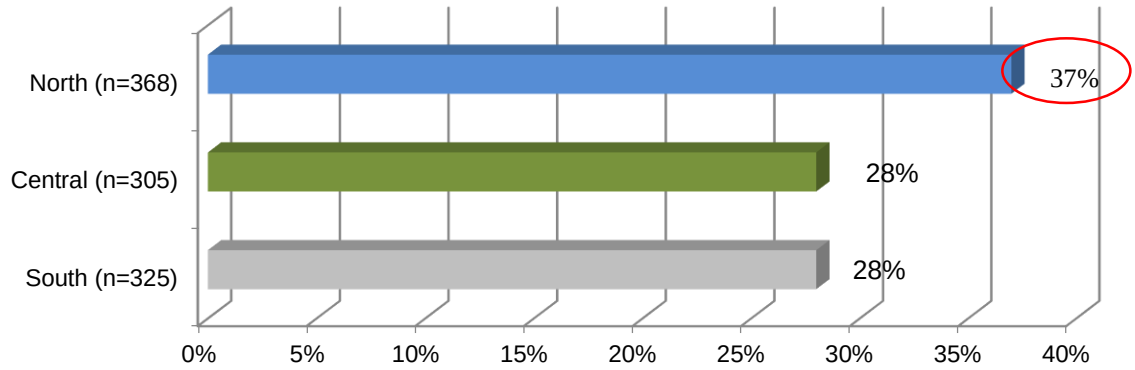

*Figure based on Q2: I'd like to ask you about the heating devices you may have in your home. Do you have a wood-burning fireplace, wood stove, or pellet stove in your home? Statistically significant differences at the 95 percent confidence level are circled.

Additional differences were found by language spoken, income, and other demographics. Results are presented below.

- English-dominant speakers (defined as those who chose to conduct the survey in English) were more likely to report that they had a wood-burning fireplace or stove compared to Spanish speakers. Specifically, 37 percent of all English speakers reported having a wood-burning device at their residence compared to 15 percent among Spanish speakers.

- Residents above median income were also more likely to report that they had wood-burning devices compared to those below-median income (41 percent compared to 26 percent, respectively). Homeowners were also more likely to report having a wood-burning device compared to renters.

- **Residents who are exempt from mandatory wood-burning regulations were more likely to own a wood-burning device compared to other residents (45 percent of exempt residents compared to 29 percent of non-exempt residents).**

Awareness and Impact of the Check Before You Burn Program

This year, awareness questions regarding the Check Before You Burn Program were specifically asked of residents with wood-burning devices who are not exempt from mandatory no-burn restrictions to provide a more accurate picture of the potential impact of program awareness on air quality. (In previous years, all residents were asked the question, regardless of whether they had a wood-burning device or were exempt from regulations). As seen in **Figure 6**, the Check Before You Burn Program continues to be widely recognized by residents. There were no statistical changes in the proportion of residents who reported hearing of the program, even though a more specific segment of the population was surveyed (80 percent in 2014 compared to 83 percent in 2010, statistically equivalent).

Figure 6: Awareness of the Check Before You Burn Program
Respondents Overall, 2010 and 2014

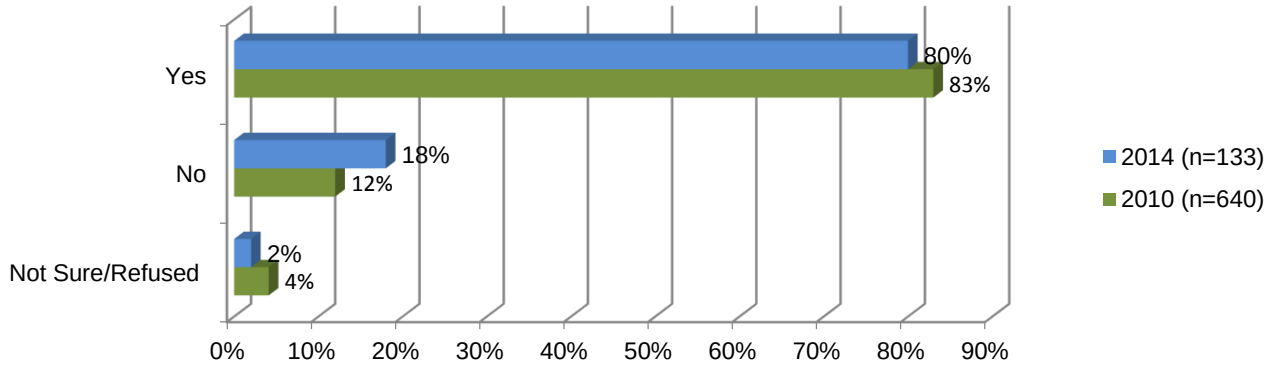

*Figure based on Q8: Check Before You Burn runs from November through February each year, and prohibits wood burning in fireplaces, wood or pellet stoves, and outdoor fire pits during certain days when it is determined that air quality levels will be most impacted. Have you ever heard of the Check Before You Burn program?" In 2014, only respondents who reported having a wood-burning stove and were not exempt from mandatory no-burn regulations were asked the question. In 2010, all respondents were asked.

Next, respondents who reported that they had heard of the Check Before You Burn Program were asked if they had reduced the amount of wood they burn in response to the outreach. Results are presented in **Figure 7. More than three-fourths (78 percent) of residents with wood-burning devices who had heard of the Check Before You Burn Program reported that they had reduced their wood burning as a result.**

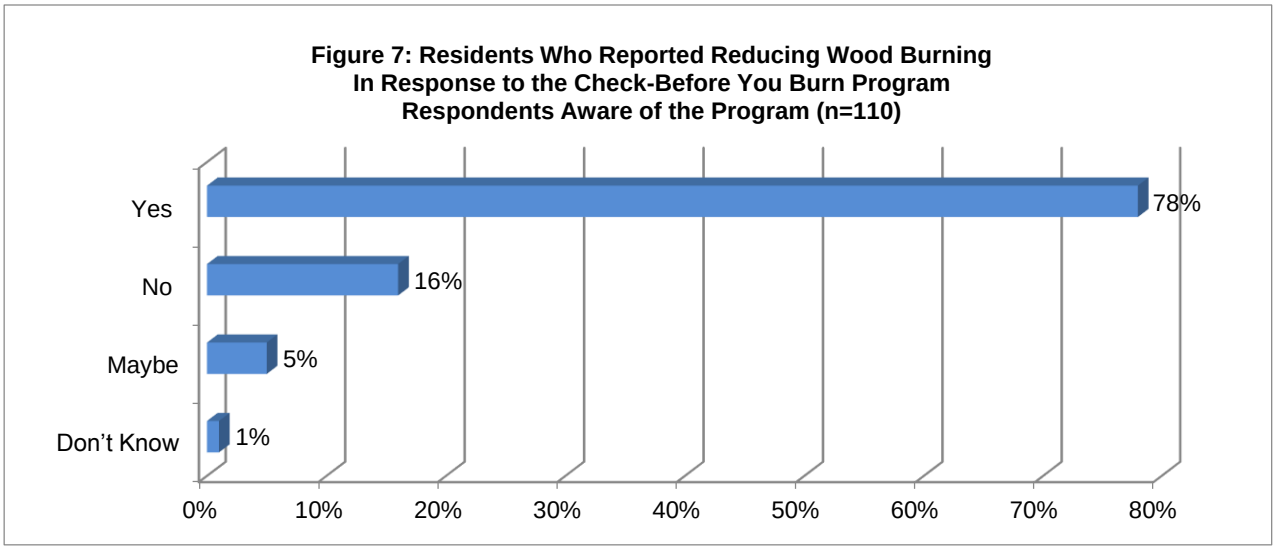

*Figure based on Q9: Have you reduced the amount of wood-burning you do in response to the Check Before You Burn Program? Base includes those respondents who have wood-burning devices, are not exempt from no-burn regulations, and have heard of the Check Before you Burn Program.

Awareness and Interest of the Burn Cleaner Rebate Program

In addition to measuring awareness of the Check Before You Burn Program, the study asked all respondents if they were aware of the Burn Cleaner Rebate Program which offers rebates to residents who replace their traditional fireplace or stove with a cleaner-burning device. Results are presented in **Figure 8. Less than a quarter of all residents surveyed (17 percent) reported that they had heard of the Burn Cleaner Program, suggesting that more outreach is needed.**

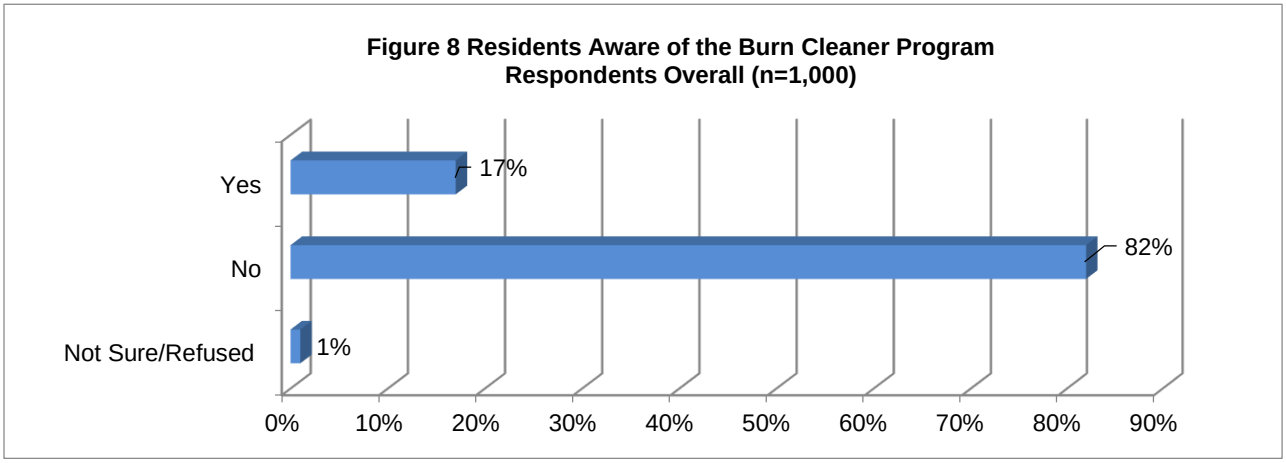

*Figure based on Q10: "To encourage cleaner burning in the Valley, there is a grant program that offers rebates to residents who replace their traditional fireplace or stove with a cleaner-burning device such as a certified wood stove or a gas fireplace. Are you aware of this grant program, it is called *Burn Cleaner*?"

Respondents who reported that they owned a wood-burning device were asked if they would be willing to replace their current wood-burning fireplace or stove with a cleaner device if they could use it on some No-Burn days. **As seen in Figure 9, just under one-third (29 percent) reported that they would be willing to switch devices if they could use it on some No-Burn days.**

Figure 9: Residents Willing to Replace Their Traditional Fireplace/Stove
Respondents with Wood-Burning Devices (n=330)

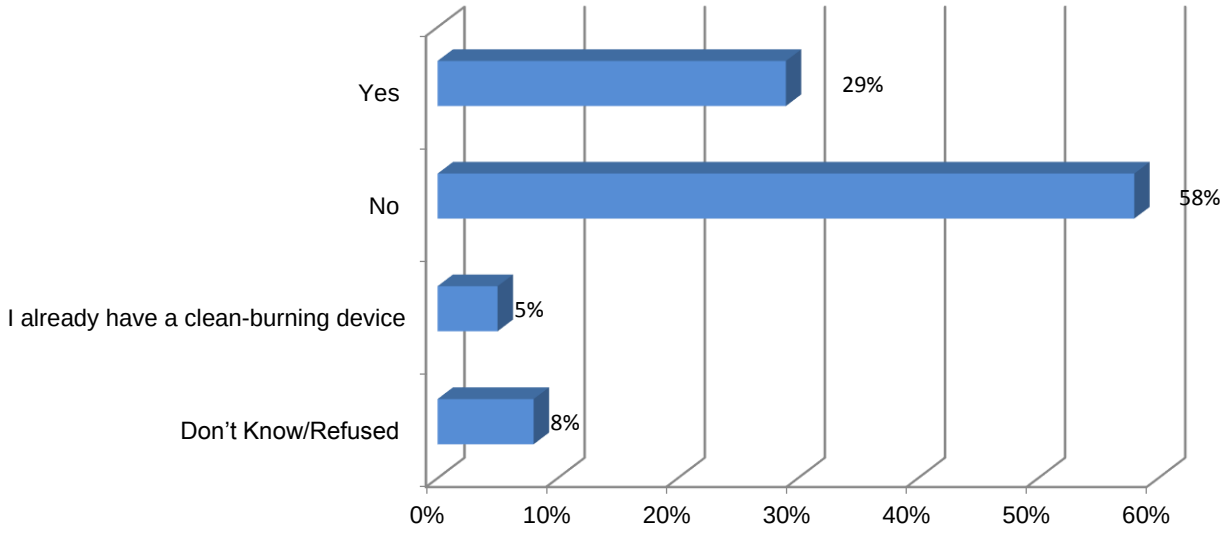

*Figure based on Q11: "Would you be willing to replace your current wood-burning fireplace or stove with a cleaner, less-polluting wood-burning device if you could use it on some No-Burn days?"

To gauge the level of discount needed to drive residents to purchase a clean burning device, respondents were presented with varying percentage discounts of 15, 25, and 50 percent off the total estimated cost of $3,000 to purchase a new device. (All respondents who reported owning a wood-burning device or stove were asked the question, even if they reported in the previous question that they were not interested in replacing their device.) **A total of 12 percent of all residents with traditional wood-burning devices reported that they would be willing to make the purchase if given a 15 percent discount.**

Those respondents who reported that they would *not* be willing to purchase a cleaner device even if offered a 15 percent discount were asked if they would make the purchase if the discount were increased to 25 percent. Fewer than 5 percent of respondents who refused a 15 percent discount said they would be swayed by a discount of 25 percent. Respondents who were not interested in a 15 or 25 percent discount were asked if they would replace their current device for a 50 percent rebate. An additional 16 percent said they would.

Findings suggest that approximately 24 percent of residents with wood-burning devices would participate in the program if the rebate were increased to 50 percent (combined totals for residents who would participate at 15, 25, and 50 percent levels.)

Beliefs about Wood Smoke

The last question regarding residential wood burning addressed beliefs about wood smoke. As seen in **Figure 10**, more than half of all residents surveyed (55 percent) reported that they believe wood smoke is a significant source of air pollution in their neighborhoods. Residents living in the Central Region (Fresno, Madera, and Kings County) were more likely to report that wood smoke was a problem (63 percent) compared to residents from the Northern and Southern regions (49 percent and 53 percent, respectively).

Figure 10: Residents Who Believe Wood Smoke is a Significant Source of Air Pollution
Respondents Overall (n=1,000)

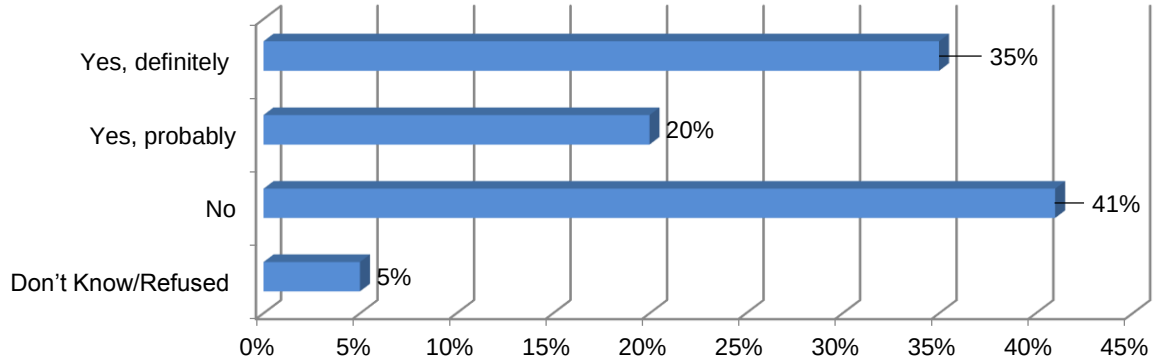

*Figure based on Q13: "Do you believe wood smoke is a significant source of air pollution in your neighborhood?"

Residential Lawn Care

Another objective of the study was to gauge the impact of gas-powered lawn equipment on air pollution and to measure awareness of programs designed to reduce pollution from these sources. Findings are presented below.

Use of Gas-Powered Lawn and Garden Equipment by Residents

Respondents were first asked who usually maintains their lawns and garden areas. **As seen in Figure 11, the majority of San Joaquin Valley residents (61 percent) tend to their own lawns rather than hire a service.** One quarter of residents use a lawn service to handle all of their yard work and another 3 percent use a lawn service for some of the yard work.

Figure 11: Proportion of Residents Who Use a Lawn Care Service
Respondents Overall (n=1.000)

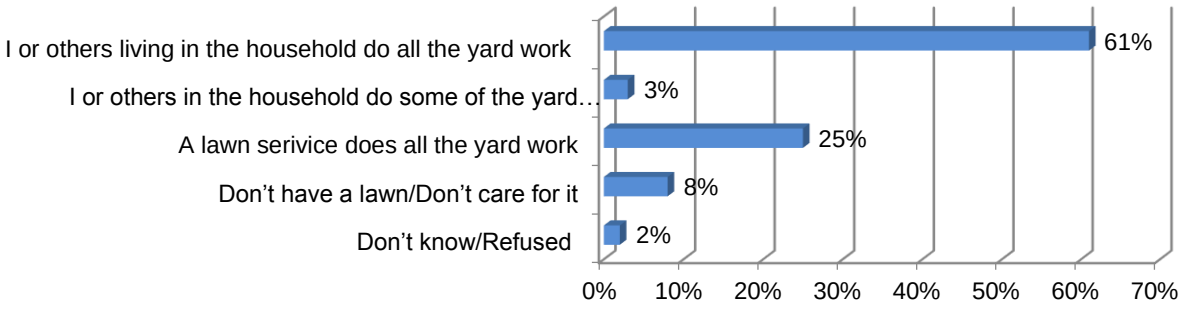

*Figure based on Q20: "Who usually maintains your lawn, shrubs, trees or garden areas?"

Residents who reported caring for their own lawns and gardens were asked if they use gas-powered equipment and, if so, to name the type of equipment. Results are presented in **Figures 12** and **13**. **Nearly three-fourths of residents (73 percent) who care for their own lawns and gardens use gas-powered equipment, most frequently walk-behind lawn mowers (84 percent), lawn edgers (39 percent), string trimmers (38 percent), and leaf blowers (35 percent)**.

Figure 12: Proportion of Residents Using Gas-Powered Lawn or Garden Equipment
Respondents Who Care for their Own Lawns (n=639)

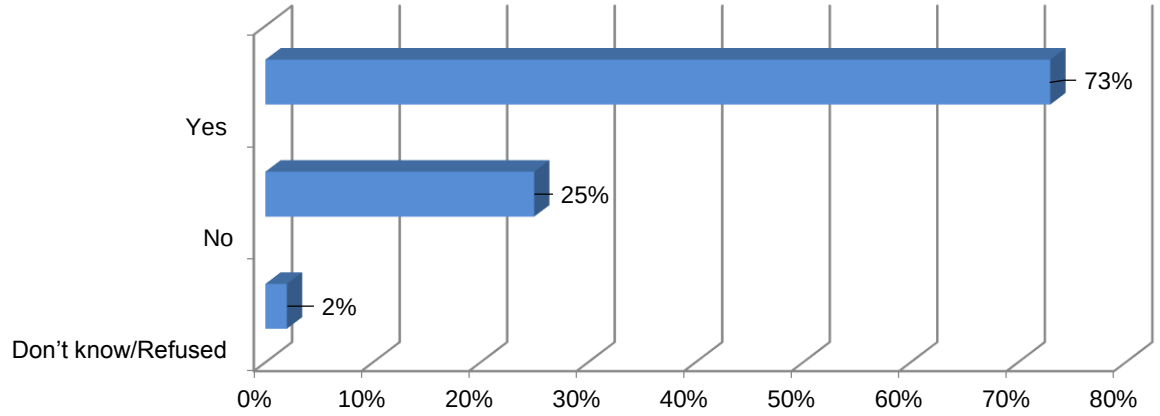

*Figure based on Q21: "Do you use any gas-powered lawn or garden equipment at your residence?"

Figure 13: Types of Gas-Powered Lawn and Garden Equipment Residents Used
Respondents Who Use Gas-Powered Equipment (n=459)

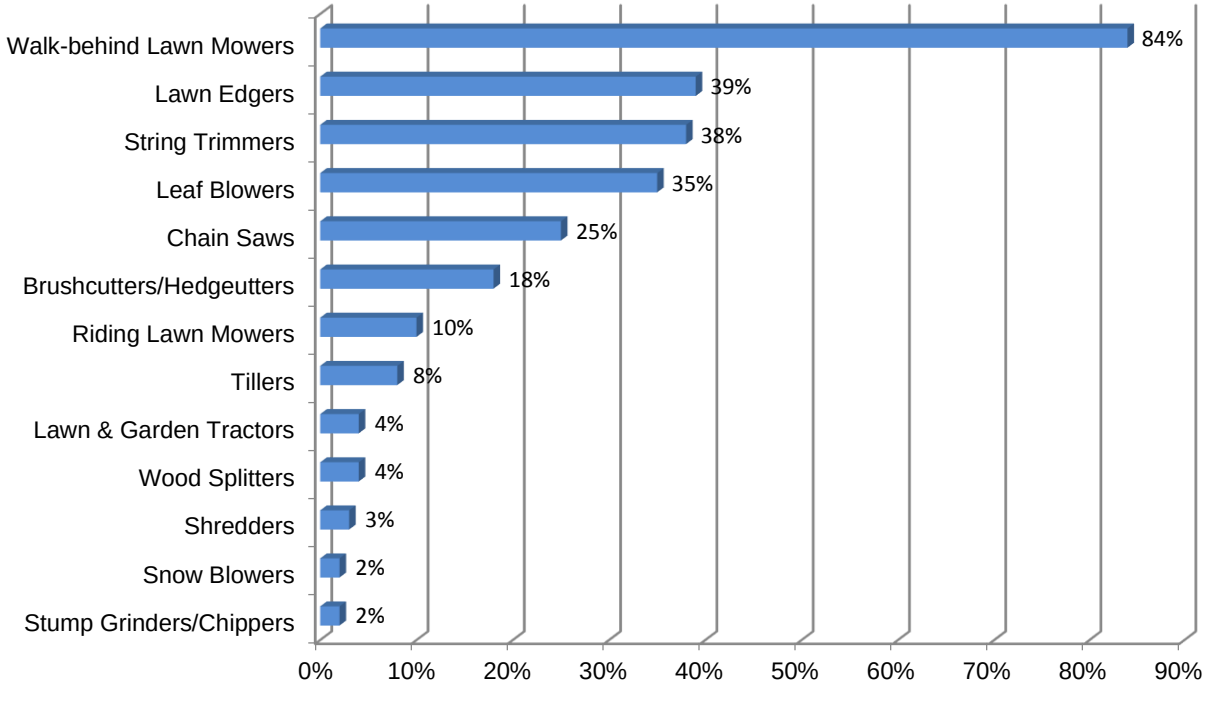

*Figure based on Q22: "Considering only gas-powered lawn and garden equipment, which of the following do you use?"

Use and Frequency of Professional Lawn Service

Residents who reported that they use a lawn service were asked how many times of month they use the service and whether that frequency varied by season. As seen in **Figure 14**, most residents (54 percent) use a service four times a month during the summer, followed by 22 percent who use a service every other week. Less than 10 percent of residents use a service more than once a week. The average number of times a lawn service was used in the summer was four times.

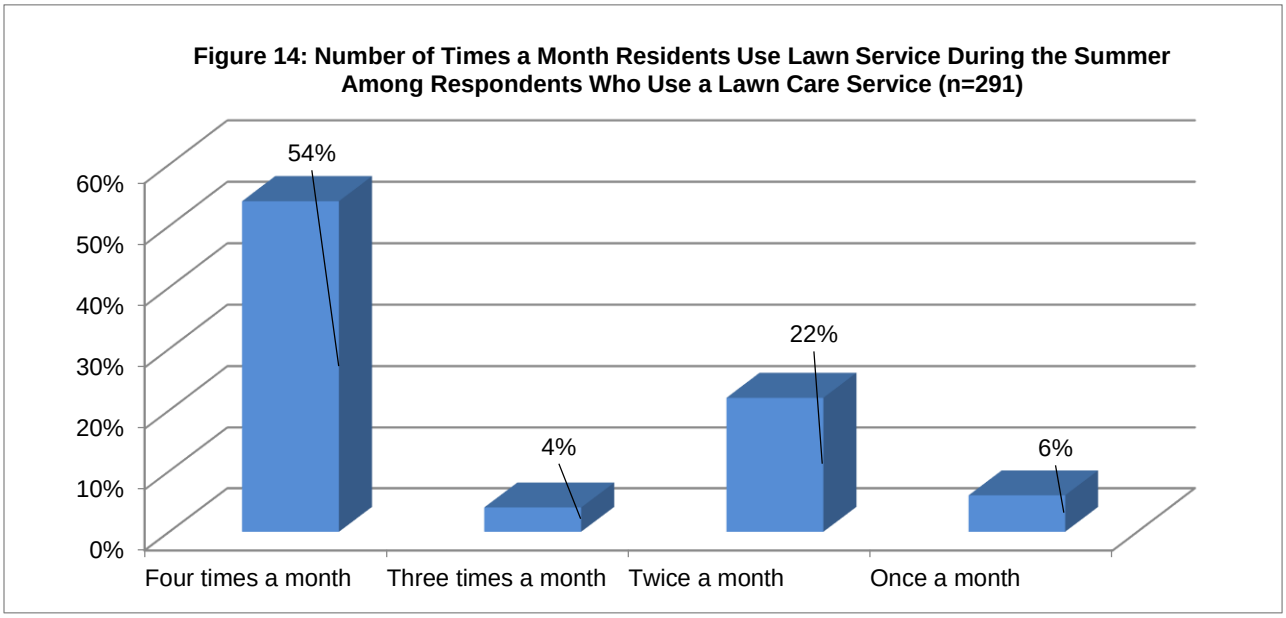

*Figure based on Q23: "During the summer, how many times a month does the lawn service come?"

Next, residents who use a lawn service were asked if the lawn service comes as often during winter. Approximately half (46 percent) of residents who use a lawn service reported that their lawn service comes as frequently during the winter months. See **Figure 15.**

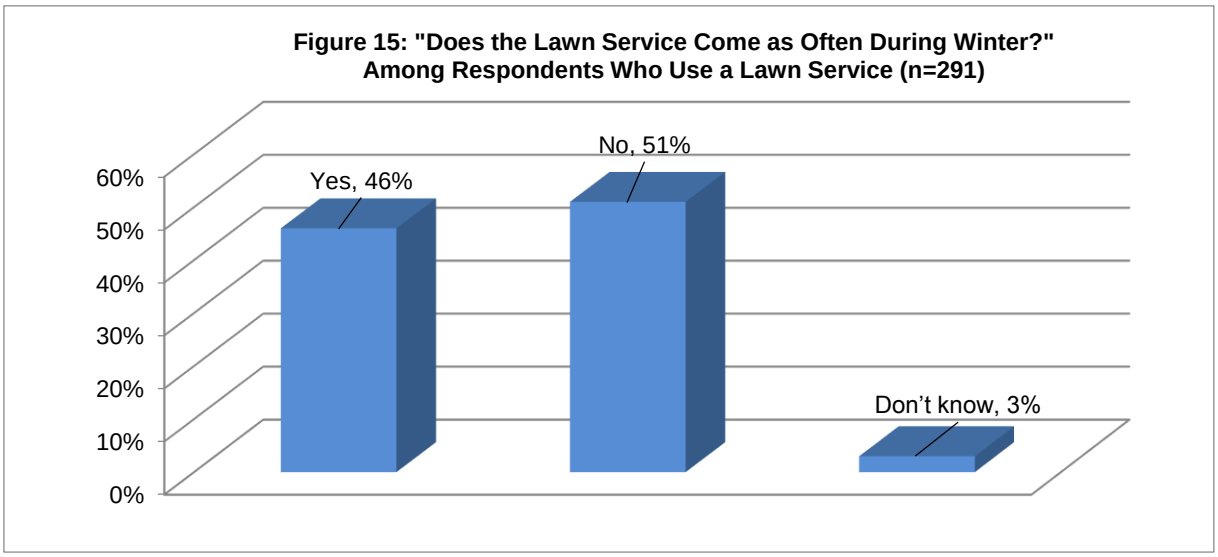

*Figure based on Q24: "Does the lawn service come as often during the winter?"

Residents were then asked if they would consider switching to a lawn care service that used cleaner equipment if that service cost less than their current service, the same as their current service, or more than their current service. Results are presented in **Figure 16**. A total of 41 percent of respondents reported that they would not consider switching.

Figure 16: Would Consider Switching to Lawn Service with Cleaner Equipment
Respondents Who Use a Lawn Care Service (n=291)

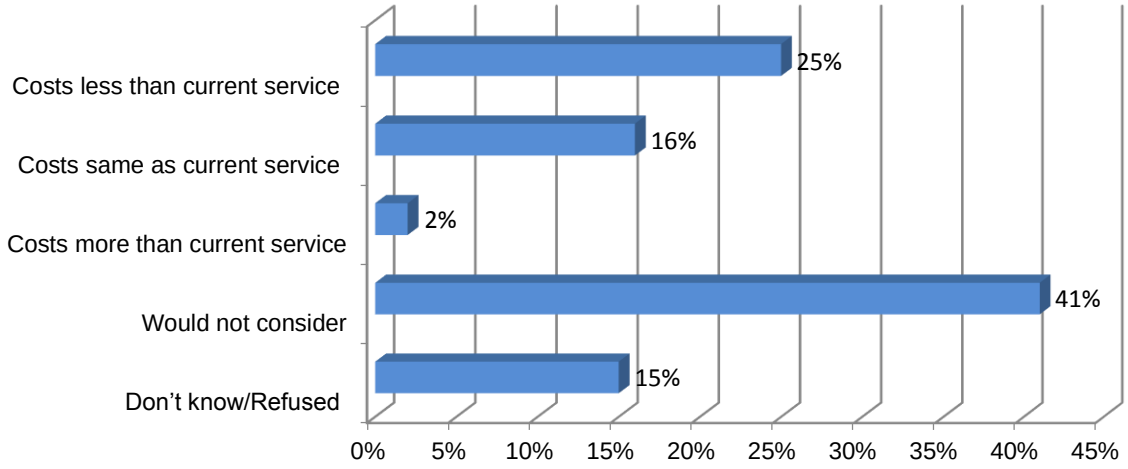

*Figure based on Q25: "Would you consider switching to a lawn care service that used cleaner equipment if it cost: less, the same, or more than your current service?"

Awareness and Interest in the Clean Green Yard Machines Rebate Program

As seen in Figure 17, 84 percent of all residents surveyed reported that they were not aware of the Clean Green Yard Machines Rebate Program. Spanish speakers were much less likely than English speakers to report that they had heard of the Rebate Program (5 percent of Spanish speakers compared to 18 of English speakers). In addition, results suggest that Spanish speaking residents are more likely to care for their own lawns. More than two-thirds of Spanish speakers (69 percent) reported that they or others in their household do all the yard work, compared to 58 percent among English speakers, a statistically significant difference.

Figure 17: Residents Aware of the Clean Green Yard Machines Rebate Program
Respondents Overall (n=1,000)

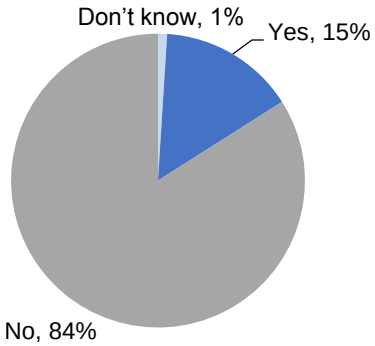

*Figure based on Q26: "Are you aware of a grant program which offers a rebate incentive for electric lawn mowers? The program is called the *Clean Green Yard Machines Rebate* Program?"

Commuting Patterns

In addition to measuring sources of air pollution from wood-smoke and gas-powered lawn equipment, the study was designed to track commuting patterns and the circumstances under which residents would consider carpooling over driving alone. The study also measured how school-age children travel to and from school. Results are presented below.

Current Commuting Patterns

Respondents were first asked how they usually get to work. Results are presented in **Figure 18**. **Half of the residents surveyed reported that they drive alone to work, followed by 30 percent who do not work outside of the home**. A total of 12 percent reported that they drive in a carpool or vanpool. Only 2 percent reported that they take public transportation.

Figure 18: How Residents Travel to Work
Respondents Overall (n=1,000)

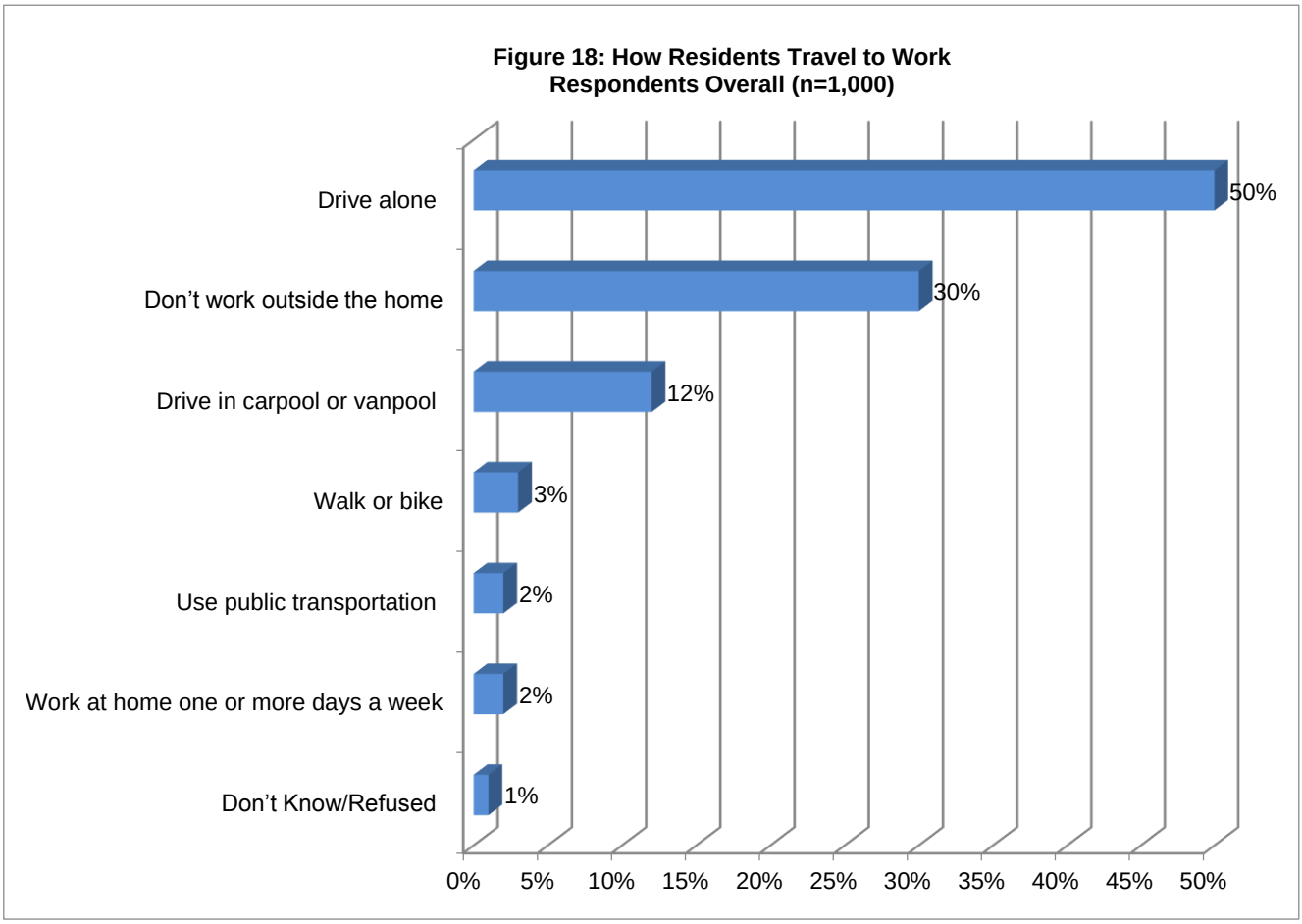

*Figure based on Q14: "How do you usually get to work?"

Future Behavior

To help identify strategies for increasing the proportion of Valley residents who carpool to work, residents were read a list of employer programs and asked if they would consider carpooling instead of driving alone if the incentive were offered. Results are presented in **Figure 19**. **Approximately half of commuters surveyed reported that they would consider carpooling if their employer provided a more flexible work schedule, financial incentives, assistance with coordinating carpool partners, or free parking.** While support for most of the programs was statistically comparable, on-site food service was less popular than a flexible work schedule or financial incentives.

Figure 19: Conditions Under Which Residents Would Consider Carpooling Among Respondents Who Drive Alone (n=452)

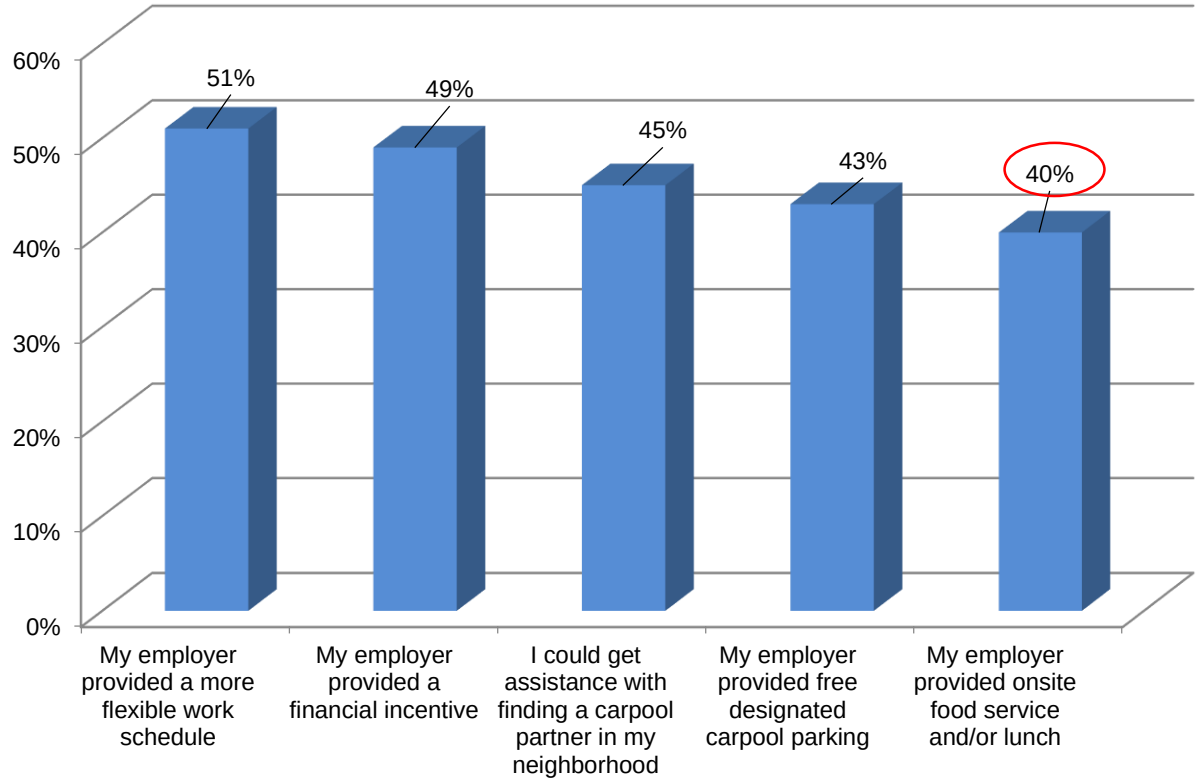

*Figure based on Q15: "Please answer yes, no, or maybe to each of the following questions: I would carpool if …?" Significant differences at the 95% confidence level are circled. On-site food service was less popular than a flexible work schedule and financial incentives.

Student Pick Up and /Drop Off

In addition to assessing the problem of commuter traffic, the study examined travel to and from school. Among residents with school-age children (42 percent of all residents surveyed) nearly half reported that they drive their children to school. One-quarter of all students walk or bike to school and 21 percent take the school bus. Less than 3 percent of all residents reported that their children take public transportation or carpool with other students. See **Figure 20**.

Figure 20: How Children are Transported to School
Among Respondents with School-Age Children (n=381)

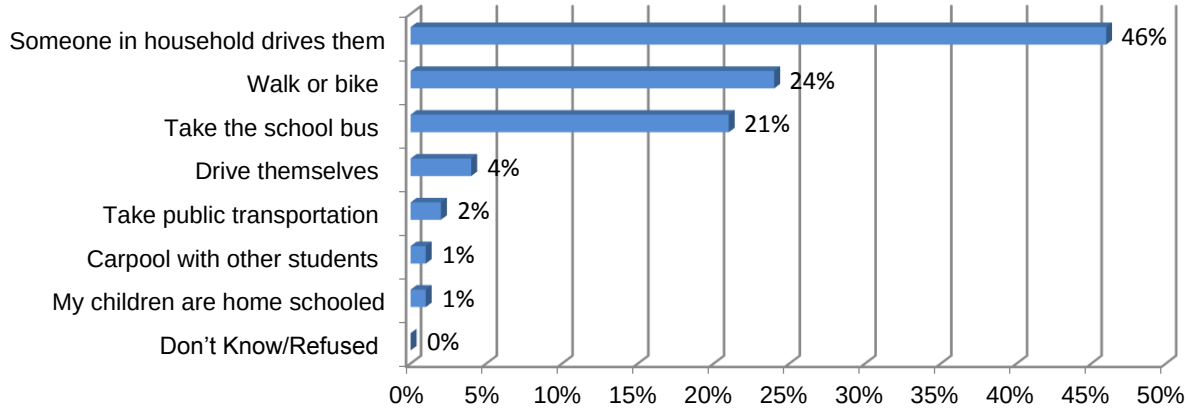

*Figure based on Q16a: "How do your children usually get to school?"

Next, residents were asked why their children do not walk or bike to school. **As seen in Figure 21, the primary reasons for not allowing children to walk or bike to school were distance and concerns about safety.**

Figure 21: Reasons Residents Do not Allow Their Children to Walk to School
Among Respondents Whose Children Do Not Walk or Bike (n=281)

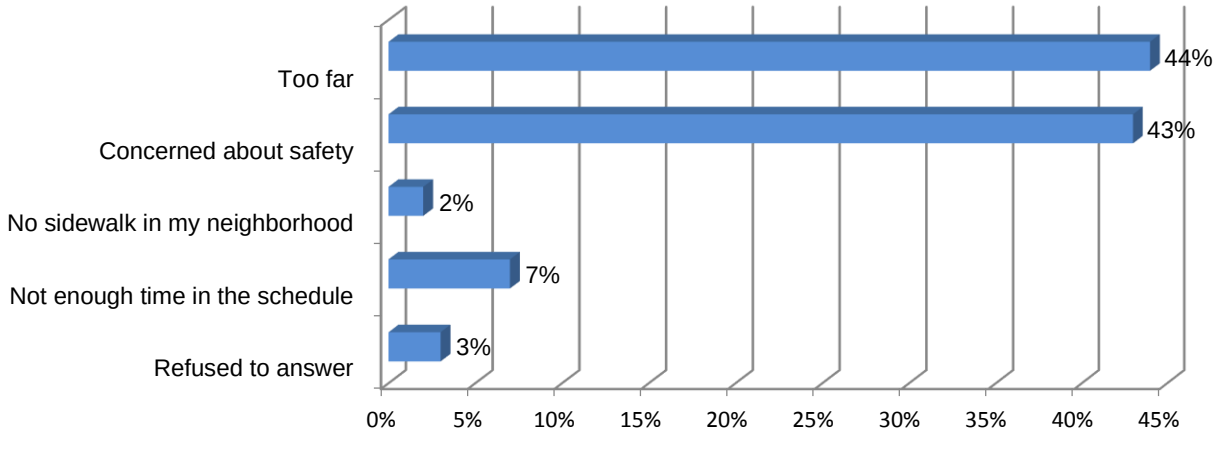

*Figure based on Q17: "What is the main reason you would not let your child walk to school either alone or with an adult?"

Beliefs about Car Idling at Schools as a Source of Air Pollution

Finally, residents with school-age children were asked if they consider idling cars at school drop-off and pick-up lines to be a source of air pollution that affect children's health. **More than two-thirds (69 percent) of residents with school-age children agreed that idling cars are a significant source of air pollution, as seen in Figure 22.**

Figure 22: Awareness of Idling as a Source of Air Pollution Effecting Children's Among Respondents with School-Age Children (n=381)

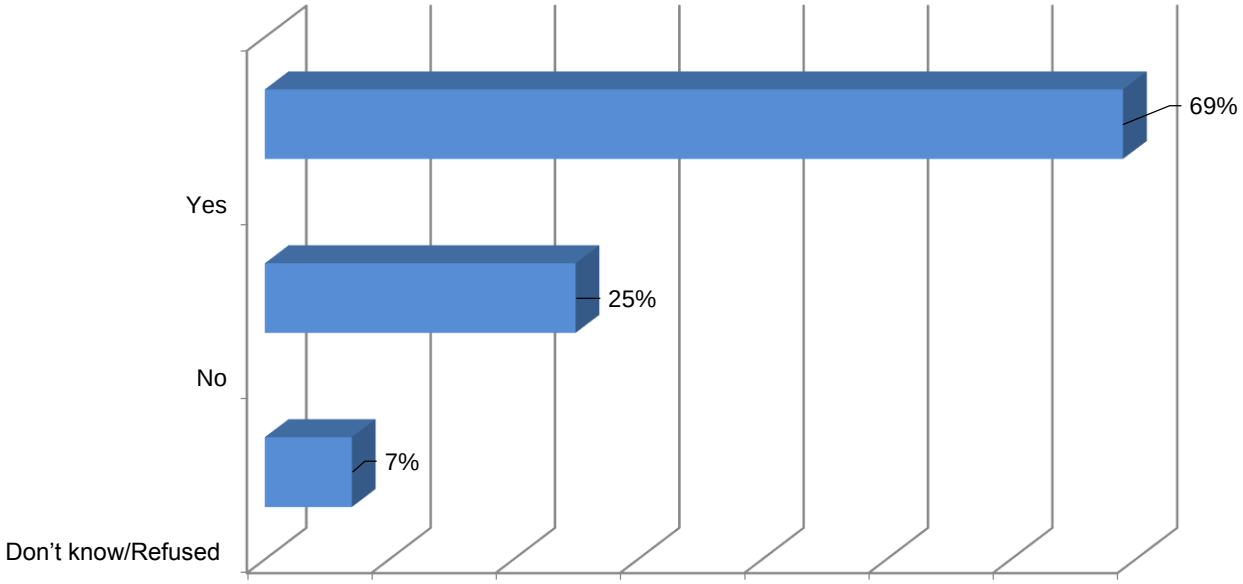

*Figure based on Q19: "Do you consider idling cars at school drop-off and pick-up lines to be a significant source of air pollution that can affect children's health?

General Beliefs and Awareness

Finally, the study addressed public perceptions of local air quality and perceptions of the Air Pollution Control District. Results are presented below.

Perceptions of Local Air Quality

In 2010 and 2014, residents were asked if they thought the air quality in their areas had gotten better, worse, or stayed the same. **As seen in Figure 23, most residents believe the air quality in the San Joaquin Valley has improved or stayed the same compared to three years ago (similar to results from 2010).** There was, however, a 5 percentage-point decrease this year in the proportion of residents who believe the air quality has gotten "somewhat worse" over time.

Figure 23: Public Perception of Local Air Qualtiy
Respondents Overall, 2010 and 2014 (n=1,000)

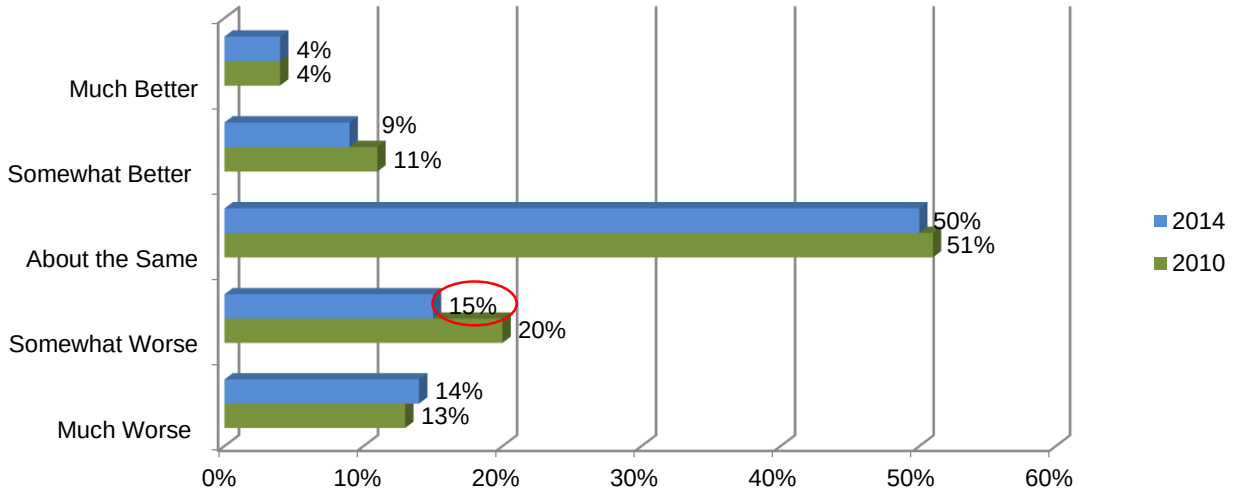

*Figure based on Q27: "Compared to three years ago, would you say the air quality in your area has gotten better, gotten worse, or stayed the same? (If better/worse: Is that much better/worse or somewhat better/worse?)" Statistically significant changes at the 95 % confidence level are circled.

Awareness and Perceptions of the Air Pollution Control District

In 2010 and 2014, respondents were asked whether they had heard of the San Joaquin Valley Air Pollution Control District. A total of 57 percent of residents this year reported that they had heard of the District, unchanged from 2010. (Awareness of the agency was highest among English speakers and those with above median incomes.) Those residents familiar with the District were asked if they had a "very favorable," "somewhat favorable," "somewhat unfavorable," or "very unfavorable" view of the agency's performance. **More than two-thirds (68 percent) of all residents familiar with the agency reported that they had a "very favorable" or "somewhat favorable" view of the District, as seen in Figure 24.**

Figure 24: Perforamance Ratings, San Joaquin Valley Air Pollution Control District Among Respondents Familar with the Agency (n=592)

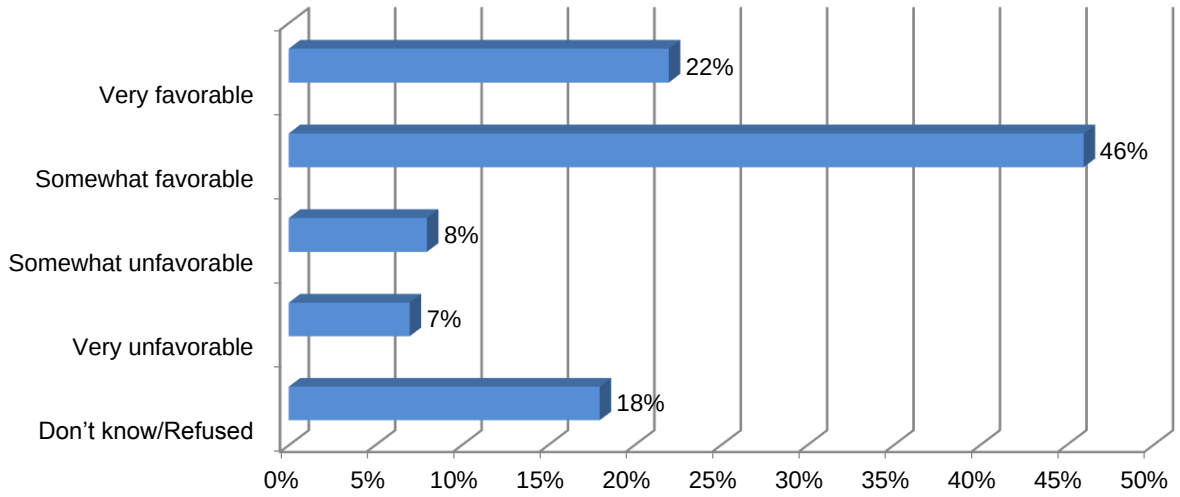

*Figure based on Q29: "The San Joaquin Valley Air Pollution Control District is responsible for monitoring the outdoor air quality and implementing programs to reduce air pollution in your area. Would you say you have a very favorable, somewhat favorable, somewhat unfavorable, or very unfavorable view of the job they are doing?"

Conclusions

Study findings suggest that past outreach efforts have helped raise public awareness about the District and its programs, but further outreach is still needed. The Check Before You Burn Program continues to be recognized by eight-out-of-ten residents, and those residents aware of the Program report that they have reduced their wood burning in response to the outreach. In contrast, awareness of the Burn Cleaner and Clean Green Yard Machines Rebate Programs could be improved. Less than 20 percent of residents are aware of either the Burn Cleaner or Yard Machines Rebate Programs. Spanish speakers, who are more likely to care for their own lawns compared to other residents, had particularly low awareness levels. In addition, findings suggest that more residents would consider carpooling to work if their employers offered a flexible schedule, financial incentives, free parking or other programs. These findings suggest that efforts to build more employer programs and outreach to increase awareness of the District's rebate programs may be helpful in promoting changes in personal behavior and improving air quality.

APPENDIX A:
SURVEY INSTRUMENT WITH WEIGHTED OVERALL FREQUENCIES

Valley Air District Residential Wood Burning, Lawn Care, and Commuting Survey 2014
Overall Frequencies (n=1,000)

INTRODUCTION

My name is _____. We are conducting a survey with people in the area about issues affecting your community, and I want to include your opinions. We are not trying to sell you anything.

01 willing to continue
02 refusal
03 call back <at specific time>
04 call back <no specific time>
05 no answer
06 busy
07 answering machine
08 disconnected number
09 language barrier (not Spanish or English)
10 business number
11 fax machine

SCREENER QUESTIONS

Landline

1. May I speak with the [youngest/oldest] adult at home who is 18 years or older?
   1 Yes, I am that person (continue interview)
   2 Yes, transferring to the person (restart intro)
   3 Not available now (If person who answered is an adult, continue interview. If person who answered is under 18 arrange a call-back)
   9 Refused (terminate)

Cell Phone

1a. Since you are on a cell phone, I can call you back if you are driving or doing anything else that requires your full attention. Can you talk safely and privately now, or not?
   1 Yes
   2 Not right now (try and arrange a time to call-back)
   9 Refused (terminate)

1b. Are you 18 years or older? (n=1,000)
   1 Yes 100%
   2 No (terminate)

All Respondents

1c. What county do you live in? (Don't Read) (n=1,000)
   01 Fresno 23%
   02 Kern 21%
   03 Kings 4%
   04 Madera 4%
   05 Merced 6%
   06 San Joaquin 18%
   07 Stanislaus 13%
   08 Tulare 11%
   09 Other, outside of San Joaquin Valley area (terminate)
   99 Don't know/refused (terminate)

1d. What is your zip code? [Record 5 digit zip code. Zip code list to be provided. Refused = terminate]

1e. Which of the following best describes the property where you live? (Read) (n=1,000)

1 House or duplex 100%
2 Apartment (terminate)
3 Condominium (terminate)
4 Townhouse (terminate)
5 Other (terminate)
9 Don't know/Refused (terminate)

1f. Do you own or rent your home? (n=1,000)

1 Own 59%
2 Rent 39%
9 Refused 2%

WOOD COMBUSTION: BEHAVIOR AND AWARENESS

2. I'd like to ask you about the heating devices you may have in your home. Do you have a wood-burning fireplace, wood stove, or pellet stove in your home? [5] (check all that apply) (n=1,000)

1 Yes, wood-burning fireplace 25%
2 Yes, wood stove 4%
3 Yes, pellet stove 3%
4 No (skip to Q4) 68%
9 Don't know/Refused (skip to Q4) 0%

3. Is your sole source of heat from a wood-burning device? (n=330)

1 Yes 19%
2 No 81%
9 Refused

4. (Only ask if Q2 = 4 or 9) Does your public utility provide a natural gas connection to your home? (Skip to Q10) (n=670)

1 Yes 85%
2 No 10%
9 Don't know/refused 4%

5. How often do you use your fireplace/stove in the winter? Nearly every day, several days a week, once a week, less than once a week, or not at all? [6] (n=330)

1 Nearly every day 8%
2 Several days a week 7%
3 Once a week 8%
4 Less than once a week 17%
5 Not at all (skip to Q10) 59%
9 Don't Know/Refused (Do not read) (Skip to Q10)

6. Once started, how many hours does your fire usually burn? [record number, 2 digits; 99 don't know/refused]
(n=133)
Mean= 6, Median= 4 hours. Excludes respondents who reported burning zero times.
1-2 hours = 24%
3-4 hours = 42 %
5-6 hours = 15%
7-13 hours = 7 %
24 hours a day = 10%

[5] Identical to QH on 2010 survey.
[6] Similar to QI on 2010 survey.

7. Which of the following types of fuel do you typically burn? (Read. Check all that apply. Rotate. Yes/No punch. 9= Don't know/refused) (n=133)
   1 Seasoned firewood that has been split and dried for a year or more 71%
   2 Partially dried wood that has some moisture 22%
   3 Pellets 13%
   4 Manufactured logs, such as *Duraflame* 32%
   5 Trash, magazines, newspapers or other household materials 11%
   6 Other (specify) 1%

8. *Check Before You Burn* runs from November through February each year, and prohibits wood burning in fireplaces, wood or pellet stoves, and outdoor fire pits during certain days when it is determined that air quality levels will be most impacted. Have you ever heard of the *Check Before You Burn* program? (n=133)
   1 Yes 80%
   2 No 18%
   3 Maybe 2%
   9 Don't know 1%

9. (Only ask if Q8 was 1 & 3) Have you reduced the amount of wood burning you do in response to the Check Before You Burn Program? (n=110)
   1 Yes 78%
   2 No 16%
   3 Maybe 5%
   4 Don't Know 1%

10. To encourage cleaner burning in the Valley, there is a grant program that offers rebates to residents who replace their traditional fireplace or stove with a cleaner-burning device such as a certified wood stove or a gas fireplace. Are you aware of this grant program, it is called *Burn Cleaner*? (n=1,000)
   1 Yes 17%
   2 No 82%
   9 Not Sure/Refused 1%

11. **(ASK only if Q2= 1, 2, 3 otherwise skip to Q13)** Would you be willing to replace your current wood-burning fireplace or stove with a cleaner, less-polluting wood-burning device if you could use it on some No-Burn days? (n=330)
   1 Yes 29%
   2 No 58%
   3 I already have a clean-burning device (don't read) (**skip to Q13**) 5%
   9 Don't know/Refused (don't read) 8%

12. Assuming a clean wood-burning device costs about $3,000, would you upgrade from your current fireplace or stove if you could get a 15% rebate on your purchase? (n=314)
   1 Yes (**Skip to Q13**) 12%
   2 No 67%
   3 I would purchase it without a rebate/incentive (do not read) (**Skip to Q13**) 1%
   4 Not interested/no discount would be enough (do not read) (**Skip to Q13**)14%
   9 Don't know 6%

12a. How about a 25% rebate? (n=276)
1 Yes (**Skip to Q13**) 3%
2 No 73%
3 I would purchase it without a rebate/incentive (do not read) (**Skip to Q13**) <1%
4 Not interested/no discount would be enough (do not read) (**Skip to Q13**) 2%
9 Don't know 6%

12b. How about a 50% rebate? (n=222)
1 Yes 16%
2 No 71%
3 I would purchase it without a rebate/incentive (do not read) 0%
4 Not interested/no discount would be enough (do not read) 2%
9 Don't know 9%

13. Do you believe wood smoke is a significant source of air pollution in your neighborhood? (n=1,000)
1 Yes, definitely 35%
2 Yes, probably 20%
3 No 41%
9 Don't know/Refused 5%

COMMUTING BEHAVIOR AND AWARENESS

14. How do you usually get to work? (Do not read.) (n=1,000)
1 Drive alone 50%
2 Drive in carpool or vanpool 12%
3 Use public transportation 2%
4 Walk or bike 3%
5 Work at home one or more days a week 2%
6 Don't work outside the home 30%
9 Don't know/refused 1%

15. (Ask only if Q14=1) Please answer yes, no, or maybe to each of the following questions: I would carpool if … (9=don't know) (n=452)
1 My employer provided a financial incentive. 49%
2 I could get assistance with finding a carpool partner in my neighborhood. 45%
3 My employer provided onsite food service and/or lunch. 40%
4 My employer provided a more flexible work schedule. 51%
5 My employee provided free designated carpool parking. 43%

16. Do you have school-age children who live with you? (n=1,000)
1 Yes 42%
2 No (Skip to Q20) 58%
9 Don't know/Refused (Skip to Q20) 0%

16a. How do your children usually get to school? (**Do Not Read**) (n=381)
1 Do they take the school bus? 21%
2 Do you or someone else in your household drive them? 46%
3 Do they drive themselves? 4%
4 Do they take public transportation? 2%
5 Do they walk or bike? 24%
6 Do they carpool with other students? 1%
7 My children are home schooled (Do not read) 1%
9 Don't Know/Refused (Do not read) 0%

17. (Ask only if Q16a = 1, 2, 3, 4, 6. Others skip to Q19) What is the main reason you would not let your child walk to school either alone or with an adult? (n=281)
    1 Too far 44%
    2 Concerned about safety 43%
    3 No sidewalk in my neighborhood 2%
    4 Not enough time in the schedule 7%
    9 Refused to answer 3%
18. (Ask only if Q16a = 6. Others skip to Q19) Which of the following best describes the main reason you decided to use a carpool to get your children to school? (Check one. Rotate first three stems.) (n=6) Due to the extremely small sample of respondents who responded to this question, results could not be analyzed statistically.
    1 It is convenient or it worked with our schedule mentioned
    2 To save money on gas mentioned
    3 To help reduce air pollution mentioned
    4 Other specify (Do not read) 0%
    9 Don't know/Refused (Do not read) 0%

19. Do you consider idling cars at school drop-off and pick-up lines to be a significant source of air pollution that can affect children's health? (n=381)
    1 Yes 69%
    2 No 25%
    9 Don't know/Refused 7%

LAWN CARE: BEHAVIOR AND AWARENESS

20. Who usually maintains your lawn, shrubs, trees or garden areas?[7] (Do not read) (n=1,000)
    1 I or others living in the household do all the yard work 61%
    2 I or others in the household do some of the yard work and a lawn service does the rest 3%
    3 A lawn service does all the yard work (skip to Q23) 25%
    4 Don't have a lawn/ Don't care for it (skip to Q26) 8%
    9 Don't know/Refused (skip to Q26) 2%

21. Do you use any gas-powered lawn or garden equipment at your residence?[8] (n=639)
    1 Yes 73%
    2 No (skip to prompt above Q26) 25%
    9 Don't Know/Refused (skip to prompt above Q26) 2%

22. Considering only gas-powered lawn and garden equipment, which of the following do you use?[9] (yes/no punch. 99 = don't know) (n=459)
    01 Walk-behind Lawn Mowers 84%
    02 String Trimmers 38%
    03 Chain Saws 25%
    04 Leaf Blowers 35%
    05 Lawn Edgers 39%
    06 Brushcutters/Hedgecutters 18%
    07 Riding Lawn Mowers 10%
    08 Tillers 8%
    09 Lawn & Garden Tractors 4%
    10 Wood Splitters 4%
    11 Shredders 3%

[7] Identical wording to Q70 from the ARB survey.
[8] Similar wording to Q80 from the ARB survey.
[9] Identical list to Q89 from the ARB survey.

12 Snow Blowers 2%
13 Stump Grinders/Chippers 2%

(Only ask Q23 through Q26 if Q20 = 2 or 3. Otherwise skip to Q26)

23. During the summer, how many times a month does the lawn service come? [record number 2 digits] [99= Don't know/Refused]
(n=291) Mean 4, Median 4
Once a month 6%
Twice a month 22%
Three times a month 4%
Four times a month 54%
More than once a week 9%
Don't know 5%

24. Does the lawn service come as often during the winter? [record number 3 digits] [99= Don't know/Refused] (n=291)
1 Yes 46%
2 No 51%
9 Don't know/Refused 3%

25. Would you consider switching to lawn care service that used cleaner equipment if it cost: (n=291)
1 Less than your current service 25%
2 The same as your current service 16%
3 More than your current service 2%
4 Would not consider (do not read) 41%
9 Don't know/refused 15%

26. Are you aware of a grant program which offers a rebate incentive for electric lawn mowers? The program is called the *Clean Green Yard Machines Rebate* Program? (n=1,000)
1 Yes 15%
2 No 84%
9 Don't know/Refused 1%

GENERAL BELIEFS AND AWARENESS

27. Compared to three years ago, would you say the air quality in your area has gotten better, gotten worse, or stayed the same? [10] (If better/worse: Is that much better/worse or somewhat better/worse?) (n=1,000)
1 Much Better 4%
2 Somewhat Better 9%
3 About the Same 50%
4 Somewhat Worse 15%
5 Much Worse 14%
6 I haven't lived here long enough to say (Don't read) 3%
9 Don't know/Refused (Don't read) 4%

28. Have you heard of the San Joaquin Valley Air Pollution Control District? [11] (n=1,000)
1 Yes 57%
2 No (**skip to Q30**) 40%
9 Not sure/Refused (**skip to Q30**) 2%
29. The San Joaquin Valley Air Pollution Control District is responsible for monitoring the outdoor air quality and implementing programs to reduce air pollution in your area. Would you say you have a very

[10] Similar wording to Q5 from 2010 survey. The time interval has been changed from 5 to 3 years.
[11] Similar wording to Q11 from 2010 survey. "Maybe" has been excluded from the options.

favorable, somewhat favorable, somewhat unfavorable, or very unfavorable view of the job they are doing? (n=592)

1 Very favorable 22%
2 Somewhat favorable 46%
3 Somewhat unfavorable 8%
4 Very unfavorable 7%
9 Don't know/refused 18%

DEMOGRAPHICS

Finally, I'd like to ask you a few general questions for research purposes. Your answers are confidential.

30. What year were you born? _____ _____ _____ _____ (n=1,000)
    18-29 16%
    30-49 36%
    50-64 29%
    65+ 14%

31. Would you please tell me what ethnic group you identify with? Are you Hispanic/Latino, Black/African American, Asian, Caucasian, or of some other ethnic or racial background? (n=1,000)
    1 Hispanic/Latino 49%
    2 Black/African American 5%
    3 Asian-American 8%
    4 White/Caucasian 35%
    5 Other (specify) 1%
    9 Refused (Don't Read) 2%

32. How many people live in your household? _____ (

33. [Asked of cell phones only] Do you have a landline telephone? (n=400)
    1 Yes 45%
    2 No 51%
    9 Refused 5%

33. [Asked of landline phones only] Do you have a cell phone? (n=600)
    1 Yes 77%
    2 No 19%
    9 Refused 4%

34. [Asked of everyone] Does your household primarily use cell phones or land line phones? (n=1,000)
    1 Cell 60%
    2 Landline 32%
    9 Refused 8%

35. I am going to read some categories of household income. Please stop me when I reach the category of your total 2013 annual household income, before taxes: (n=1,000)

1 Less than $15,000 12%
2 $15,000 to less than $35,000 20%
3 $35,000 to less than $50,000 12%
4 $50,000 to less than $75,000 9%
5 $75,000 to less than $100,000 5%
6 $100,000 to less than $150,000 6%
7 $150,000 to less than $200,000 2%
8 More than $200,000 1%
9 Refused (DON'T READ) 34%

36. (GENDER BY OBSERVATION-- DON'T READ) (n=1,000)
1 Male 50%
2 Female 50%

37. Note Language (n=1,000) (English 73% or Spanish 27%)

That concludes our survey. Thank you very much for your time.

APPENDIX B:
DEMOGRAPHIC PROFILE OF RESIDENTS SURVEYED COMPARED TO POPULATION ESTIMATES

Table 1: Demographic Profile of Residents Surveyed Compared to Population Estimates

Population Characteristic	U.S. Census Population (Across 8 County-Region)	Unweighted Sample	Weighted Sample
Fresno	23.4%	23.8%	23.1%
Kern	21.2%	18.7%	21.2%
Kings	3.7%	3.7%	3.8%
Madera	3.8%	4.2%	3.7%
Merced	6.5%	7.9%	6.5%
San Joaquin	17.4%	17.7%	17.8%
Stanislaus	12.9%	9.6%	12.6%
Tulare	11.2%	14.4%	11.5%
Cell only	32.6%	37.0%	31.6%
Male	50.4%	44.8%	50.0%
Female	49.6%	55.2%	50.0%
White	35.6%	40.4%	34.6%
Black	5.5%	3.4%	5.3%
Hispanic	49.6%	42.7%	49.2%
Asian	8.1%	4.7%	7.8%
Age <65	85.3%	78.1%	85.3%
Age 65+	14.7%	21.9%	14.7%