

## ***Executive Summary***

During the third quarter of 2020, TVAQCA released a survey (TVAQCA 3Q2020 Survey) into the Tri-Valley Area as both an outreach effort and to gather information regarding residents' and workers' understanding and experiences with outdoor air quality. We emailed the link to the online survey to our stakeholder contacts in Dublin, Pleasanton, Livermore, and San Ramon and Danville. Our intention was to understand day-to-day experiences, however just as the survey was launched, the wildfires in northern California started raging air currents transported hazardous levels of smoke into the Tri-Valley for several weeks in August and September. This juxtaposition helped prompt more interest in the survey, but also required the addition of a question regarding air quality created by wildfires. Also, as TVAQCA was trying to understand typical experiences and behavior, the survey specified that responses should reflect pre- or non- pandemic times.

As the 3Q2020 Survey was an inaugural effort, getting the word out required not only using all of the Advisory Committee contacts, social media discussions, and presentations to community groups, it was also decided to extend the open period of the survey until responses dwindled (the end of November 2020). Ultimately there were approximately 300 households that responded (approximately one survey per household); it is estimated that this represents approximately 900 people, mostly residents and a handful of workers that live outside of the Tri-Valley.

As an effort for full outreach and to possibly identify communities with environmental justice issues, a Spanish version of the essay was also created, and a link sent to a prominent organization that represents the Hispanic/Latinx community. Unfortunately, the current fears of ICE (U.S. Immigration and Customs Enforcement) surveillance were cited as a reason for lack of responses. It may also be that many Spanish-speaking households have at least one English speaking member that answered the survey. We will need to consider this for future surveys.

The following are findings from the survey:

- 1) Residents appear generally aware of air quality, especially during wildfires, but only partially aware of the specifics of Ozone (O<sub>3</sub>) and Particulate Matter (PM<sub>2.5</sub>) compliance. Also, air quality was shown to be a significant criterion in living-location and quality-of-life decisions for most respondents.
- 2) It is hard to measure how successful the survey was in introducing the TVAQCA; however, assuming respondents read the introduction on the survey, they now know about TVAQCA. In our next annual survey, the question regarding TVAQCA awareness will be asked again to help measure this.
- 3) In answer to the question if there were *vulnerable-population individuals in their household*, a majority responded that their household has one or more vulnerable population individual (sensitive to air quality). Surprisingly, responses with pregnant women were the smallest number – perhaps a reflection of the pandemic. The highest responses were households with elderly and asthmatics. There was a significant number of “Other” responses. Responses to subsequent open-ended questions suggest this could be largely allergies. Allergies will be added as a possible response on the next survey.
- 4) The open-ended responses to Question 6 (explain bad air quality impacts) did not identify sources, except for wildfires, rather effects were mostly described, thus not helping to identify

any impactful non-identified emission sources. Future questions will more specifically solicit the source as well as the effect.

- 5) A look at use of appliances which emit air pollution outside (e.g., leaf blower gas grill, etc.) revealed a strong response to the lawn/garden equipment question (Question 14) with 68% of respondents answering the question. Also, hired landscaper/gardener using (assumed) gas-powered equipment were cited almost half of the time, whereas almost a third of the respondents who do their own landscaping work have already converted to electric. Although there were responses in all categories for *Fire Appliances* (Question 13), by far the largest was *Gas or Propane BBQ/Grill* at 59% of the time.
- 6) Most of the submitted suggestions are consistent with solutions that the air quality community have been suggesting for some time.
- 7) Unfortunately, the response to the Spanish version of the survey was very poor (one response only, which was invoked to double-check that there weren't any technical problems). The current fears of ICE (U.S. Immigration and Customs Enforcement) surveillance was cited as a reason for lack of responses. It may also be that many Spanish-speaking households have at least one English speaking member that answered the survey. This will need to be considered for future surveys.
- 8) The percent of responders who fully completed the survey was very acceptable at 93%. Although there were 16 questions on the survey, the design did allow the average completion rate to be 8 minutes. Open-ended questions allowed for longer responses as desired.
- 9) Even though instructions were clear, and examples were given on how to respond to questions, there were many responses that had to be adjusted to reflect the true intent in the numerically proper format. It was easy to see the intention for many, others were harder and ultimately required some interpretation. Questions in future surveys will be simplified to help avoid this problem.

The two most significant highlights are the near-unanimous agreement that the air quality was unacceptable during wildfires, and that traffic and lawn/garden equipment are the largest emitters of pollution and noise. About half of respondents were using professional landscapers who (presumably) are using gas-powered equipment. Respondents would like to see these issues changed.

We plan to incorporate lessons learned into future annual surveys and repeat some questions to see if response changes through time.

**Report on the Tri-Valley Air Quality Community Alliance (TVAQCA) Community Survey**  
**Laurene Green**  
**January 28, 2021**

***Introduction***

During the third quarter of 2020, TVAQCA released a survey (TVAQCA 3Q2020 Survey) into the Tri-Valley Area as both an outreach effort and to gather information regarding residents' and workers' understanding and experiences with outdoor air quality. This included Dublin, Pleasanton, Livermore, and San Ramon and Danville. On the outreach side, the survey included some text at the beginning introducing the respondent to TVAQCA and supplying a small write-up on Ozone and PM2.5 compliance issues in the Tri-Valley. On the information gathering side 16 questions were fashioned to understand the respondent's level-of-awareness on air quality issues, and how they experience air quality in their lives. This report describes the process of designing and deploying the survey, as well as an analysis of the responses received.

**Survey Methods**

TVAQCA set the following goals of the survey:

- 1) To get a sense of Tri-Valley residences' experience and knowledge about local air quality,
- 2) To introduce TVAQCA and Tri-Valley air quality compliance issues to those not yet familiar,
- 3) To identify populations sensitive to poor air quality (vulnerable populations),
- 4) To help identify any impactful, but yet-to-be-identified emission sources,
- 5) To understand household levels of emissions from transportation and outdoor appliances choices,
- 6) To solicit ideas how to improv local air quality
- 7) Try to reach communities with possible environmental justice issues, and
- 8) To limit the number of questions so as to not dissuade respondents from completing the survey, and not exceed 10 minutes to fill out the survey.

With these in mind, TVAQCA set about designing the first annual outreach survey, with some qualifiers to collect information for typical (pre-COVID-19) behavior.

*SURVEY TOOL* – An account with Survey Monkey was established and used to create the survey.

*SURVEY DESIGN* – The survey contained 15 questions plus a final request for the respondents Zip Code. Questions were designed to cover the 5 goals listed above. In particular, BETA-testing indicated that the test time would be within the 10-minute goal TVAQCA had set previously.

The intention of the survey was to understand day-to-day experiences, however just as the survey was launched, the wildfires in northern California started raging and air currents transported hazardous levels of smoke into the Tri-Valley for several weeks in August and September. This juxtaposition helped prompt more interest in the survey, but also required the addition of a question regarding air quality and

wildfires. Also, as TVAQCA was trying to understand typical experiences and behavior, the survey specified at times that responses should reflect pre- or non- pandemic times.

*REVIEW PROCESS* – A set of questions were created and sent to BAAQMD July 6, 2020, then discussed during the July 8<sup>th</sup> Q2 review Zoom meeting, and suggestions were incorporated. In particular it was suggested to simplify the language. A draft or BETA version of the survey was tested amongst the TVAQCA Oversight and Science Committee Members and their families. The findings were incorporated, and a final version was produced.

*SPANISH VERSION* – A local spanish teacher volunteered to translate the survey into a second spanish version, which was later tested on a local individual who speaks English but has spanish as her native language. When the survey was launched both versions were forwarded to the local group La Familia in an effort to reach spanish-speaking households.

*DISTRIBUTION AND PROMOTION* – When the two versions were finalized, links to both versions were distributed via email. As the 3Q2020 Survey was an inaugural effort, getting the word out required not only using all of the Advisory Committee contacts, social media discussions, and presentations to community groups, it was also decided to extend the open period of the survey until responses dwindled at the end of November 2020.

The following tables list groups which were contacted, and presentations given to promote the survey.

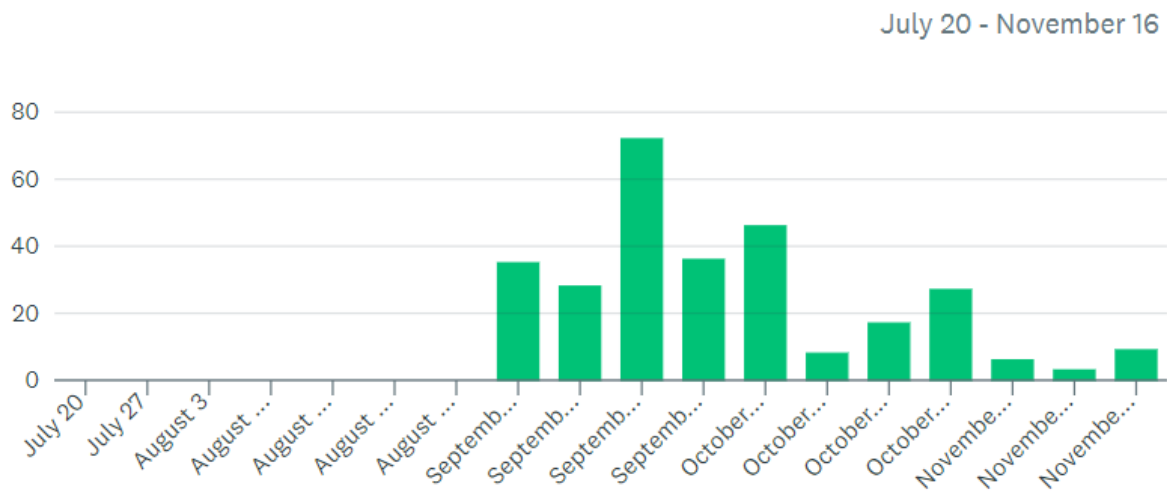
<b>Organizations Participating in TVAQCA Survey</b>
Bike Pleasanton
Citizens’ Climate Education
Hacienda Business Park Newsletter
Interfaith Power and Light
La Familia
Lawrence Livermore National Laboratories Newsline
Livermore Chamber of Commerce
Local Interfaith Council
Lots of Personal Outreach
Next Door – Pleasanton, Livermore
Office of Scott Haggerty’s Newsletter
PeachJar
Sons In Retirement – LLNL
Spare the Air
Sustainable Contra Costa
Tri-Valley Non-Profit Alliance
Tri-Valley Women’s Action Group
TVAQCA Advisory Group
TVAQCA Website and FB page
Unitarian Universalist Church Livermore
Tri-Valley Women’s Action Group

Toastmasters Club, Speakeasies Pleasanton

## Response Statistics

Ultimately, 287 people responded to the survey. As the survey was designed to encompass the household, this represents many more individuals; rounding up and assuming a conservative average of 3 persons per household, that is roughly 900 individuals captured in the responses. Below was the weekly response volume.

## Responses Volume



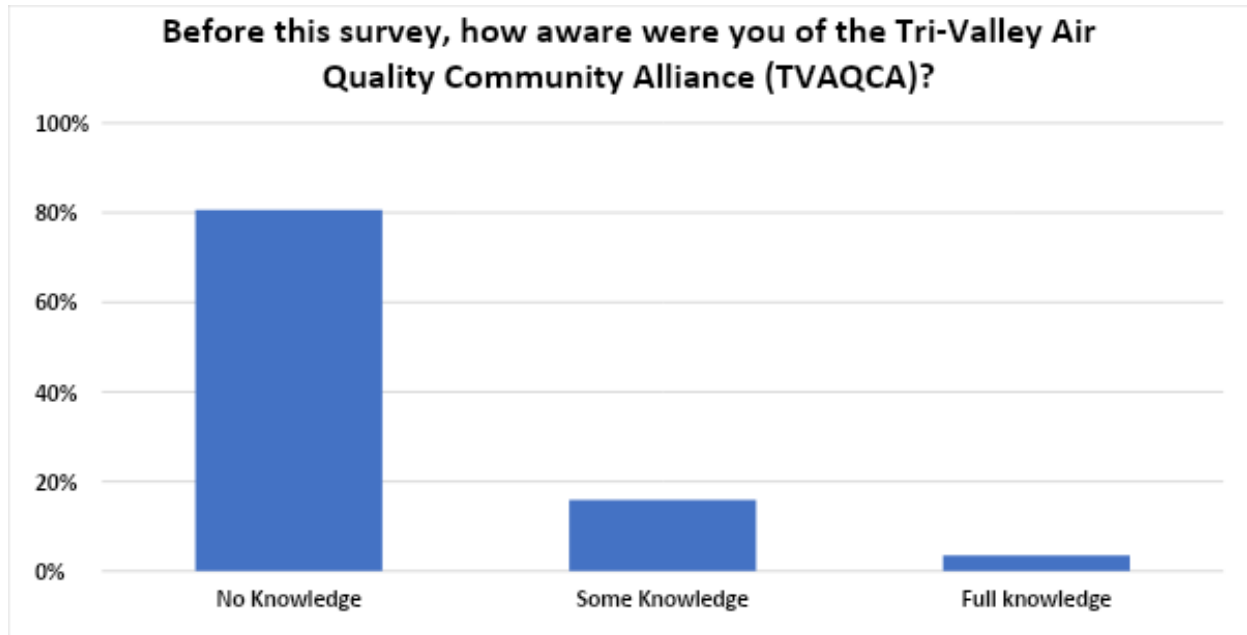
[ANALYZE RESULTS](#)

The surges in late October and late November were in response to presentations given by TVAQCA.

The following are descriptions of the responses by question.

**Question 1: Before this survey, how aware were you of the Tri-Valley Air Quality Community Alliance (TVAQCA)?**

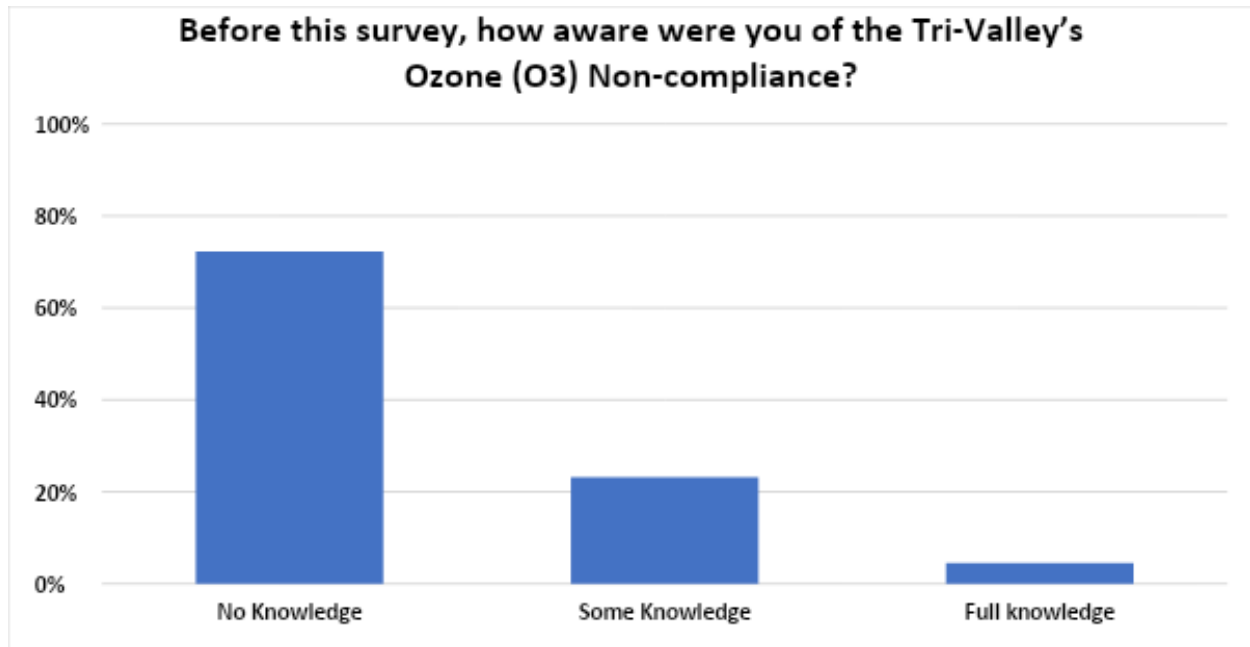
As expected, a majority of respondents (80%) had **No Knowledge** of the TVAQCA before taking the survey.



20% of respondents did have some or full knowledge, so TVAQCA has already made some inroads.

**Question 2: Before this survey, how aware were you of the Tri-Valley's Ozone (O3) Non-compliance?**

A majority of respondents (72%) had **No Knowledge** of the status of Ozone (O3) compliance in the Tri-Valley Area.

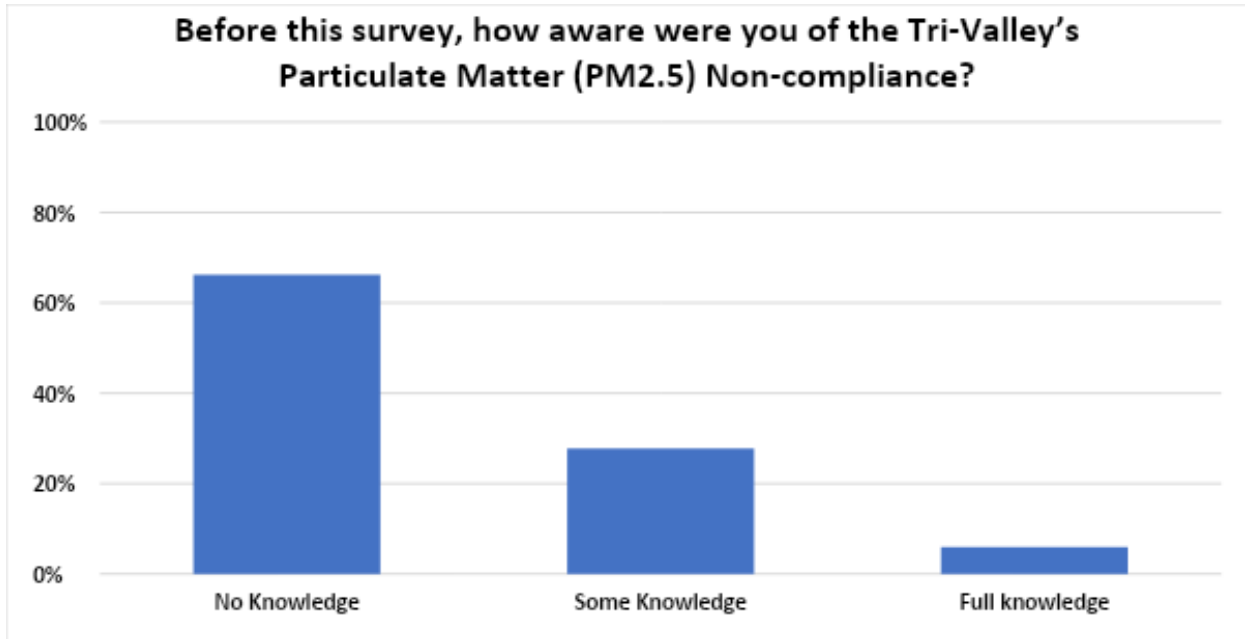


28% of respondents had some knowledge of Ozone (O3) compliance issues.



**Question 3: Before this survey, how aware were you of the Tri-Valley's Particulate Matter (PM2.5) Non-compliance?**

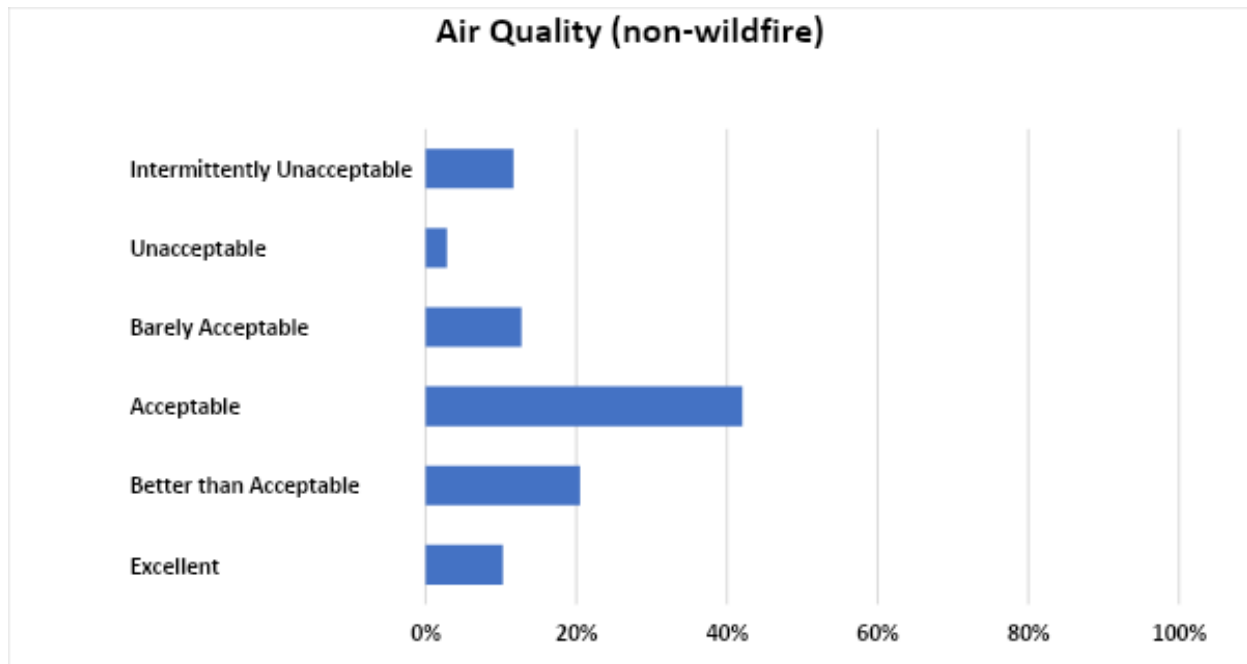
A majority of respondents (66%) had **No Knowledge** of the status of Particulate Matter (PM2.5) compliance in the Tri-Valley Area.



34% of respondents had some knowledge of Particulate Matter (PM2.5) compliance issues.

**Question 4: How good/bad is the air quality in your specific neighborhood (don't include wildfire days)?**

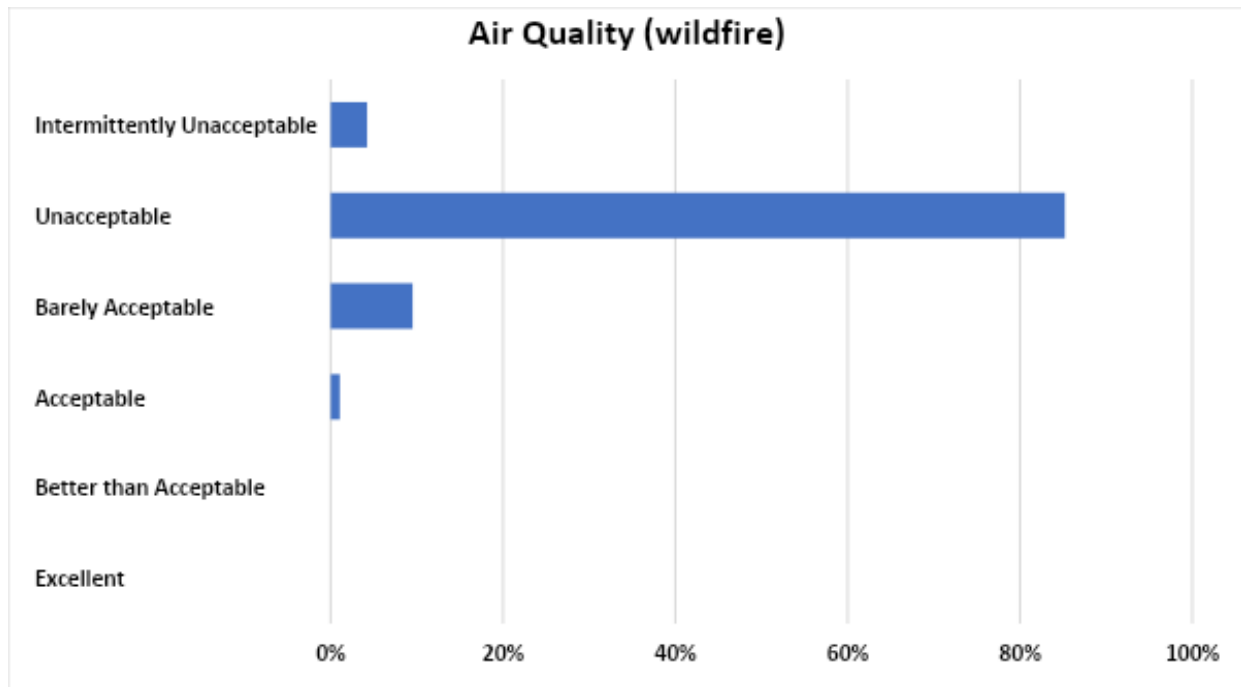
28% of respondents find the air quality to be problematic during non-wildfire times.



That means that 72% of respondents are satisfied with the air quality in the Tri-Valley during non-wildfire times.

**Question 5: How good/bad has the air quality been in your specific neighborhood particularly during recent wildfire events?**

99% of respondents find the air quality to be problematic during wildfire times.



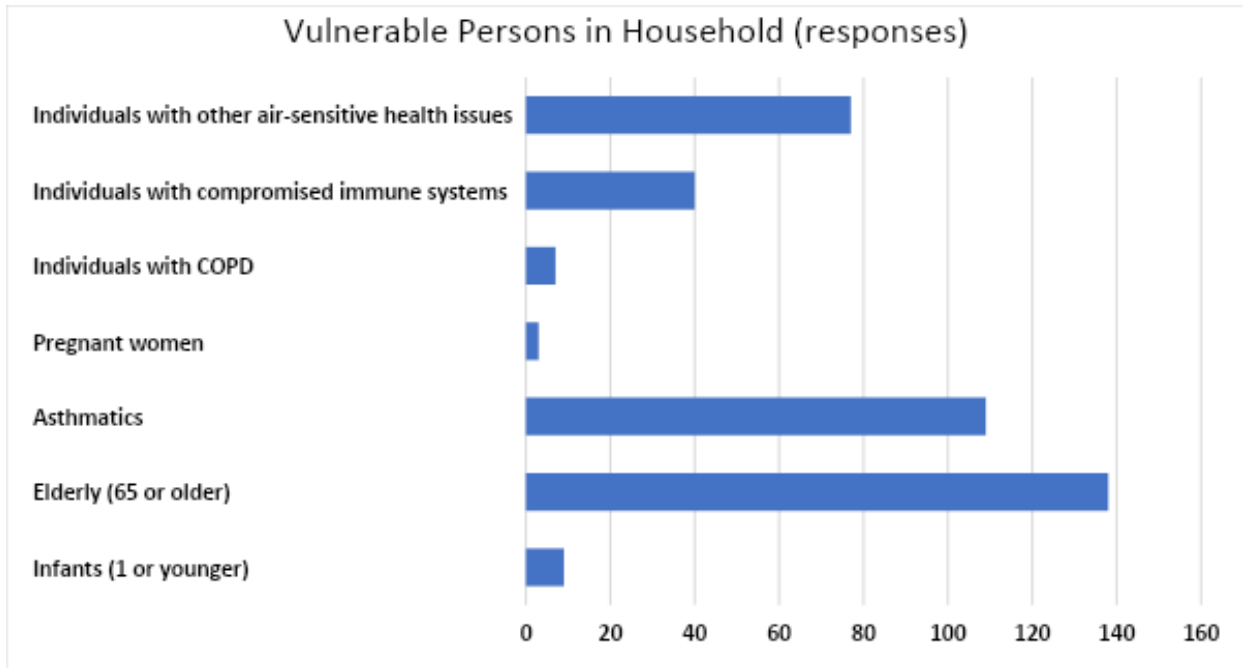
That means only 1% of respondents are satisfied with the air quality in the Tri-Valley during the late 2020 wildfire season.

**Question 6: Are you or a household member significantly impacted by bad air quality? If yes please explain; if no, enter N/A.**

There were 135 responses with impacts, and 68 responses registering no impacts. The majority of responses expanded in detail on the same data collected in Question 7 (*Do you have vulnerable-population individuals in your household, and if so, how many?*). The majority of descriptions mention asthma. Headaches and irritated eyes were often cited. 19 respondents said that they and/or others in the household suffer from allergies, and air quality plays a role. Bad air quality was also cited several times for limiting the ability to exercise or play outside. Cabin fever effects were cited as spin-off problems from poor air quality, but it was hard to parse out the COVID-19 lockdown effect, as they were simultaneous. Heightened impacts from wildfires were often discussed.

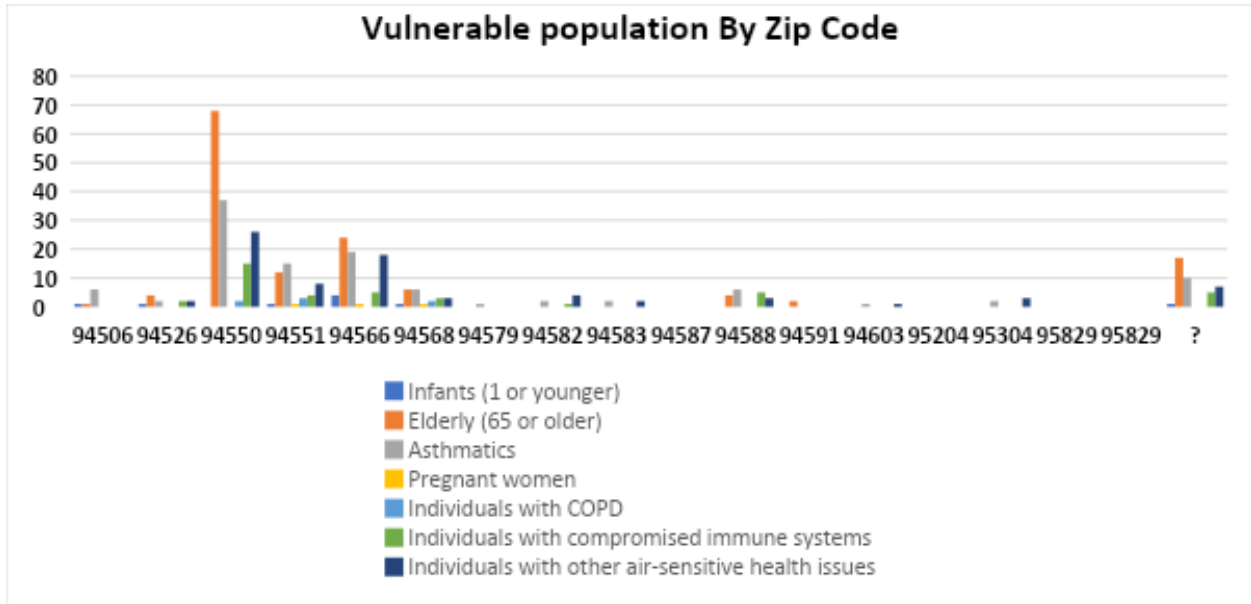
**Question 7: Do you have vulnerable-population individuals in your household, and if so, how many? Fill out as many as apply (example, 2).**

188 respondents have a total of 383 vulnerable persons in their households.



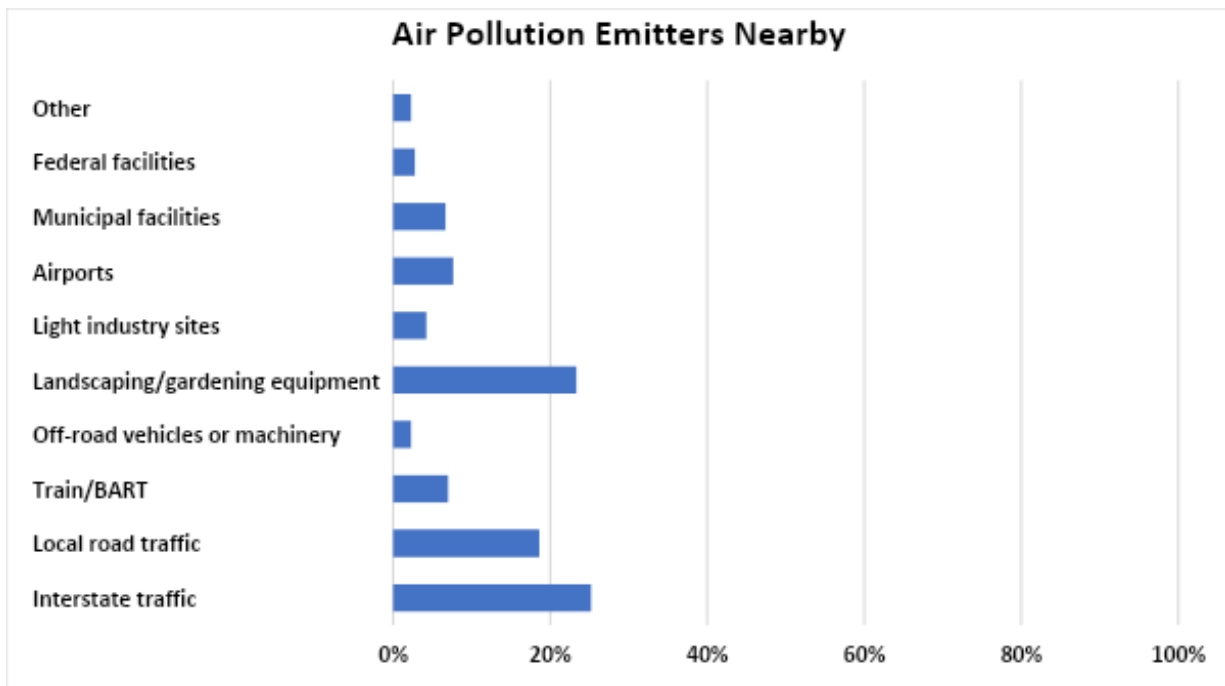
“Other air-sensitive health issues” varied, but allergies are frequently seen in the descriptions and responses to other questions.

Here is a breakdown by zip code. Livermore and Pleasanton responders were the largest number with an air-sensitive health issue.



**Question 8: Do you have any significant air pollution producers near you? Check as many as apply.**

51% respondents have pollution emitters near them which include traffic (including Train/BART) and landscaping/gardening equipment.

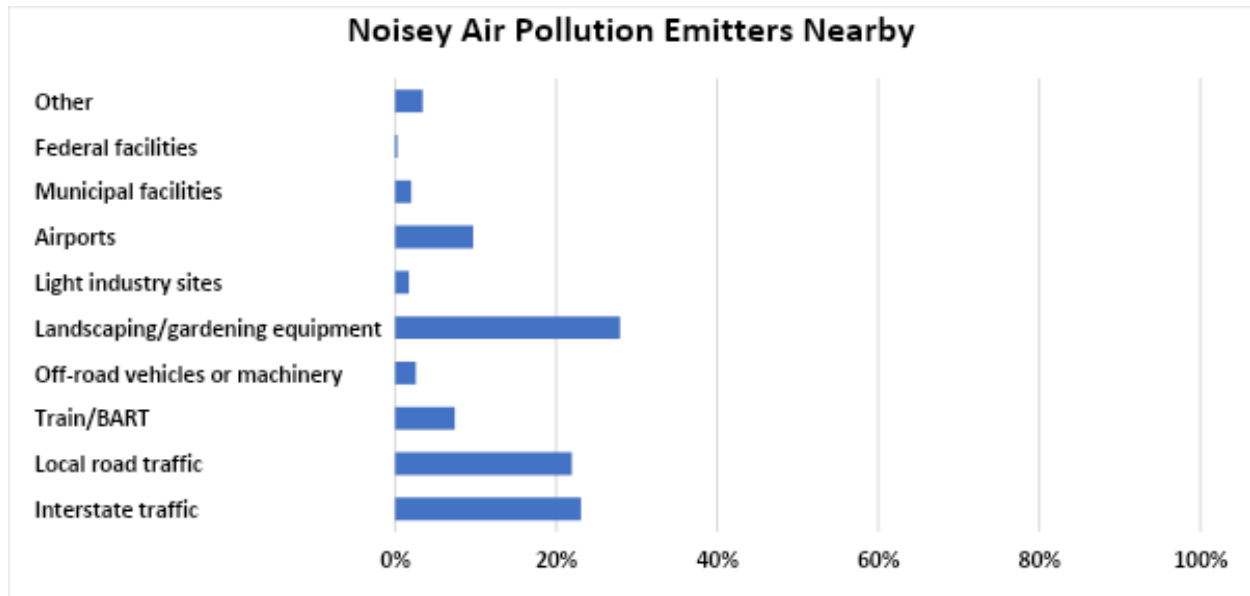


Comments mention leaf blowers in particular as pollution emitters, which respondents would like to see either converted to electric or outlawed. Note, modern trains are considered to be lesser polluters,

especially BART, but they are significant noise emitters and were included to couple with the next question.

**Question 9: Do you have any air pollution producers which are a significant noise problem for you?**

52% respondents have pollution emitters near them which are traffic (including Train/BART) and have landscaping/gardening equipment.

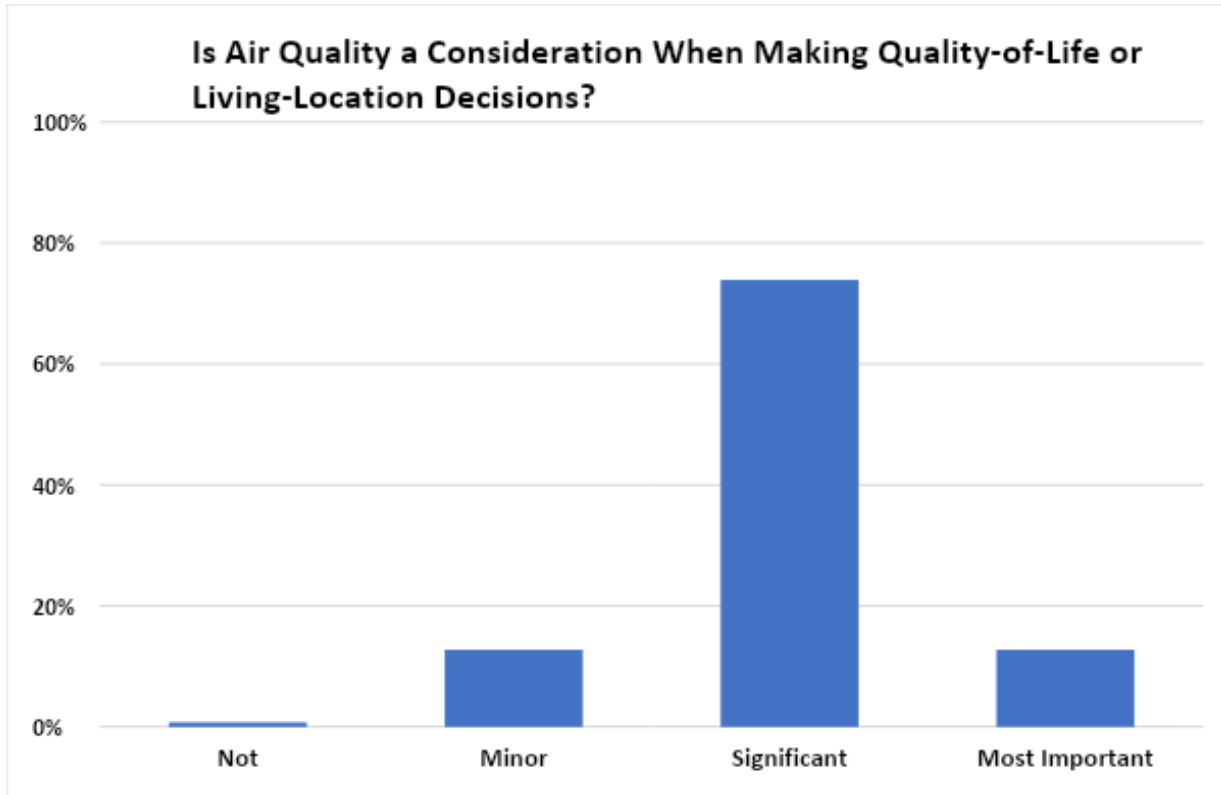


This pattern matches the responses from the previous question.



**Question 10: What value do you place on good air quality?**

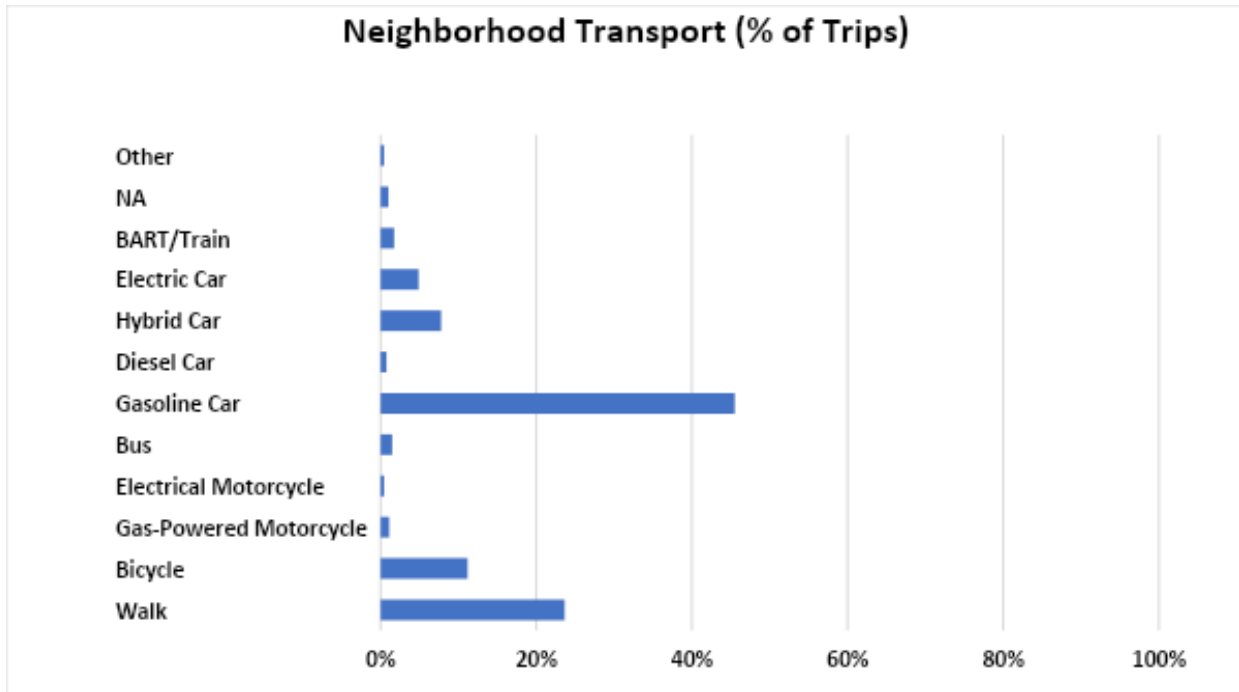
87% of respondents consider air quality as significant or the most important criteria when considering quality-of-life or living-location decisions.



The response discussed above is important to keep in mind when making choices to keep the Tri-Valley a desirable place to live.

**Question 11: What transportation option(s) do you and your household members mostly use when in your neighborhood/town (pre COVID-19), and how often (total for all members)? Fill out as many as apply (example, to the store and back is 2 trips). For N/A enter 0 (zero).**

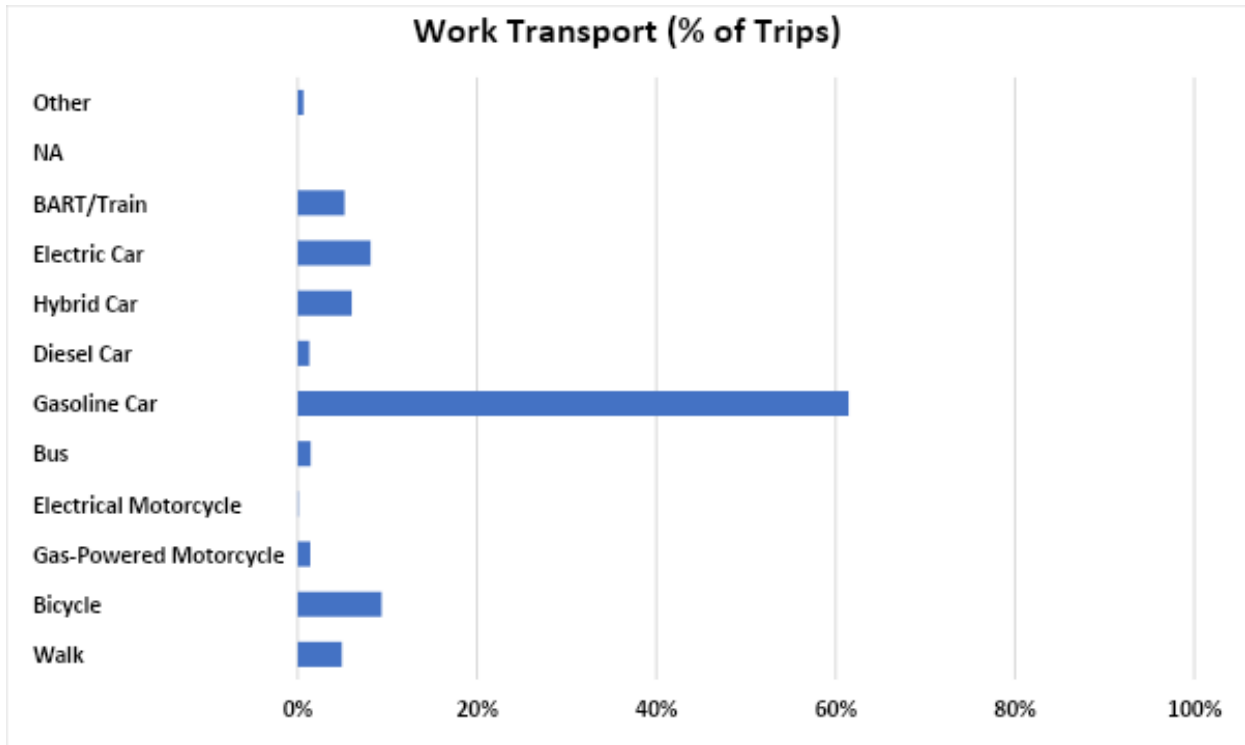
For travel in and around their neighborhoods, 47% of trips use gas or diesel-powered cars.



An encouraging 35% of the trips are walking or bicycle.

**Question 12: If you and any household members work outside of the home, what transportation option(s) do you use typically for your commute (pre-COVID-19), and how often (total for all members)? Fill out as many as apply (example, to work and back is 2 trips). For N/A enter 0 (zero).**

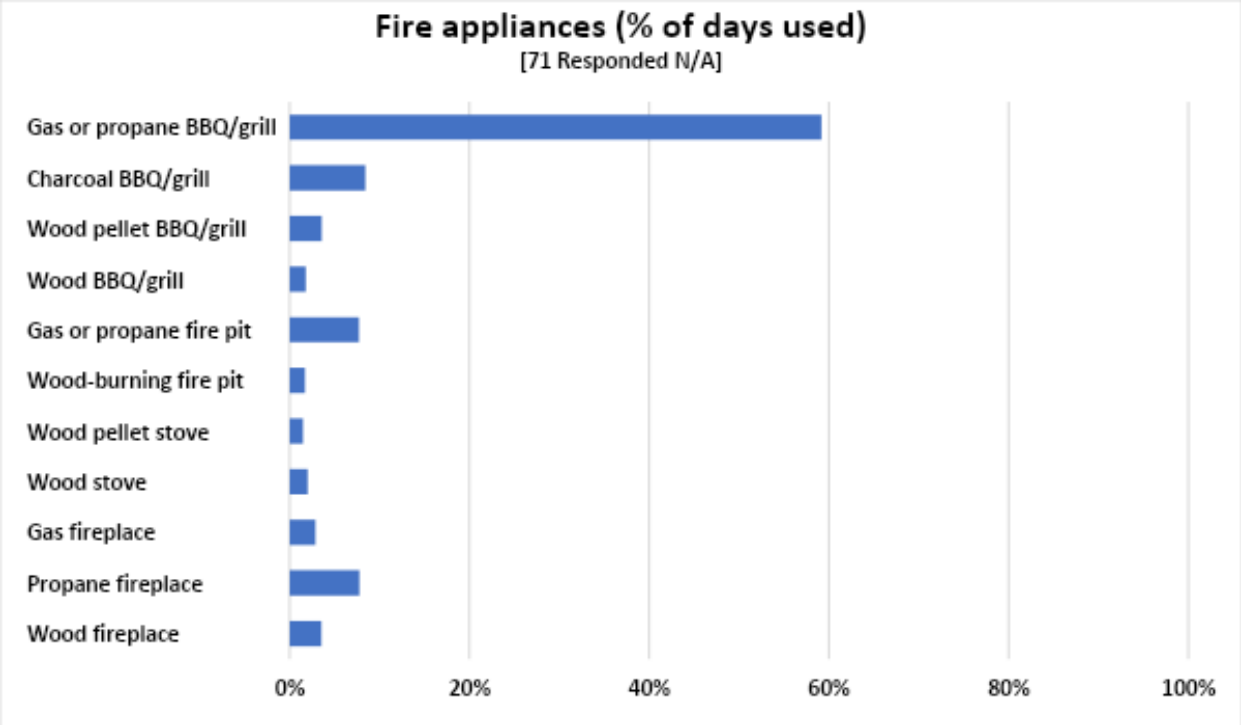
For 62% of travel to work trips, gas or diesel-powered cars are used.



Only, 14% of trips are walked or use a bicycle.

**Question 13: Do you have a working fire appliance? Please fill out all that apply (example, 60). For N /A enter 0 (zero).**

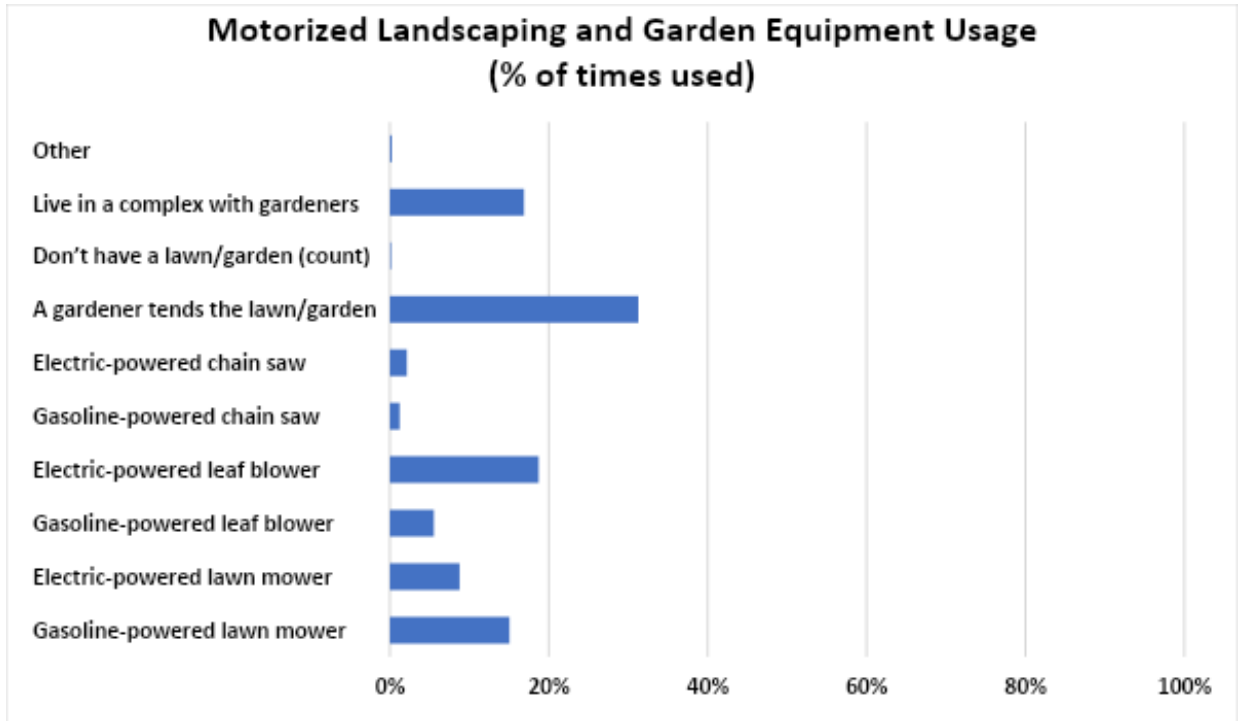
59% of the times that outside fire appliances are used they are gas or propane BBQ/grills.



63% of respondents use some type of fire appliances.

**Question 14: Please fill in if you have any of the following motorized landscaping/garden equipment, and describe how often you use them (example, 4,6).**

48% of the time a hired landscaper/gardener is using motorized landscaping and gardening equipment. The working assumption is that most landscapers/gardeners still use gas-powered equipment, so the conversion of this industry to electric could significantly reduce local emissions.



An encouraging 30% of the time electric equipment is used. It appears that residents are already converting to electric.

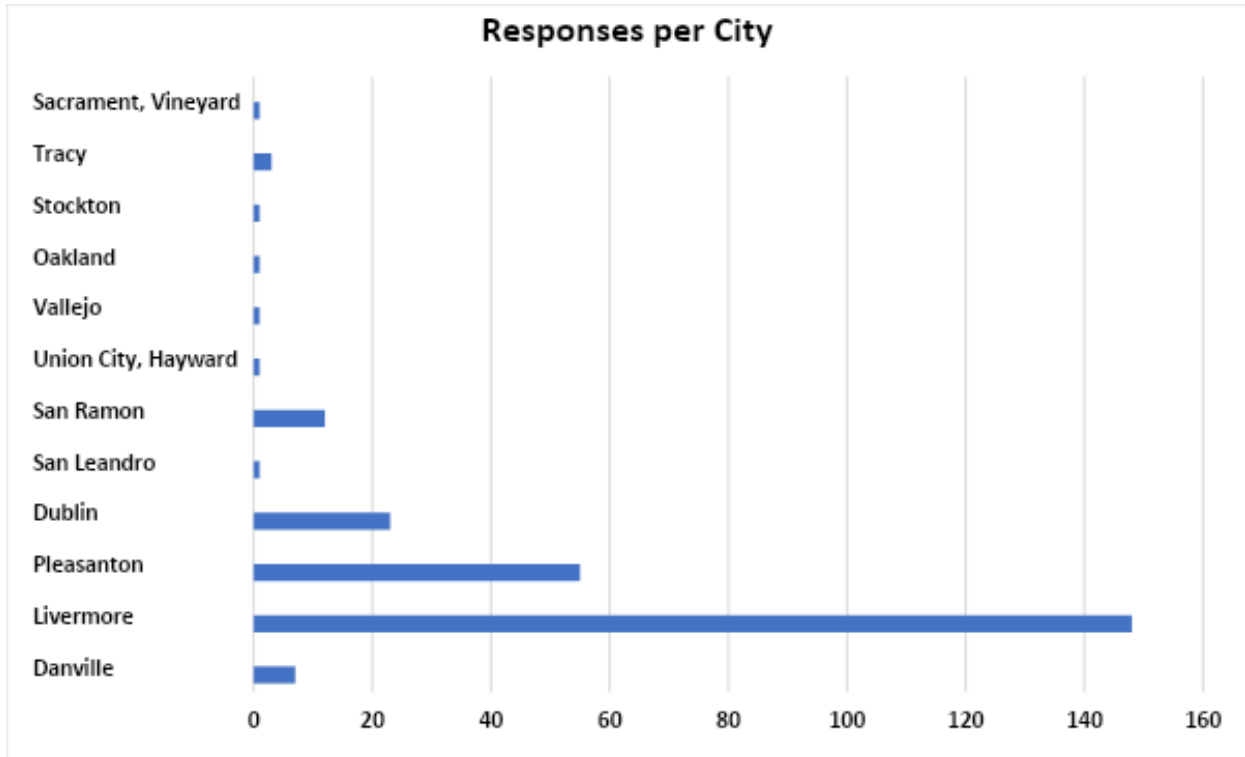
***Question 15: Do you have any suggestions on ways to address air or noise pollution in the Tri-Valley, or more specifically near your neighborhood?***

There were 117 suggestions.

Several responses mentioned converting gas equipment to electric, especially for leaf blowers and the like, also more e-charging stations and more solar power. Improving and incentivizing the use of public transportation as well as facilitating and incentivizing more work-at-home days was often discussed. Walls and bio-barriers (trees and bushes) were suggested to block fumes and noise from the freeways. Education of our air quality, what causes it and practical alternatives was mentioned several times. Some practical ordinances were mentioned like for limiting hours to minimize traffic (especial truck traffic during commute hours), fugitive dust (construction and gravel pit operations), and noise pollution. The less practical but novel included "Allow burning of trees and brush during the winter", "Spray. Environmentally friendly disinfectant to stop the spread of virus.", and "nuke San Francisco". Better forest management was cited several times to address wildfires.

**Question 16: Please enter your ZIP CODE**

254 respondents supplied their zip code. Here the zip code responses are translated to cities. About 200 or  $\frac{3}{4}$  were from either Pleasanton or Livermore. Below the zip code responses are translated to cities.



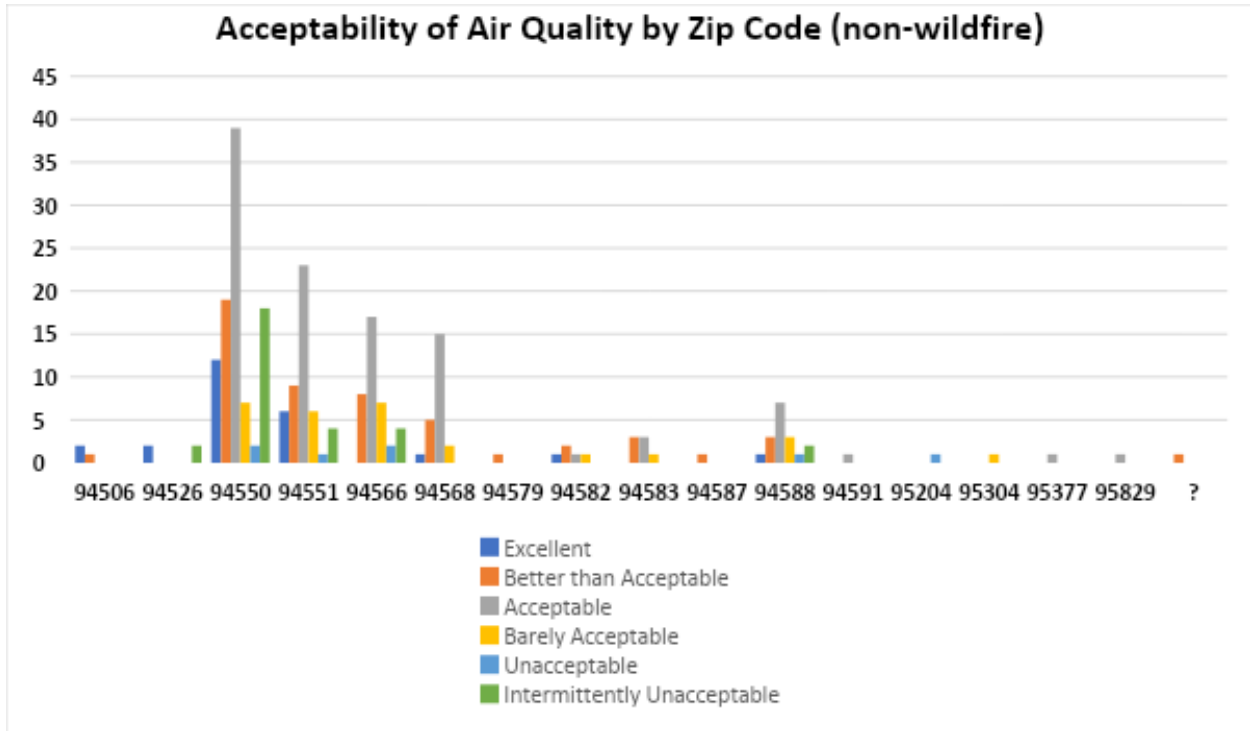
Livermore responses heavily outweigh others.

The following table shows the zip codes of respondents and their cities.

<b>Zip Code</b>	<b>Associated Cities</b>
94506	Danville
94526	Danville
94550	Livermore
94551	Livermore
94566	Pleasanton
94568	Dublin
94579	San Leandro
94582	San Ramon
94583	San Ramon
94587	Union City, Hayward
94588	Pleasanton
94591	Vallejo
94603	Oakland
95204	Stockton
95304	Tracy
95377	Tracy
95829	Sacramento, Vineyard

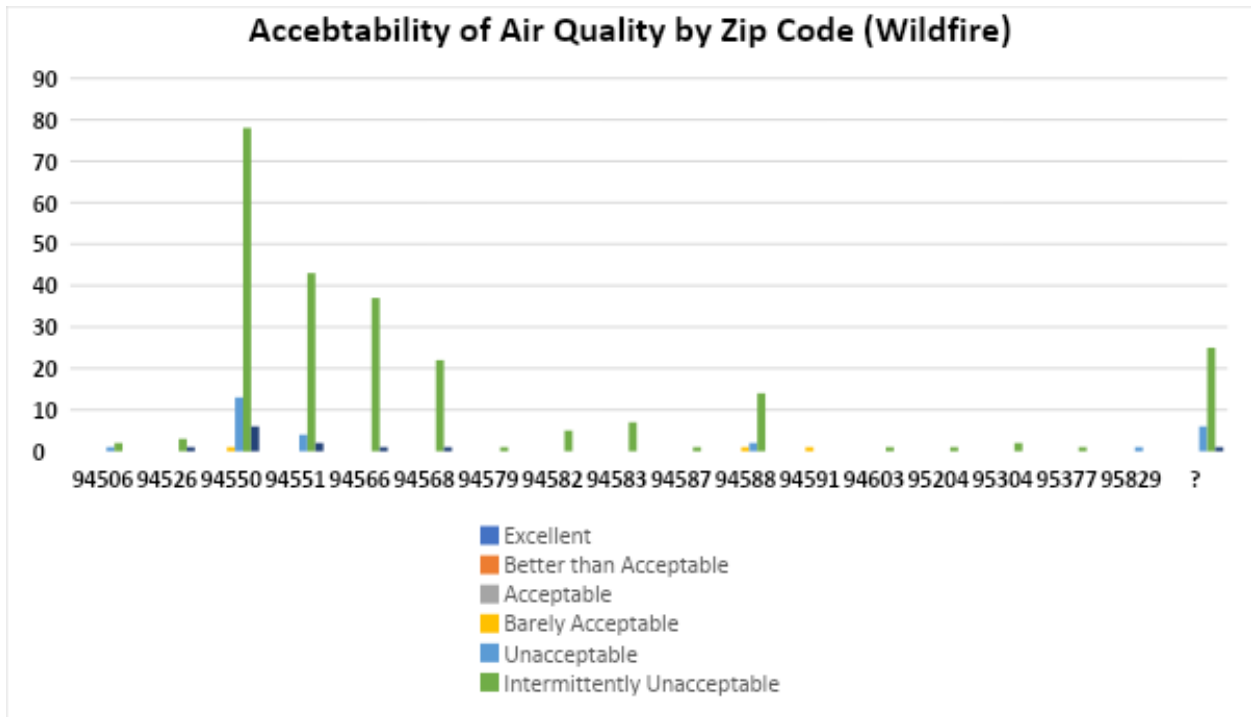
An example of how one can apply this information is in the following graphs displaying air quality by zip code.





The gray, orange and blue columns show that the respondents from Livermore and Pleasanton Zip Codes (94550, 94551, and 94566, 94588) find their air quality to be acceptable to excellent.

Here is the same breakdown for air quality during wildfires. Although 99% of the respondents felt the air quality was problematic, one can see the few respondents that thought air quality was acceptable during wildfires are from Livermore and Vallejo. Unfortunately, reviewing the open-ended question responses did not explain why these 3 respondents appear to experience the wildfires differently than the overwhelming majority. A clue may be that none of them had vulnerable population individuals in their households.



## Findings

The following are findings from the survey:

- 1) Residents appear generally aware of air quality, especially during wildfires, but only partially aware of the specifics of Ozone (O<sub>3</sub>) and Particulate Matter (PM<sub>2.5</sub>) compliance. Also, air quality was shown to be a significant criterion in living-location and quality-of-life decisions for most respondents.
- 2) It is hard to measure how successful the survey was in introducing the TVAQCA; however, assuming respondents read the introduction on the survey, they now know about TVAQCA. In our next annual survey, the question regarding TVAQCA awareness will be asked again to help measure this.
- 3) A significant majority of responses say that their household has one or more vulnerable population individual (sensitive to air quality). Surprisingly, responses with pregnant women were the smallest number – perhaps a reflection of the pandemic. The highest responses were households with elderly and asthmatics. There was a significant number of “Other” responses. Responses to subsequent open-ended questions suggest this could be largely allergies. Allergies will be added as a possible response on the next survey.
- 4) The open-ended responses to Question 6 (explain bad air quality impacts) did not identify sources, except for wildfires, rather effects were mostly described, thus not helping to identify any impactful non-identified emission sources. Future questions will more specifically solicit the source as well as the effect.
- 5) A look at use of appliances which emit outside air pollution (e.g., leaf blower gas grill, etc.) revealed a strong response to the lawn/garden equipment question (Question 14) with 68% of respondents answering the question. Also, hired landscaper/gardener using (assumed) gas-powered equipment were cited almost half of the time, whereas almost a third of the respondents have already converted to electric. Although there were responses in all categories for *Fire Appliances* (Question 13), by far the largest was *Gas or Propane BBQ/Grill* at 59% of the time.
- 6) Most of the submitted suggestions are consistent with solutions that the air quality community have been suggesting for some time.
- 7) Unfortunately, the response to the spanish version of the survey was very poor. The current fears of ICE (U.S. Immigration and Customs Enforcement) surveillance was cited as a reason for lack of responses. It may also be that many spanish speaking households have at least one English speaking member that answered the survey. This will need to be considered for future surveys.
- 8) The rate of completions for the survey was very acceptable at 93%. Although there were 16 questions on the survey, the design did allow the average completion rate to be 8 minutes. Open-ended questions allowed for longer responses as desired.
- 9) Even though instructions were clear, and examples were given on how to respond to questions, there were many responses that had to be adjusted to reflect the true intent in the numerically proper format. It was easy to see the intention for many, others were harder and ultimately required some interpretation. Questions in future surveys will be simplified to help avoid this problem.

- 10) The two most significant highlights are the near-unanimous agreement that the air quality was unacceptable during wildfires, and that traffic and lawn/garden equipment are the largest emitters of pollution and noise. About half of respondents were using professional landscapers who (presumably) are using gas-powered equipment. Respondents would like to see these issues changed.

### **Future Surveys**

It is expected that TVAQCA will conduct a similar survey on an annual basis. Lessons learned will be incorporated into future annual surveys, and some questions will be deliberately repeated to see response changes through time.

The following will be considered when designing the 3Q2021 Survey.

- 1) Several of the questions from this current survey will be used again to see how responses change with time.
- 2) Some questions will be reworded for better affect and to remove any unnecessary overlap (e.g., questions designed to solicit information on yet-to-be-identified emissions source).
- 3) Some questions will need to be simplified as two-part answers were often answered in the wrong format.
- 4) An attempt will be made to see if a spanish version can be better deployed.
- 5) The ability to distinguish between Tri-Valley residents and non-resident Tri-Valley workers will be included in the next survey.
- 6) There will be presentations throughout the year on the results of the survey with a reminder that this is an annual event, in hopes of capturing the same respondents plus more, especially workers.
- 7) This survey focused on outdoor air pollution. Indoor air pollution may be considered in the next survey (e.g., gas hot-water heaters, stoves, smoking/vaping, etc.).