

Executive Summary

This second annual TVAQCA Survey was designed to focus on indoor air emissions (last year's was focused on outdoor air emissions), and to track the change in responses to selected questions through time. TVAQCA intends to continue tracking these questions in future surveys. The Survey also attempts to better understand what percentage of respondent's household members live and/or work in the Tri-Valley, as several of last year's respondents worked in the Tri-Valley but commuted back home outside of the area. Results of this survey show that 96% of respondents live in the Tri-Valley, with 27% of those households have members that commute outside.

It was hoped that this second survey would cast a wider net to capture more and diverse responses. However, due to significant loss of TVAQCA personnel and COVID-19 effects, much of the advertising outreach was not possible. As such, TVAQCA has now increased personnel and resources in hopes of casting that wider net for the third annual survey. Responses were initially sparse, so the survey which started in the very end of the 3rd Quarter of 2021 (hence the name), was kept open into the 2nd Quarter 2022. There was some success late in this period in having schools use this survey as a class project, thus giving some generational texture to the responses: youthful participants and their concerns over educating adults as well as kids was expressed. Persons included in survey responses (responses x persons per household) were estimated to be approximately 900 for the previous year's and 800 for this year's survey.

In general, for tracked questions, similar patterns were seen in the responses, with indications of improved understanding and awareness of air quality issues. Effects of wildfire smoke (or lack thereof this last season) are reflected in responses, and the concern over emissions and noise from the Livermore Airport is still expressed, especially regarding a possible expansion. The *Suggestions* and *Comments* display a robust awareness of the need to convert to electric for transportation and appliances, as well as general energy efficiency, and a desire for more public education.

About half of the respondents have an indoor fire appliance (wood fireplace, propane fireplace, gas fireplace, wood pellet stove, or gas or propane grill), and about a third of appliances are gas-powered. A majority of stoves/ovens are gas, but electrical versions are not much less in number, and it will be interesting to see how those change in time, especially as there currently is a local push for households to consider induction stoves. About half of respondents have gas water-heaters; that too should change in the near future due to a parallel local push to convert to electric. Also, there is some increase seen on the use of electric and hybrid vehicles.

Finally, results indicate that the message about O₃ and PM_{2.5} levels in the Tri-Valley is getting through, as knowledge of these has increased significantly. TVAQCA hopes that we are part of that education.

Report on the Tri-Valley Air Quality Community Alliance (TVAQCA) Community Survey 3Q2021
Laurene Green
August 31, 2022

Introduction

At the end of the third quarter of 2021 (September 30, 2021), TVAQCA released a survey (TVAQCA 3Q2021 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. Whereas the TVAQCA 3Q2020 Survey concentrated on outdoor air quality, this survey concentrated on indoor air quality, while including some previous questions to track changes.

Due to loss of personal, and COVID-19 draining time and resources, the outreach program was less robust for this survey. Also, efforts to engage the Hispanic community were met with resistance; again, fears of ICE (U.S. Immigration and Customs Enforcement) surveillance were cited, so a Spanish version of the survey was not created. It was also decided to extend the open period of the survey to receive more responses into the 2nd Quarter 2022 (May 25, 2022). Ultimately there were approximately 200 households that responded with an average of 4 people per household, representing approximately 800 people, with a combination of individuals that live and/or work in the Tri-Valley.

Realizing the need for a different approach and more resources, TVAQCA has recently hired a Project Coordinator, added new members to the Oversight Committee, and engaged interns (with Spanish and Mandarin language skills) that will help design and execute the next survey, and create a robust plan for wider outreach with a focus on our Hispanic community.

Survey Methods

TVAQCA set the following goals of the survey:

- 1) To get a sense of how Tri-Valley residences' experience and knowledge about local air quality is changing through time,
- 2) To continue 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 continue to try and identify any impactful, but yet-to-be-identified emission sources,
- 5) To understand household levels of emissions from indoor appliances choices,
- 6) To better understand what percentage of responded households live and/or work in the Tri-Valley or commute elsewhere.
- 7) To solicit ideas on how to improve local air quality, and
- 8) To not exceed 10 minutes to fill out the survey.

With these in mind, TVAQCA set about designing the second annual outreach survey. Here are some details on that process.

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

SURVEY DESIGN – The survey contained 20 questions including a request for a Zip Code. Questions were designed to cover the goals listed above. In particular, BETA-testing indicated that the test time would be within the 10-minute goal TVAQCA even though we had added increased it to 20 questions. The increase allowed TVAQCA to include question from the previous survey for tracking answers through time.

REVIEW PROCESS – A set of questions were created and sent to TVAQCA Oversight and Science Committee Members and their families for preliminary testing. The findings were incorporated, and a final version was produced.

DISTRIBUTION AND PROMOTION – When the two versions were finalized, links to the survey was distributed via email, and at in-person outreach events.

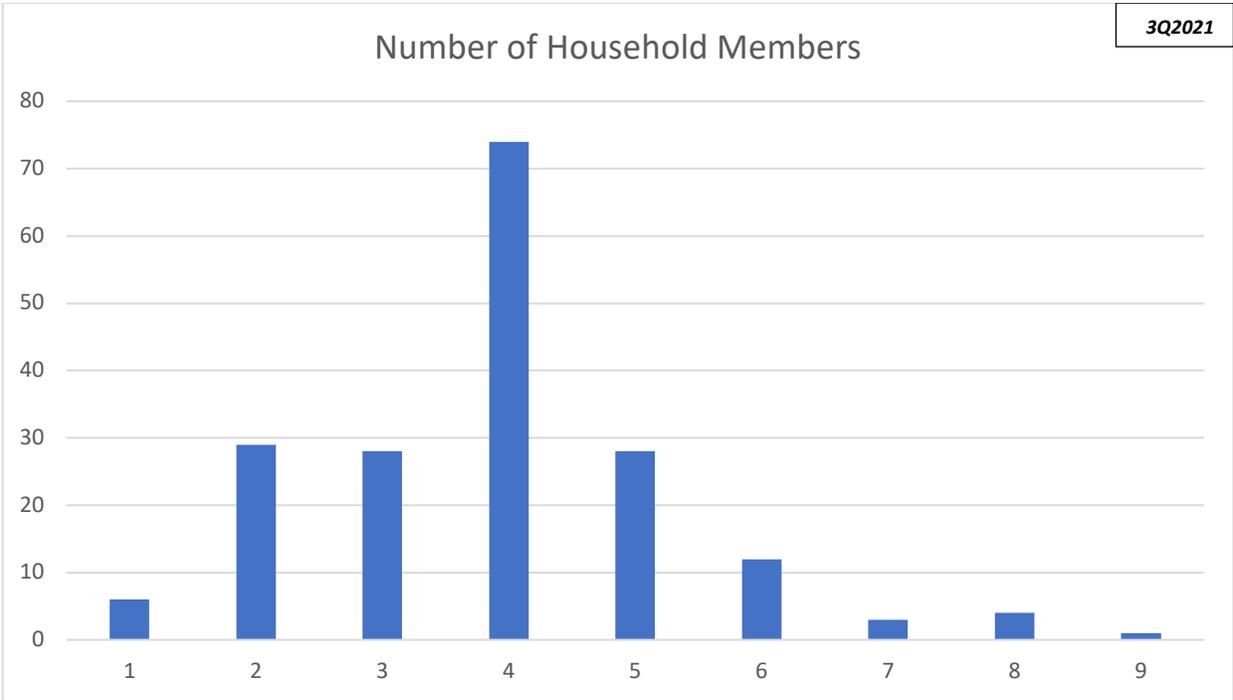
Response Statistics

Ultimately, 185 people responded to the survey. As the survey was designed to encompass the household, this represents many more individuals; using the survey-established average of 4 persons per household and rounding up, that is roughly 800 individuals captured in the responses.

The following are descriptions of the responses by question.

Question 1: How many people are in your household?

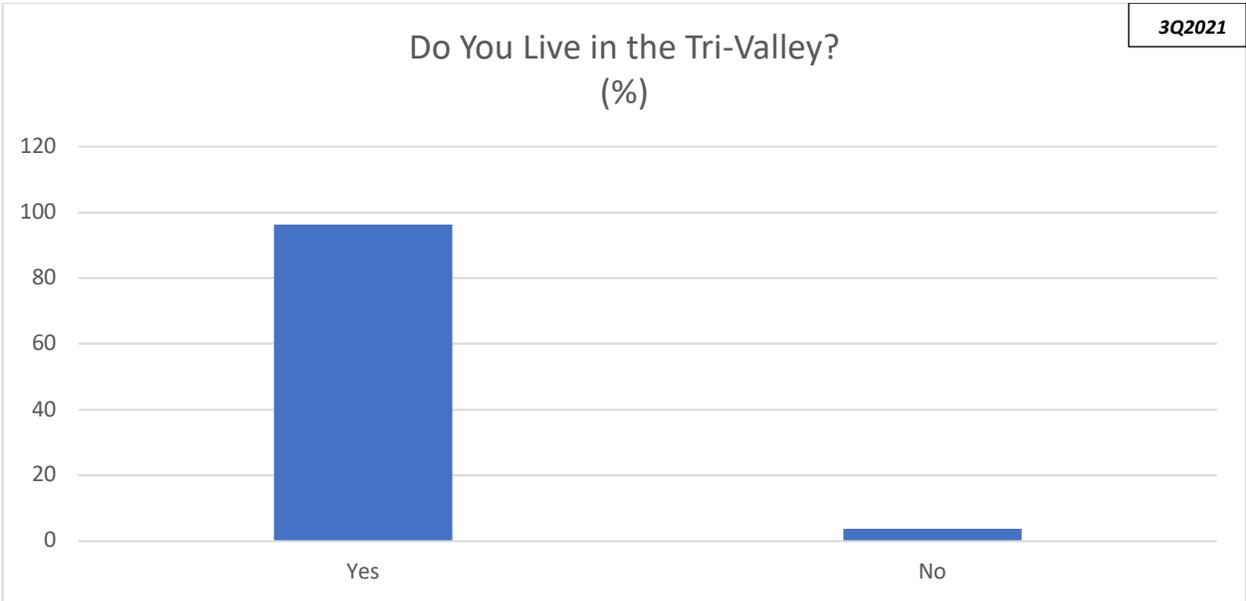
We assumed an average of 3 persons per household in the previous survey.



This question presents 4 persons per household as a better average.

Question 2: Do You Live in the Tri-Valley?

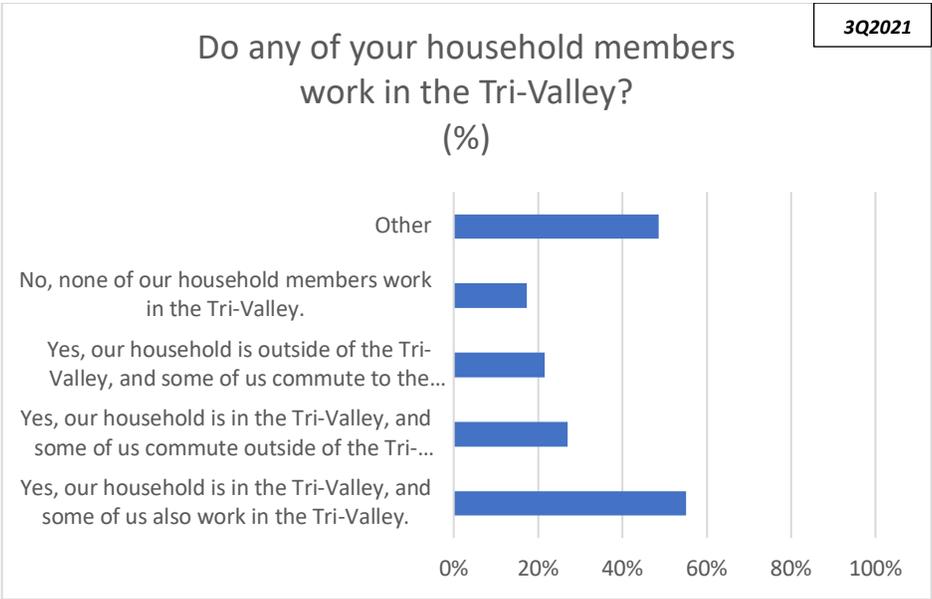
The Tri-Valley is defined as Livermore, Dublin, Pleasanton, and San Ramon.



96% of respondents live in the Tri-Valley.

Question 3: Do any of your household members work in the Tri-Valley?

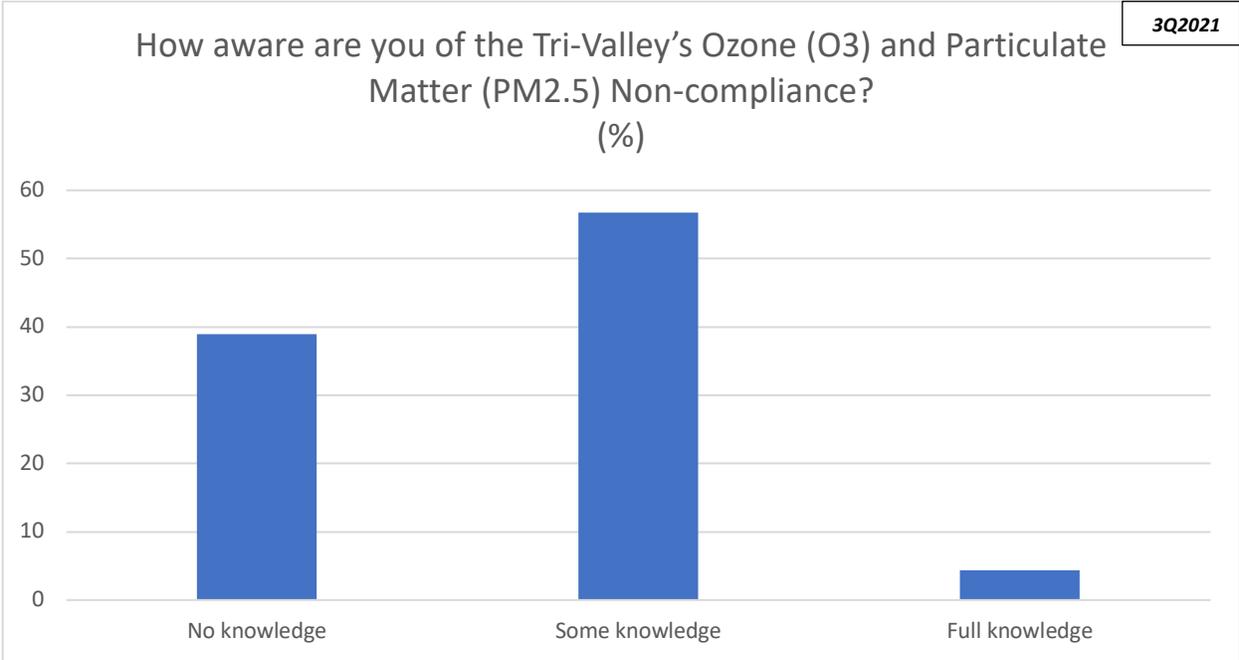
This question is intended to better understand the work locations of respondents.



55% of respondents that live in the Tri-Valley have household members that work in the Tr-Valley and 27% have members that commute outside of the Tri-Valley.

Question 4: How aware are you of the Tri-Valley’s Ozone (O3) and Particulate Matter (PM2.5) Non-compliance?

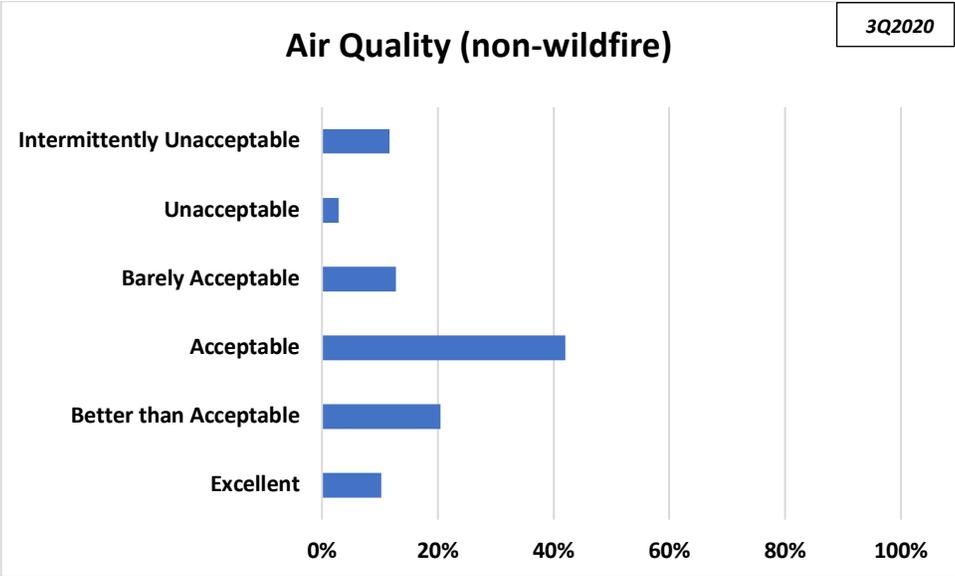
This combines 2 questions we hope to keep tracking through several surveys.



The “Some Knowledge” response has grown from approximately 20% to 57%. This would indicate that our program and others are progressing in our mission to educate residents on O3 and PM2.5 in the Tri-Valley. “Full Knowledge has not really budged, so there is more work to educate people to a confident level.

Question 5: How good/bad is the air quality in your specific neighborhood (don't include wildfire days)?

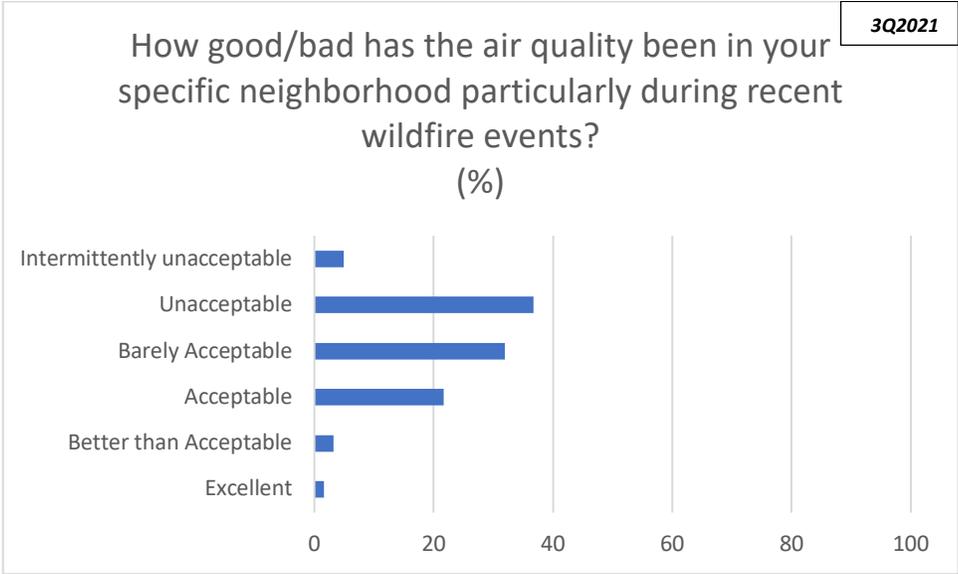
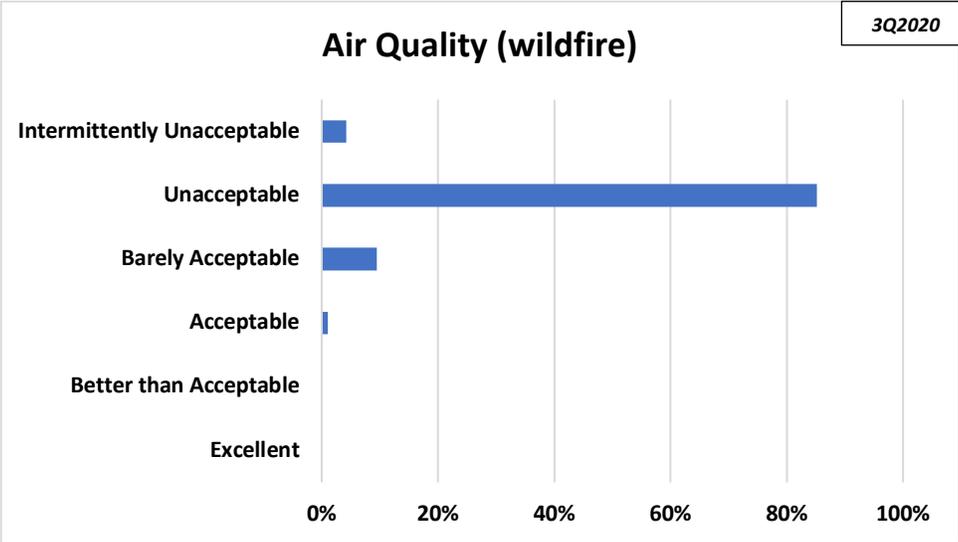
For comparison, last-year's survey results for the same question are presented first



Compared to the previous survey, respondents are experiencing some better air quality on non-wildfire days.

Question 6: How good/bad has the air quality been in your specific neighborhood particularly during recent wildfire events?

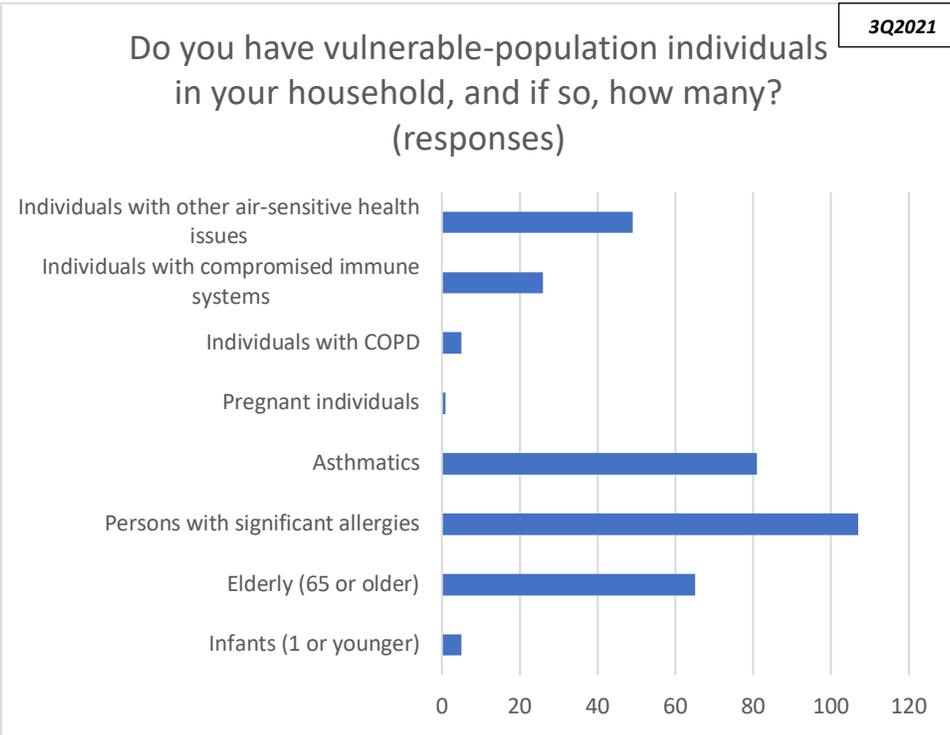
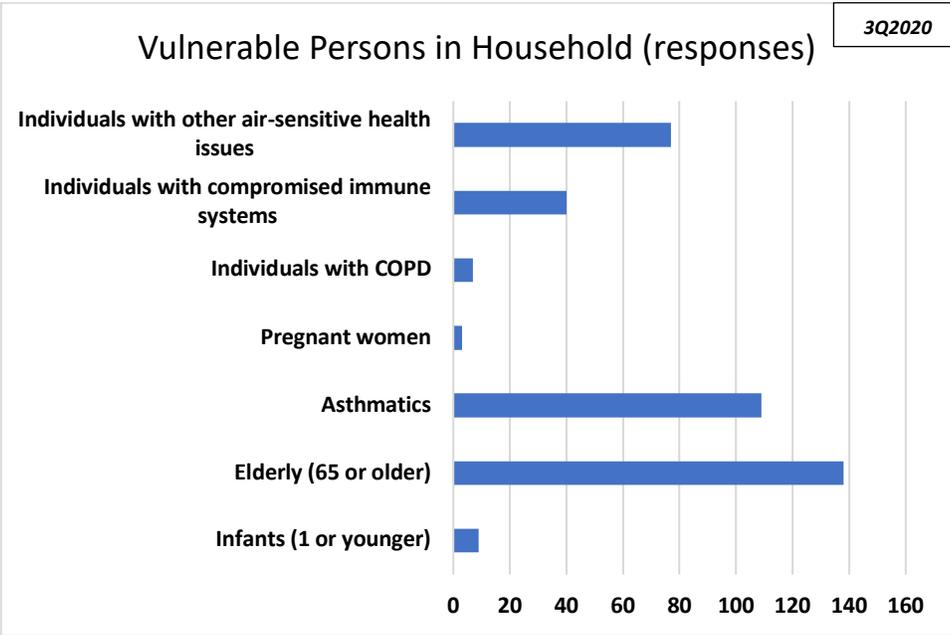
For comparison, last-year's survey results for the same question are presented first



Air quality during wildfire events has improved as well. Perhaps it is because this last season didn't have as many fires and associated smoke in or near the Tri-Valley compared to the last.

Question 7: Do you have vulnerable-population individuals in your household, and if so, how many?

For comparison, last-year’s survey results for the same question are presented first.

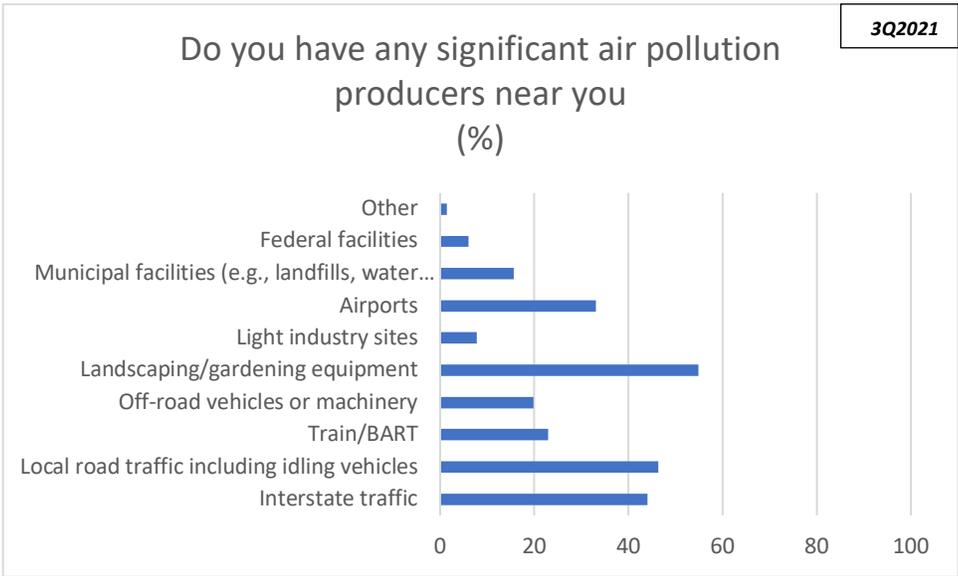
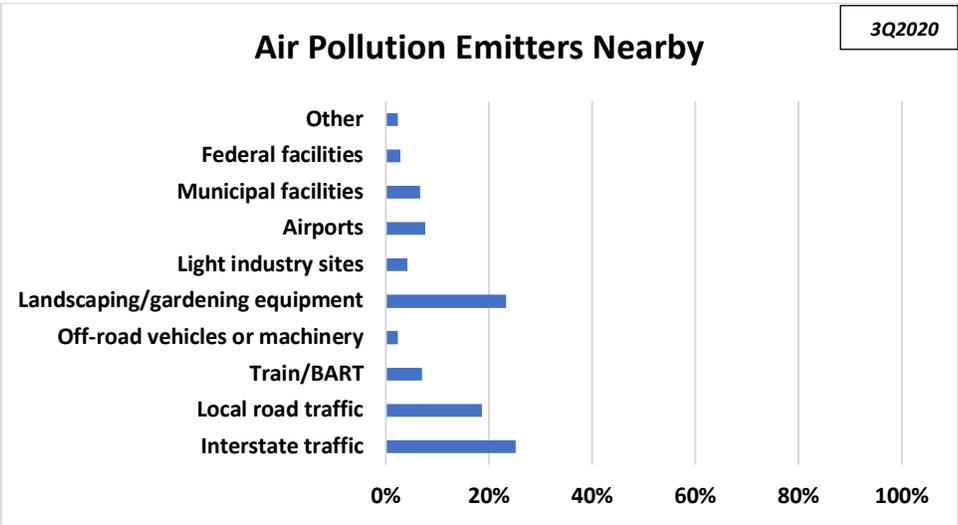


The pattern is similar compared to the last survey, except for the newly added “Persons with significant allergies” answer, which received significant responses. There were 119 responses out of 187 respondents with one or more potential answers identified as being in the household, and several of

those identified more than one person with a specific vulnerability. Last year's survey had 184 similar responses out of 289 respondents.

Question 8: Do you have any significant air pollution producers near you?

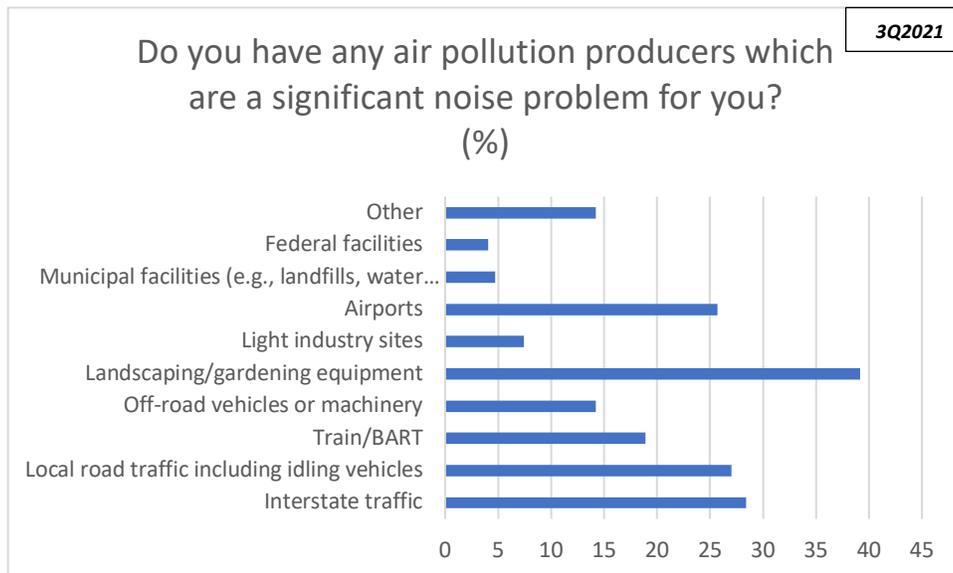
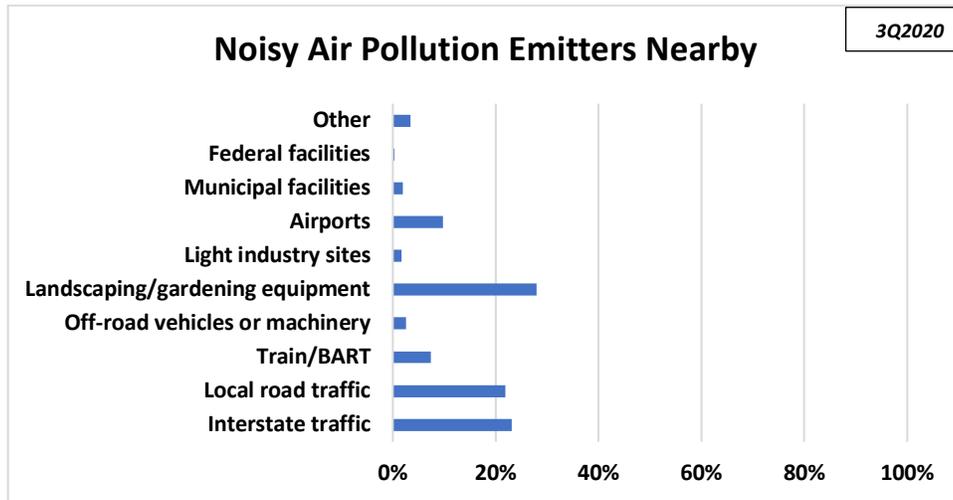
For comparison, last-year’s survey results for the same question are presented first.



The pattern is similar compared to the last survey, but with more responses in most categories. This may be indicative of an increase in awareness of emission sources.

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

For comparison, last-year's survey results for the same question are presented first.



The pattern is similar compared to the last survey, but with more responses in most categories. This may be indicative of an increase in awareness of emission sources.

Question 10: Are there particular toxic air or noise emissions in your area that you are concerned about?

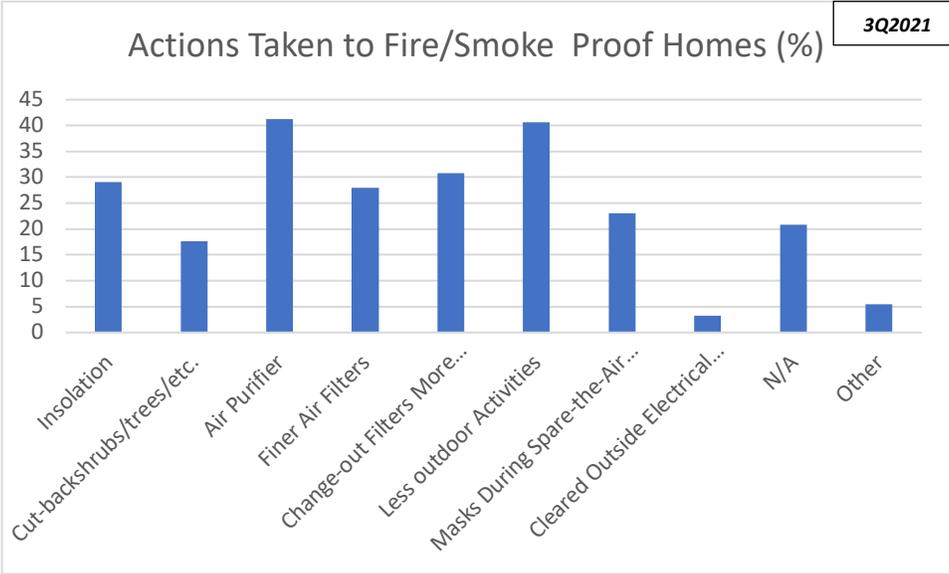
Below is an accounting of the responses other than N/A. The column in the right tallies the number of responses in this category. The last response was collected from Question 11, which asked for suggestions.

Summary Categories	Responses
Livermore Airport	10
Nearby construction	2
Gravel quarry fugitive dust	3
Wastewater treatment plant	3
Residential trash burning	1
Vineyard maintenance vehicles	1
Dust in the air from train tracks	1
Chemicals on the vineyards	1
Traffic noise and emissions (dirt bikes mentioned)	10
Lawn & garden equipment (gas in particular) noise & emissions especially during non-noise hours	4
Wildfire smoke	8
Idling vehicles	1
Business	1
Fireworks are a problem near my house	1

As with the last survey there appears to be significant concern about wildfire smoke, and noise & emissions from traffic and the Livermore Airport, with comments specific to concerns of airport expansion.

Question 11: What actions have you taken recently to help fire-proof/smoke-proof you, your home, and/or your property?

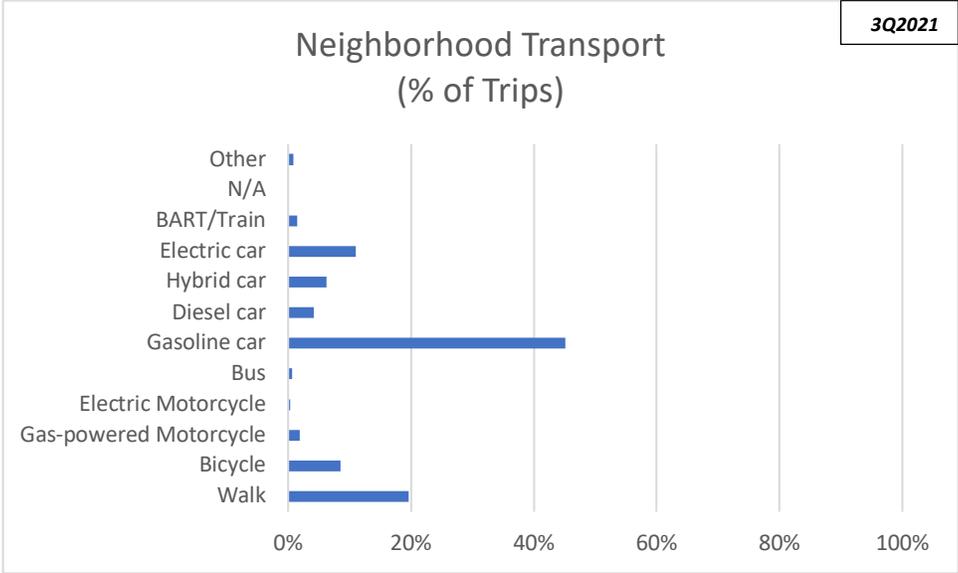
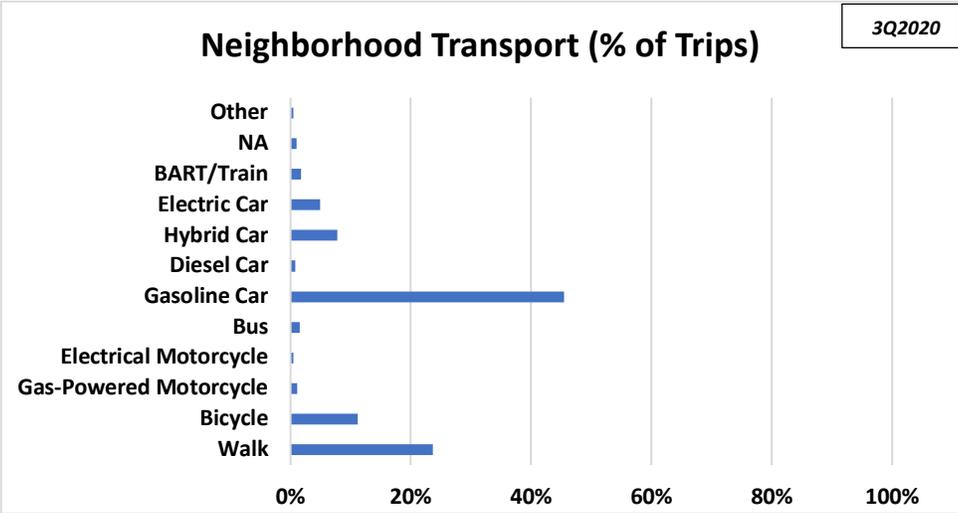
Below is an accounting of the responses.



Responses show many efforts to prepare for wildfires. The “Other” responses were “Asked PG and E to put our overhead wires underground. No luck.”, “changed battery in our smoke alarm”, and “We leave the area whenever possible on high-smoke days”.

Question 12: What transportation option(s) do you and your household members mostly use when in your neighborhood/town (this last year), and how often (total for all members)?

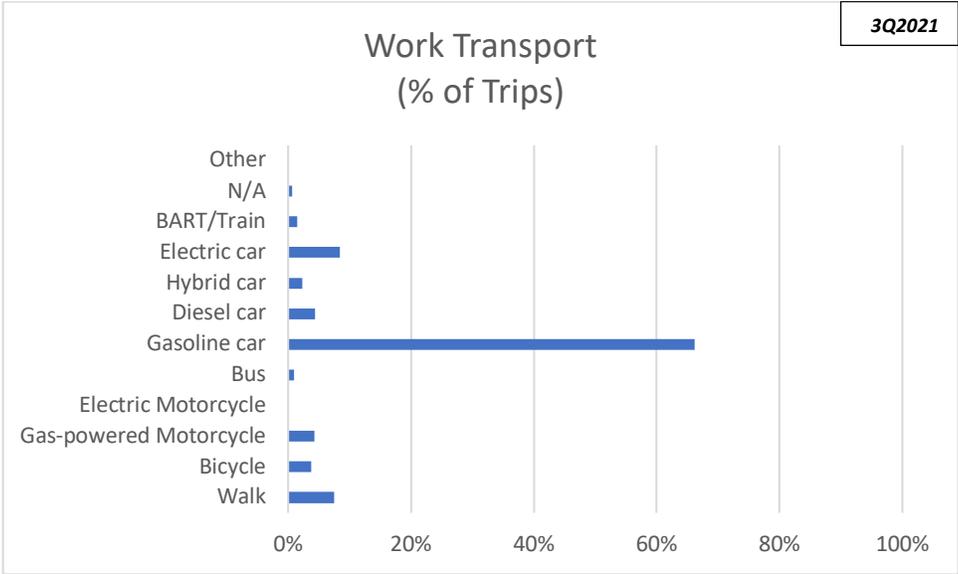
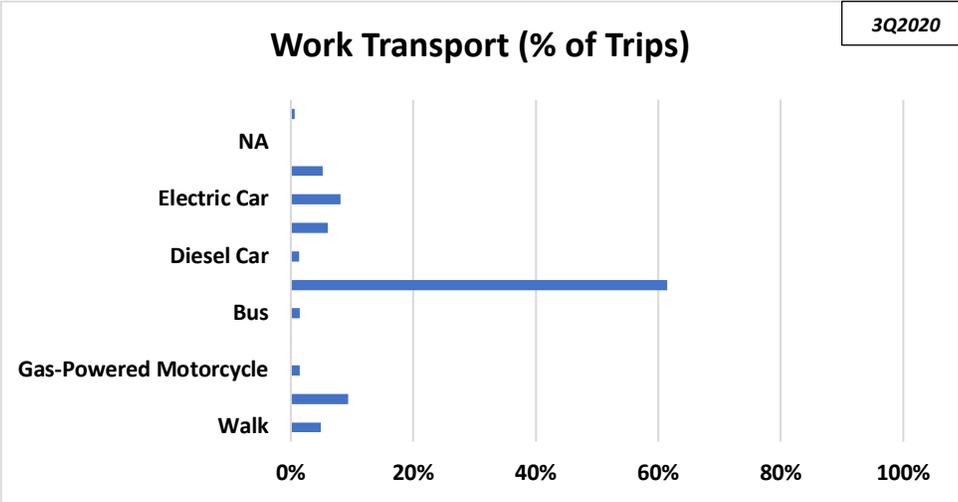
For comparison, last-year’s survey results for the same question are presented first.



Much of the pattern is similar to last year except that electric car use has noticeably increased.

Question 13: If you and any household members work outside of the home, what transportation option(s) do you typically use for your commute (this last year), and how often (total for all members)?

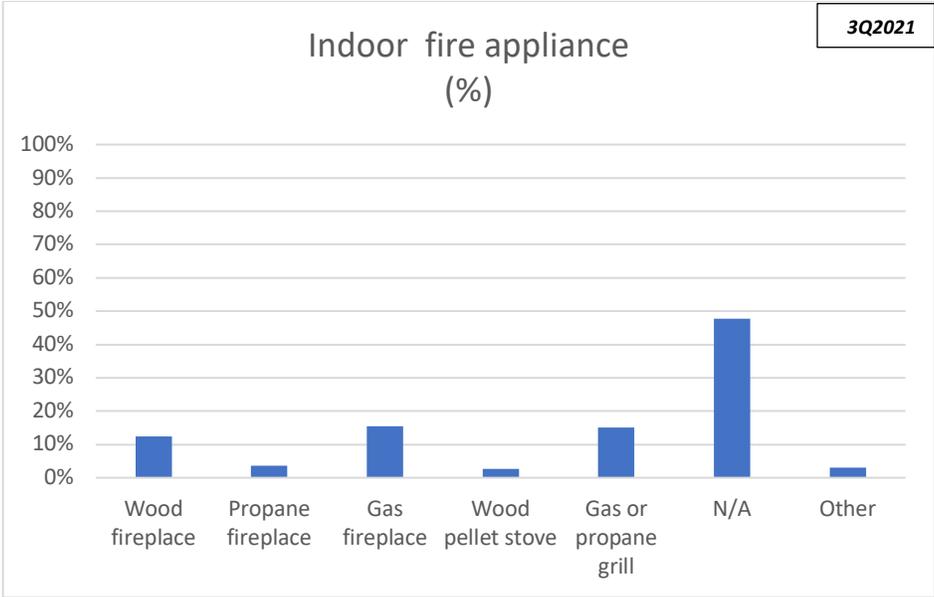
For comparison, last-year’s survey results for the same question are presented first.



Gasoline powered cars are still by large the most used.

Question 14: Do you regularly use an indoor fire appliance?

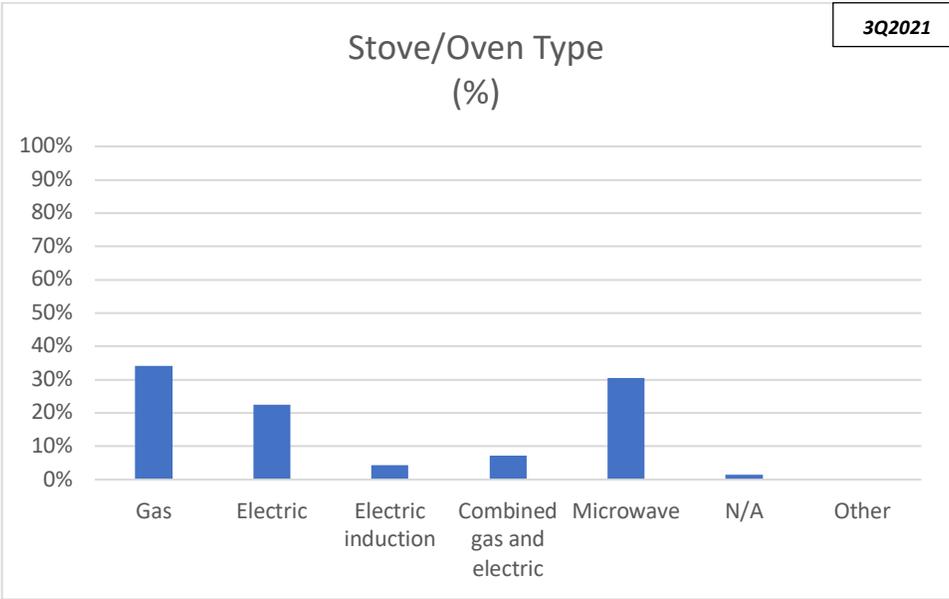
Below is an accounting of the responses.



About half of the responses use an indoor fire appliance, and 35% are a type of gas appliance. 9 of the respondents use more than one indoor fire appliance.

Question 15: Do you regularly use a stove/oven?

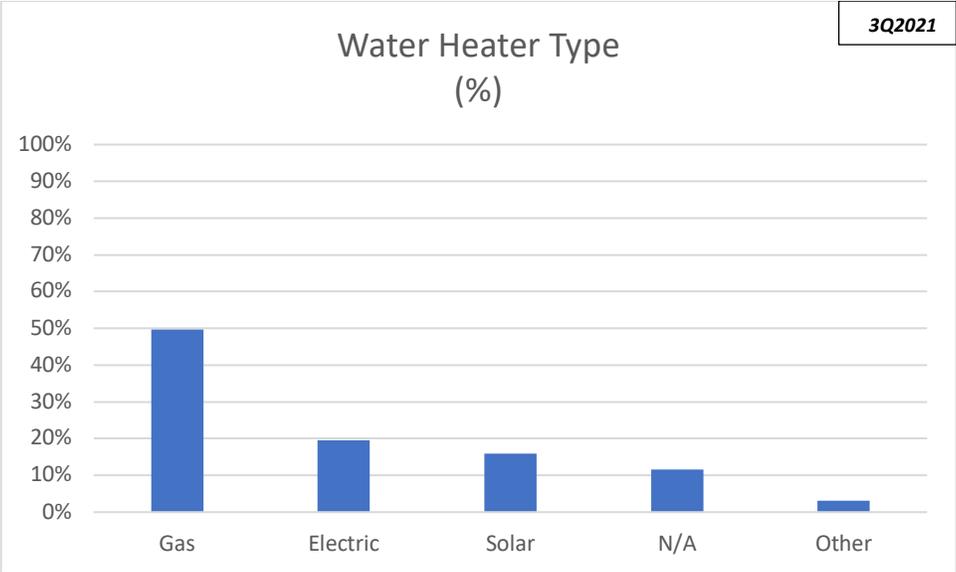
Reminder: A respondent could choose more than one answer, and many did.



Gas stove/oven use is the largest with electric and microwave not far behind.

Question 16: What style water-heater does your household use?

Below is an accounting of the responses.



Approximately half of the responses are for a gas water heater use.

Question 17: Do you have any suggestions on ways to address air or noise pollution in the Tri-Valley, or more specifically in/near your neighborhood?

Below is a summary of the responses.

Category	Summary of Responses
Humans	Less human activity
Homes	Upgrade homes to be more energy efficient and produce lower emissions/carbon footprint Convert to electric household appliances Convert to electric garden and landscaping equipment
Ground transport	Convert to electric transportation Convert to electric for construction vehicles More clean mass-transport, for students especially More bike-friendly, pedestrian-friendly paths and access to downtown and shopping areas Noise proof items which generate noise and high-traffic areas Less traffic Reroute trains away from populated areas to reduce noise and emissions
Inform	Information/education for all ages regarding air quality Use email to inform cities of this issue Increase awareness of personal use of gas-powered cars etc. Regular air quality predictions in various forms of media, like weather predictions
Trees	Plant more trees, increase forests Install Tree barriers along highways to absorb emissions and noise
Solar	Increase use of solar Increase the amount of solar storage facilities
City Actions	Enforcement of existing ordinances for speeding, car emission and noise emission violations Ordinances to further limited hours of operations for noisy equipment Ordinances/laws minimizing idling vehicles, especially near children Rebates for fossil fuel to electric conversion
Air-traffic	Enforce air-traffic pattern and times laws that exist Prohibit use at Livermore Airport of lead-included, or diesel fuels, and jet fuel (done elsewhere) Prevent Livermore Airport Expansion Lessen flights at Livermore Airport

The newest suggestion is that of increasing solar storage facilities; this may deserve better focus. Although most of these other responses are familiar, it appears that the desire to enforce current ordinances/laws (and perhaps add some new ones) is more pronounced than before. The idea to better inform the public was also more vocalized than before – one can hear imbedded in their responses the frustration of our youth trying to get older individuals to pay attention to this subject. There is still a concern over the current use and potential expansion of the Livermore Airport, even though the expansion plans have been put on hold for now.

Question 18: Please enter your 5-digit Zip Code

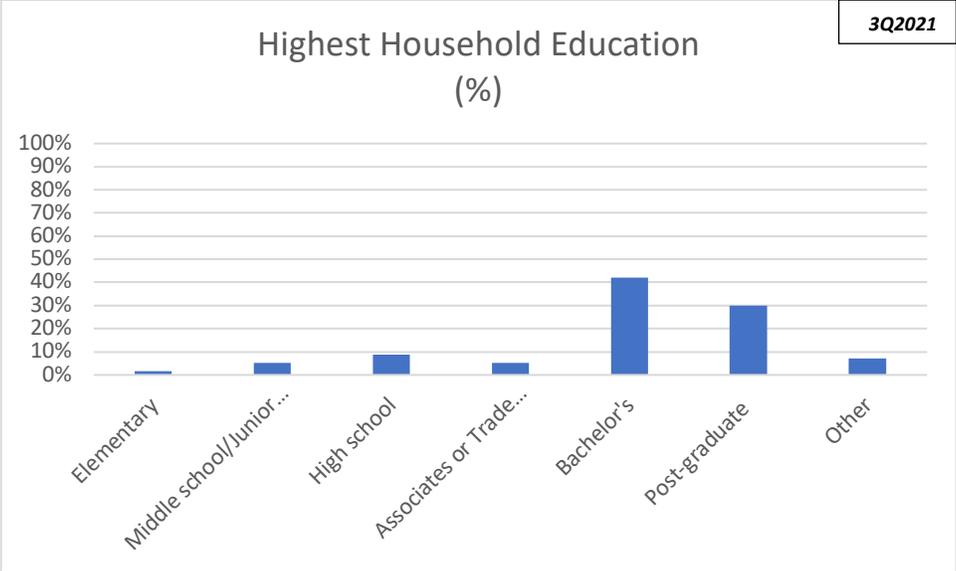
The following table shows the zip codes of respondents and their cities

Zip Code	Associated Cities
92551	Moreno Valley
94500	Livermore
94549	Lafayette
94550	Livermore
94551	Livermore
94566	Pleasanton
94568	Dublin
94582	San Ramon
94583	San Ramon
94587	Union City
94588	Pleasanton
94591	Vallejo
95376	Tracy
	Non declared

Some cities from last year don't appear and some new ones do.

Question 19: Please tell us the highest education in your household?

This question was a proxy question to establish household income. Unfortunately, only 25% of respondents answered the question.



Of those that responded, bachelors and post-graduate degrees are the large majority. A response to the last question asking for comments may be a clue as to why this question wasn't responded to very well; it indicated a dislike for questions of a personal nature, presumably like this one. One could surmise that the responses would have been even lower if the question directly asked about highest household income.

Question 20: If you'd like to make further comments, please write them in the comment box below?

The responses were thin and mostly some forms of thank you. The last lines have less easily categorized comments, whereas the first lines were easily summarized and combine.

Comment Summary	Count
Thank You	15
Use diesel vehicles	2
Use electric or hybrid cars	1
Don't expand the Livermore Airport	1
We have lived in Livermore for 57 years. I perceive air quality to be better now than when we arrived.	1
Why was I forced to take this survey, and why were so many private questions asked?	1
By taking this survey i have learned more about air quality especially in tri-valley.	1

The assumption is that there was a misunderstanding about the emissions of diesel vehicles. Again, we see a concern expressed about Livermore Airport expansion.

Findings

The following are findings from the survey:

- 1) Average household has 4 people.
- 2) 96% of respondents live in the Tri-Valley.
- 3) 55% of household have members that work in the Tri-Valley, and 27% have members that commute outside.
- 4) Knowledge of O₃ and PM_{2.5} in the Tri-Valley has increased from 20 to 57% comparing with last years survey.
- 5) In general, for tracked questions, similar patterns were seen in the responses, with indications of improved understanding and awareness of air quality issues.
- 6) Effects of wildfire smoke (or lack thereof this last season) are reflected in responses.
- 7) The concern over emissions and noise from the Livermore Airport is still expressed, especially regarding a possible expansion.
- 8) Suggestions and Comments display a robust awareness of the need to convert to electric for transportation and appliances, as well as general energy efficiency, and a desire for more public education.
- 9) About a half of the respondents have an indoor fire appliance and about a third of appliances are gas-powered.
- 10) A majority of stoves/ovens are gas, but electrical versions are not much less.
- 11) About half of respondents have gas water heaters.
- 12) There is some increase seen on the use of electric and hybrid vehicles.

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.

The following will be considered when designing the 3Q2022 Survey.

- 1) Some of the questions from this current survey will be used again to see how responses change with time.
- 2) We have acquired Interns with a variety of language abilities which will be employed for the next survey.
- 3) Assuming that COVID-19 continues to subside, we are hopeful for more in-person outreach events to inform the public and also capture more survey responses.
- 4) This survey focused indoor air pollution; the next will focus on wildfire events.