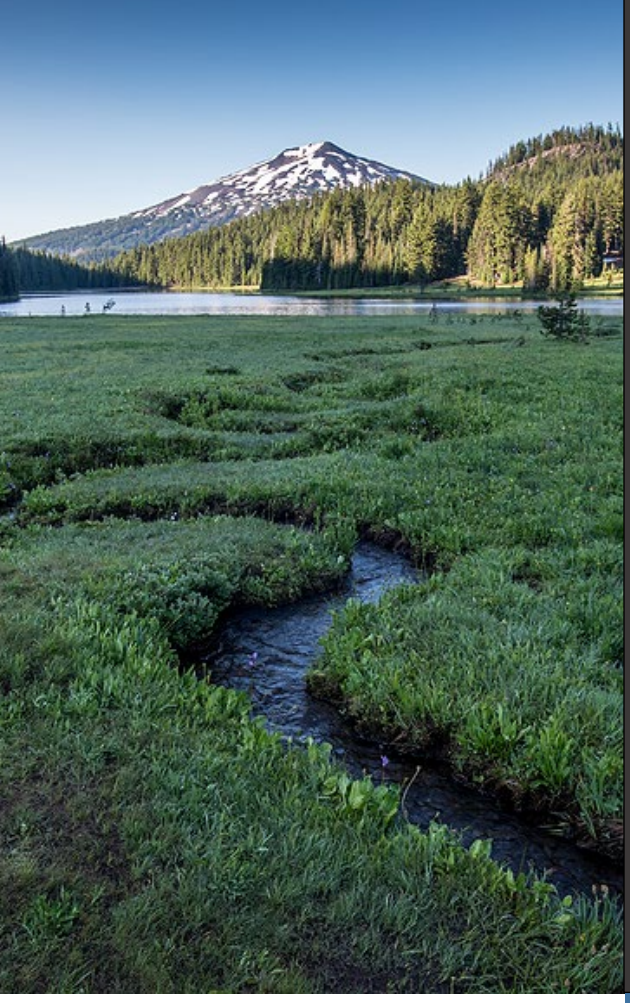

2020 Home Heating Survey Results

Submitted to: Jeffery Stocum
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May 2023

State of Oregon
DEQ Department of Environmental Quality

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Executive Summary

In 2021, Oregon Department of Environmental Quality commissioned the Center for Marketing & Consumer Insight at Oregon State University to conduct a survey that questioned Oregonians about their home's heating and general environmental concerns. The survey data collection period was August-October 2021 and respondents were asked about the previous 12 months (2020-2021 heating season). This is a tabulation of the survey results.

The three goals of the survey were to: 1) Collect the data needed to calculate the statewide Residential Wood Combustion air emissions for submission to the U.S. Environmental Protection Agency as part of the National Emissions Inventory. The air emissions data and calculations are covered under the "2020 Residential Wood Combustion Emissions Inventory report." 2) Gather related data on home heating, and 3) document Oregonian's opinions on air quality and environmental concerns. This document contains a summary of the data collected for the second and third goals.

The Survey was successful in meeting the goals. Responses did a good job of representing the entire state, results were used to calculate and submit air emissions data to the EPA and insight was gained on how Oregonians heat their homes and how they feel about environmental issues.

1. Survey

Oregon DEQ commissioned the Center for Marketing & Consumer Insight at Oregon State University to conduct an online survey of Oregonians about their home heating and general environmental concerns. This was done as part of a project to collect data for calculating air emissions from wood smoke, understand how homes are heated and document specific environmental concerns.

Invitations to respond to the online survey were sent to established DEQ e-mail lists, purchased e-mail lists and homeowner's groups across the state to survey as many people as possible.

The survey yielded a total of 2,921 questionnaires that met criteria for analysis. Responses represented every county except Grant County (which represents 0.2% of Oregon's population). Multnomah County was overrepresented by about 7% (26% of total responses, 19% of population). However, it is significant to note that the Portland Metro area (Multnomah, Clackamas and Washington Counties) was only slightly overrepresented by about 3% (49% of responses, 46% of population). Figure 1 shows the east/west designation for counties, 11% of the survey responses represent households on the eastside of the Cascade Mountains which accounts for 13% of Oregon's population, whereas 89% were from the westside which accounts for 87% of the population. Even if a survey response was deemed complete enough to be used for the analysis, many respondents did not answer every question.

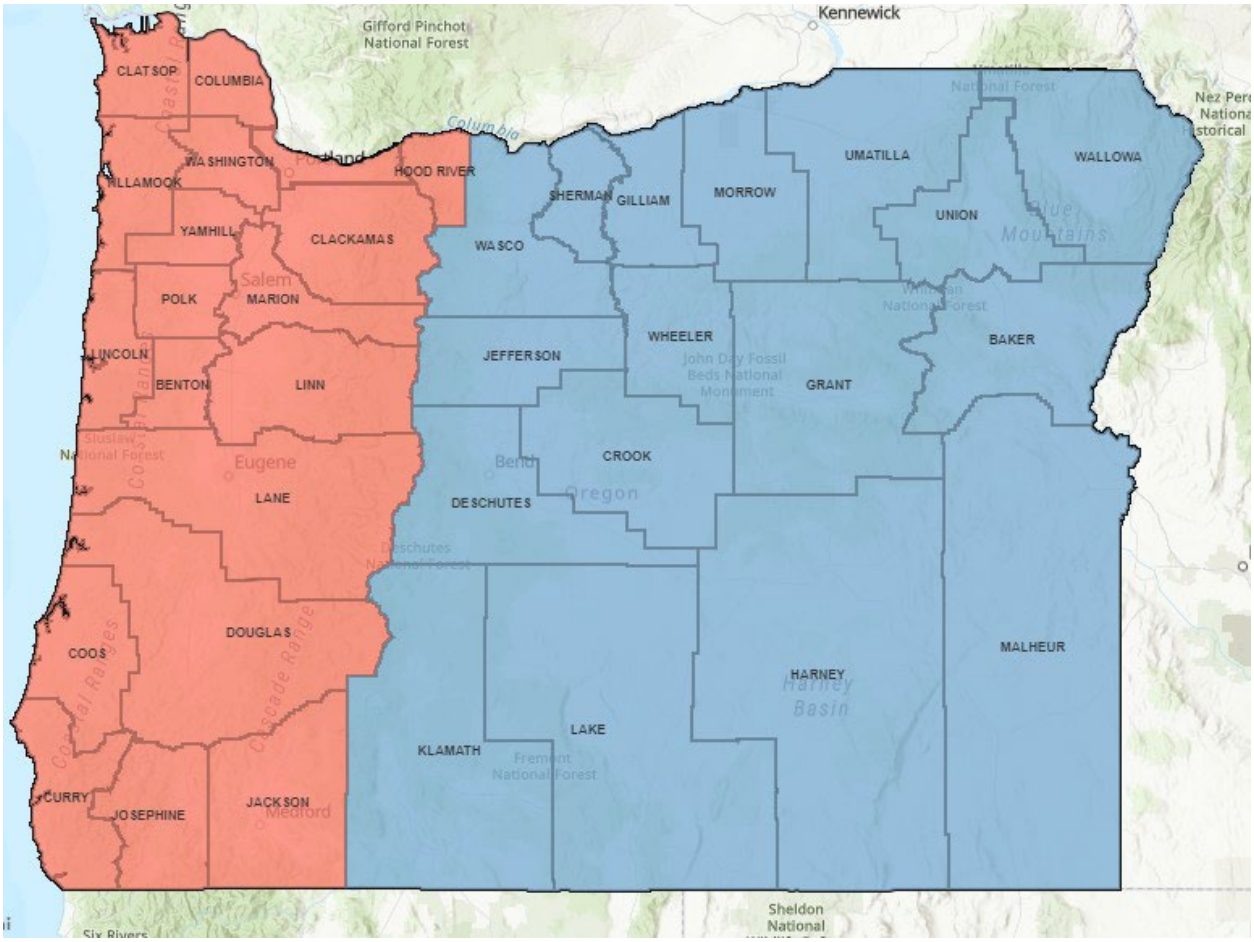


Figure 1. East/West County Designation

2. Results

The results presented in this report are all "raw" counts directly from the survey results.

2.1 Demographics

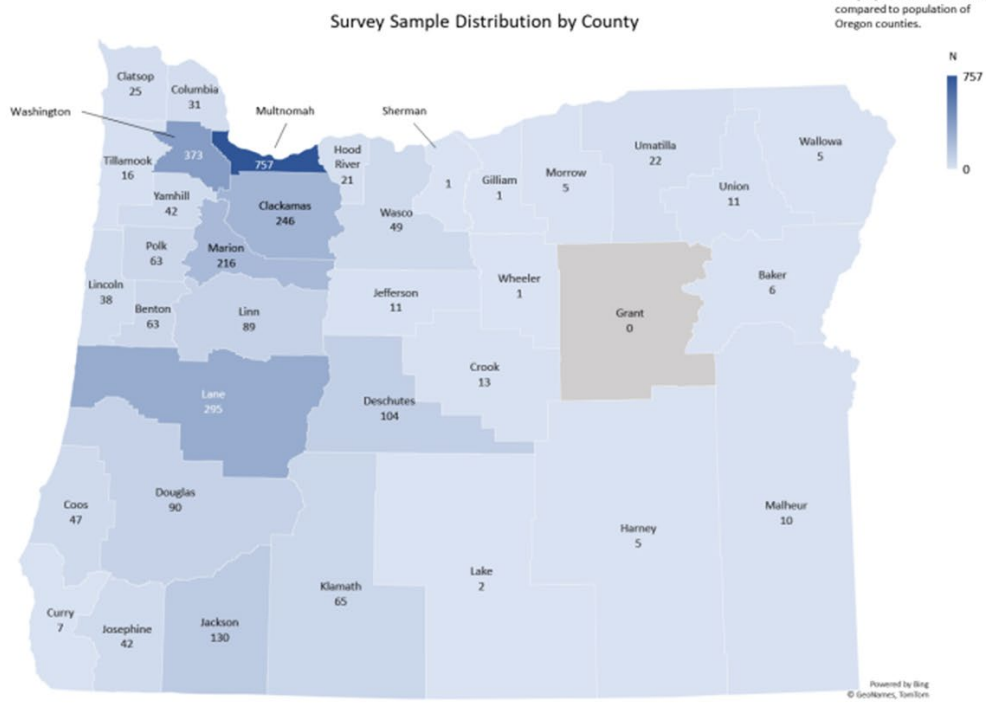
Table 1 documents that response rates from households on both sides of the Cascade Mountains were close to population data (less than a 3% difference). The lower number of responses from eastside residents is consistent with the significantly lower population. Population data is from the Portland State University Population Research Center. The east/west designation is important because it's a key indicator of a county's winter weather (heating degree days), access to forests and cultural and social norms. Figure 2 shows the response levels by county.

Table 1. Survey N-values and Population

	N	%
Number of surveys used	2921	-
Population of Oregon, 2020	4,268,055	-
Responses from Westside	2610	89
Population of Westside	3,699,890	87
Responses from Eastside	311	13
Population of Eastside	568,165	11

N = Total number
% = Percentage

Figure 2. Sample Distribution by County (n = 2921)



County	n	%data	%pop	%diff
Baker	6	0.21%	0.38%	-0.17%
Benton	63	2.17%	2.20%	-0.03%
Clackamas	246	8.48%	9.88%	-1.40%
Clatsop	25	0.86%	0.96%	-0.10%
Columbia	31	1.07%	1.23%	-0.16%
Coos	47	1.62%	1.51%	0.11%
Crook	13	0.45%	0.60%	-0.15%
Curry	7	0.24%	0.54%	-0.30%
Deschutes	104	3.58%	4.88%	-1.29%
Douglas	90	3.10%	2.63%	0.47%
Gilliam	1	0.03%	0.05%	-0.01%
Grant	0	0.00%	0.17%	-0.17%
Harney	5	0.17%	0.18%	0.00%
Hood River	21	0.72%	0.55%	0.17%
Jackson	130	4.48%	5.22%	-0.74%
Jefferson	11	0.38%	0.60%	-0.22%
Josephine	42	1.45%	2.06%	-0.61%
Klamath	65	2.24%	1.62%	0.62%
Lake	2	0.07%	0.19%	-0.12%
Lane	295	10.17%	9.07%	1.09%
Lincoln	38	1.31%	1.20%	0.11%
Linn	89	3.07%	3.13%	-0.07%
Malheur	10	0.34%	0.71%	-0.37%
Marion	216	7.44%	8.22%	-0.78%
Morrow	5	0.17%	0.28%	-0.11%
Multnomah	757	26.09%	19.13%	6.96%
Polk	63	2.17%	2.06%	0.11%
Sherman	1	0.03%	0.05%	-0.01%
Tillamook	16	0.55%	0.65%	-0.09%
Umatilla	22	0.76%	1.84%	-1.08%
Union	11	0.38%	0.63%	-0.25%
Wallowa	5	0.17%	0.18%	0.00%
Wasco	49	1.69%	0.63%	1.05%
Washington	373	12.85%	14.24%	-1.39%
Wheeler	1	0.03%	0.03%	0.00%
Yamhill	42	1.45%	2.53%	-1.08%

Table 2 presents the number of respondents in rural, suburban and urban areas. There are fewer rural housing units than urban housing units, because there are not as many people living in rural areas (even though it represents a much larger geographical area, see Figure 3). If an equal number of people in rural and urban areas had been surveyed the results would have been disproportionately biased to rural housing.

There are many definitions for urban, rural or suburban housing units, an easy method for comparisons is based on population density. For this survey, urban, rural or suburban designation was left up to the respondent without a description or definition. The reasoning was that 1) it is unlikely that any respondent would know their housing unit's population density and 2) the survey is looking for consumer sentiment in-nature information. For example, if a respondent thinks, or feels, that they are a rural Oregonian, then they probably behave as a rural consumer; likewise, if they think they are an urban Oregonian they probably behave that way. Respondents did provide some address data and there is some data on IP address location, it would be possible to determine many respondents' location and thus actual population density, but that would take resources to make these determinations and may not yield better data than using respondent's feelings. Interestingly, significant respondents reported that they are in the suburbs (medium density) when really, they are probably in an urban-density area. This is likely due to large housing complexes in small towns/suburbs pushing the density into the urban category. An example would be a large complex in a college town, which results in high density, yet the town does not "feel" urban.

Table 2. Urban, Suburban and Rural Responses

	N	%
Reported urban	1246	43
Urban population based on density	2,304,750	54
Reported suburban	988	34
Suburban population based on density	682,889	16
Reported rural	687	24
Rural population based on density	1,280,417	30

N = Total number
% = Percentage

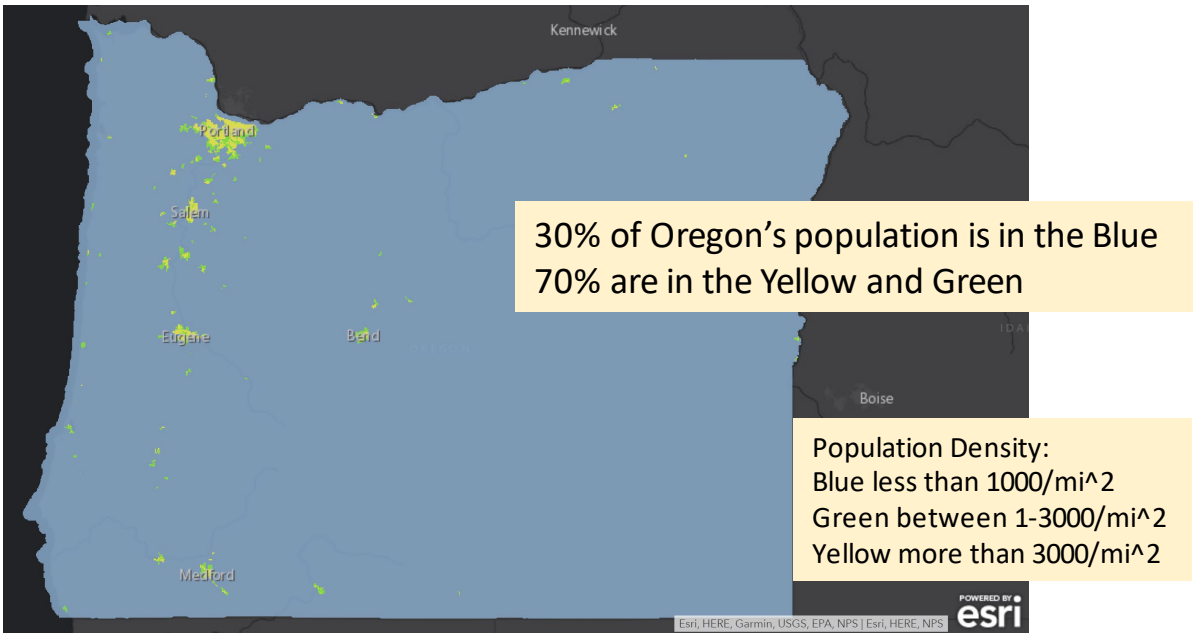


Figure 3. Population Density

The type of housing unit structure and income level have a strong correlation with consumer behavior (where they live, how they heat their homes, outdoor, recreational burning, etc.). Table 4 summarizes survey respondent's type of housing structure. The results show a housing unit that is a detached, single residence has a strong influence on whether the home is wood burning or not (both for home heat and outdoor, recreational burning). The two ethnic categories, Black and African American and Hispanic and Latino/a/x, are the only two with less than 50% of respondents living in a detached, single residence.

Table 4. Housing Unit Structure Type

	N	%
Detached Single Residence, DSR	1796	61
Mobile Home (non-DSR)	325	11
Multiplex 2-4 Units (non-DSR)	425	15
Large Complex, 5+ Units (non-DSR)	375	13
Total non-DSR	1125	39

	DSR		Non-DSR	
	N	%	N	%
Wood burner, Home Heat (primary or other)	299	80	74	20
Wood burner, Outdoor Recreational	686	75	227	25
Income over $150k	191	82	43	18
Income $150-100k	412	78	118	22
Income $99-75k	284	74	101	26
Income $74-50k	234	61	152	39
Income $49-25k	250	51	245	49
Income Less than $25k	128	35	233	65
Asian	49	60	33	40
White	1502	55	817	35
Native Hawaiian/Pacific Islander	25	58	18	42
Middle Eastern/North African	10	63	6	37
American Indian/Alaska Native	49	57	37	43
Black and African American	27	46	32	54
Hispanic and Latino/a/x	89	49	93	51

DSR = Detached Single Residence
N = Total number
% = Percentage

Whether occupants own or rent homes also has a strong influence on their consumer behavior; Table 5 summarizes ownership results. The respondents who said they were wood burners (home heat or outdoor, recreational burning) have a significantly higher rate of being homeowners rather than renters. Income group is a strong indicator of ownership, see Figure 4. Hispanic and Latino/a/x respondents were less than 50% homeowners; they were the only ethnic group below this level.

Table 5. Housing Unit Ownership

	Own		Rent	
	N	%	N	%
Total	1944	67	968	33
Urban	869	70	377	30
Suburban	615	63	364	37
Rural	460	67	227	33
Westside	1736	67	866	33
Eastside	208	67	102	33
Wood burner for Heat	290	78	80	22
Outdoor Recreational Wood burner	741	81	171	19
Income over $150k	206	89	26	11
Income $150-100k	458	86	72	14
Income $99-75k	311	81	72	19
Income $74-50k	269	70	117	30
Income $49-25k	250	51	244	49
Income Less than $25k	109	30	252	70
Asian	50	67	25	33
White	1591	69	722	31
Native Hawaiian/Pacific Islander	26	63	15	37
Middle Eastern/North African	10	67	5	33
American Indian/Alaska Native	45	54	39	46
Black and African American	31	53	27	47
Hispanic and Latino/a/x	83	48	91	52

N = Total number
% = Percentage

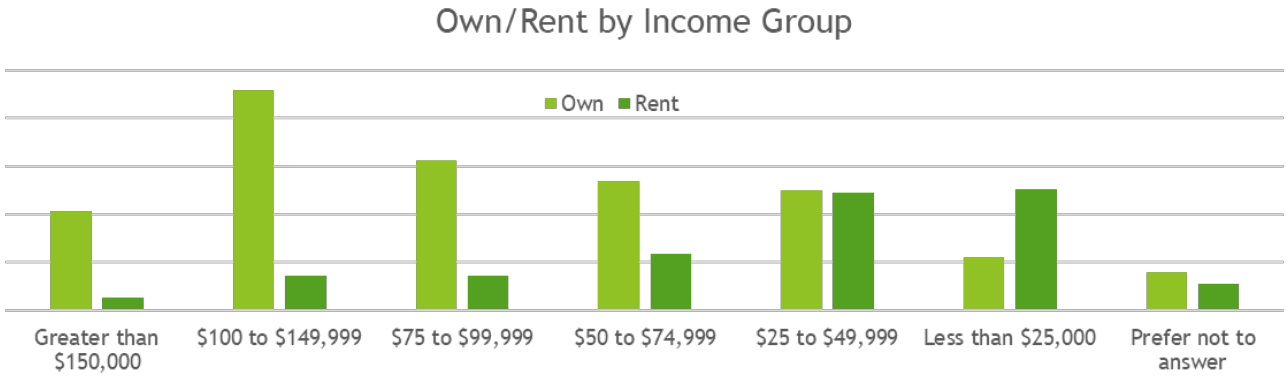


Figure 4. Ownership by Income Group

2.2 Home Heating

An important part of the survey was to find out how people heat their homes. Table 6 summarizes the results of the survey.

Home heating survey considerations:

- Responses are for the primary source of home heat.
- "All Other" category, in bottom half of table, includes Fuel Oil, Kerosene, Propane, Other and None
- Natural Gas is not available everywhere in Oregon.
- Rural housing units are much more likely to be heated with electricity or wood and significantly less likely to use Natural Gas.
- Eastside housing units are more likely to be heated with wood than westside homes.
- Higher income generally corresponds to a higher rate of heating with natural gas and lower income generally corresponds to a higher rate of heating with electricity.
- Households that identified as American Indian/Native Alaskan were the highest wood heat group.
- One survey question asked if the home doesn't use Natural Gas for heat, is it available in their neighborhood. On the survey, 852 answers were provided, of those 581 responded yes (68%) and 271 responded no (32%).

Table 6. Housing Unit Primary Heat Source

	N	%
Total Electricity	1373	47
Total Natural Gas	1105	38
Total Wood	154	5
Total Fuel Oil/Kerosene	65	2
Total Propane	73	2
Total Other	25	1
Total None	125	4

	Electricity		Nat Gas		Wood		All Other	
	N	%	N	%	N	%	N	%
Urban	542	43	553	44	26	2	125	10
Suburban	474	48	419	42	28	3	66	7
Rural	357	52	133	19	100	15	97	14
Westside	1263	48	993	38	117	4	236	9
Eastside	110	35	112	36	37	12	52	17
Wood burner, Home Heat	122	32	82	22	154	41	15	4
Wood burner, Outdoor Recreational	384	44	400	44	71	8	58	6
Income over $150k	72	31	145	62	8	3	9	4
Income $150-100k	167	32	300	57	22	4	41	8
Income $99-75k	173	45	188	49	14	4	10	3
Income $74-50k	223	58	124	32	15	4	24	6
Income $49-25k	307	62	135	27	28	6	25	5
Income Less than $25k	261	72	72	20	14	4	14	4
Asian	38	46	38	46	4	5	2	2
White	1140	49	962	41	98	4	121	5
Native Hawaiian/Pacific Islander	22	51	20	47	0	0	1	2
Middle Eastern/North African	6	38	9	56	0	0	1	6
American Indian/Alaska Native	48	56	19	22	10	12	9	10
Black and African American	36	61	19	32	2	3	2	3
Hispanic and Latino/a/x	109	60	56	31	8	4	8	5

N = Total number
% = Percentage

Figures 5 and 6 show the relationships between primary heat source and income group or ethnic identification. This visual representation of data reflects a clear correlation between higher income and Natural Gas used for home heat; Natural Gas is generally an inexpensive heating option. Conversely, the correlation of the lower income groups having a higher rate of electric home heating (expensive). The Ethnic groups with the highest rates of home heating with the expensive method of electricity (and the lowest rates of Natural Gas heating) are American Indian/Alaska Native, Black and African American and Hispanic and Latino/a/x.

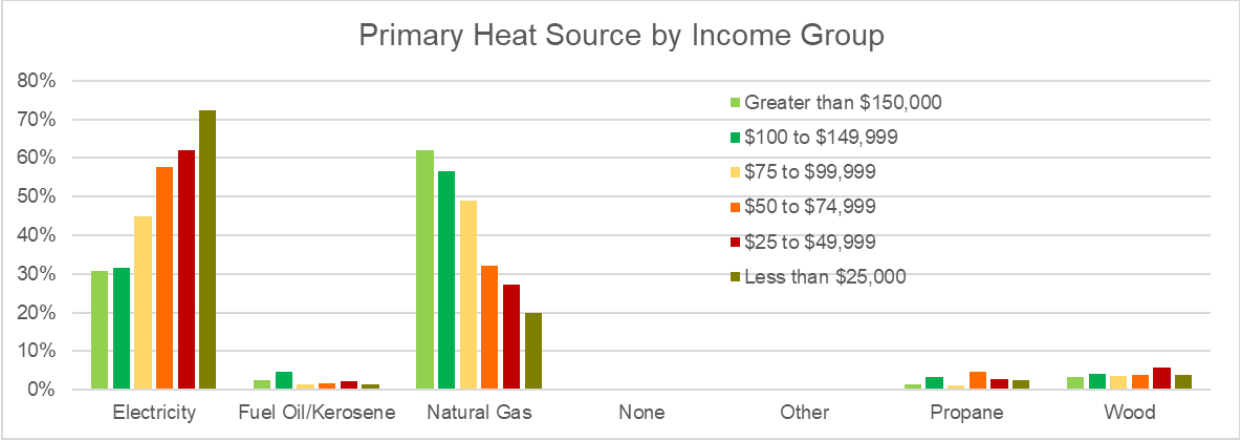


Figure 5. Heat Source by Income Group

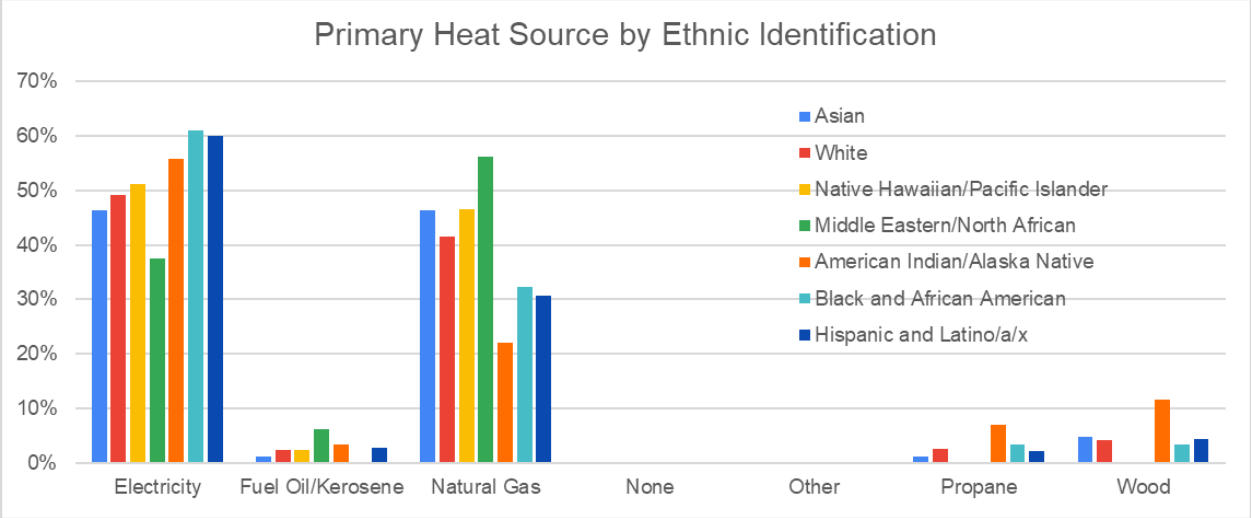


Figure 6. Heat Source by Ethnic Identification

Respondents were asked about their opinion regarding the affordability of heating their home. Table 7 summarizes the results of the question.

Table 7. Opinion of Home Heating Costs

	Never Too High		Rarely Too High		Sometimes Too High		Always Too High	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Total	342	13	804	31	1106	42	375	14
Westside, urban	154	15	308	29	402	39	179	17
Westside, suburban	97	12	272	33	375	45	85	10
Westside, rural	65	13	158	32	195	40	71	15
Eastside, urban	6	8	22	28	37	48	12	16
Eastside, suburban	9	12	20	25	41	52	9	11
Eastside, rural	11	10	24	22	56	51	19	17
Wood burner for Heat	53	15	96	27	142	40	29	8
Outdoor Recreational Wood burner	89	10	219	25	421	47	151	17
Natural Gas Primary Heat	146	14	346	32	436	40	130	12
Electricity Primary Heat	144	11	383	29	573	43	217	16
Asian	7	9	26	32	40	49	8	10
White	304	13	709	31	939	41	327	14
Native Hawaiian/Pacific Islander	2	5	6	14	27	63	8	19
Middle Eastern/North African	3	19	4	25	9	56	0	0
American Indian/Alaska Native	9	11	23	27	39	46	14	16
Black and African American	3	5	24	41	22	38	9	16
Hispanic and Latino/a/x	23	13	48	27	82	45	28	15

N = Total number
% = Percentage

The survey asked about wood-burning bans affecting the ability of respondents to heat their homes (only the 373 that said they burned wood for heat, primary or secondary heat, are included). Table 8 summarizes if respondents answered "yes" or "no" that bans affect their ability to heat their home. Table 9 breaks down the question of compliance with burn bans. Of note, 19% of wood burners are unaware that there are burn bans. Some of the respondents may not live in areas with burn bans, but some likely live in places with bans.

Table 8. Burn Bans Impact Ability to Heat Home (of only the 373 that said they burned wood for heat)

	Yes		No	
	N	%	N	%
Total	74	23	242	77
Urban	18	30	42	70
Suburban	27	23	90	77
Rural	29	21	110	79
Westside	65	24	206	76
Eastside	9	20	36	80
Income over $150k	6	21	22	79
Income $150-100k	23	40	34	60
Income $99-75k	6	13	39	87
Income $74-50k	8	16	41	84
Income $49-25k	11	18	49	82
Income Less than $25k	12	32	26	68

N = Total number
% = Percentage

Table 9. Burn Ban Compliance (of only the 373 that said they burned wood for heat)

	Always follow the suggestions or bans		Sometimes follow the suggestions or bans		Never follow the suggestions or bans		I am unaware of the suggestions or bans	
	N	%	N	%	N	%	N	%
Total	201	63	51	16	9	3	60	19
Urban	37	61	9	15	2	3	13	21
Suburban	89	74	14	12	4	3	14	12
Rural	75	54	28	20	3	2	33	24
Westside	173	63	44	16	7	3	52	19
Eastside	28	62	7	16	2	4	8	18

N = Total number
% = Percentage

Table 10 is a summary of the answers about outdoor, recreational wood burning. Figure 7 shows the results by income category while Figure 8 shows outdoor, recreational burning by ethnic identification. Respondents that burn wood for home heat, tend to burn outdoor recreationally more frequently than the average respondent. Higher income corresponds to more outdoor, recreational burning and lower income corresponds to less outdoor recreational burning. Hawaiian/Pacific Islander and Middle Eastern/North African respondents were the highest outdoor, recreational burners.

Table 10. Outdoor Recreational Wood Burning

	Yes		No	
	N	%	N	%
Total	913	34	1738	66
Urban	438	39	682	61
Suburban	259	28	654	72
Rural	216	35	402	65
Westside	818	34	1558	66
Eastside	95	35	180	65
Wood burner for Heat	182	54	155	46
Income over $150k	95	42	130	58
Income $150-100k	203	39	311	61
Income $99-75k	170	45	204	55
Income $74-50k	154	41	225	59
Income $49-25k	113	23	373	77
Income Less than $25k	54	15	307	85
Asian	19	24	61	76
White	753	33	1511	67
Native Hawaiian/Pacific Islander	27	63	16	37
Middle Eastern/North African	11	69	5	31
American Indian/Alaska Native	30	35	56	65
Black and African American	27	46	32	54
Hispanic and Latino/a/x	75	41	106	59

N = Total number
% = Percentage

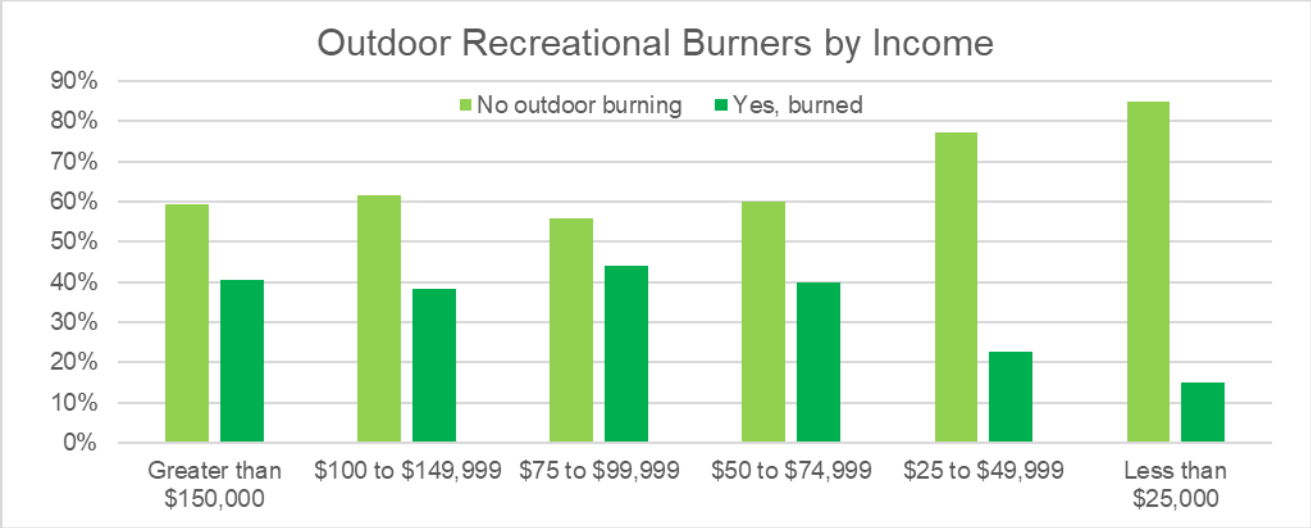


Figure 7. Outdoor Recreational Wood Burners by Income Group

Figure 8. Outdoor Recreational Wood Burners by Ethnic Identification

2.3 Opinions and Concerns

This section of results focuses on questions regarding respondents' opinions and concerns around general environmental issues facing Oregon. Tables 11 through 17 summarize respondents' environmental concerns.

Table 11 summarizes the question that asked how the wildfires of 2020 impacted their household. There were 5 available responses:

- Greatly, a member of the household's medical condition was affected.
- Greatly, I voluntarily relocated temporarily due to air.
- Slightly, there was concern for a member of the household's medical condition.
- Slightly, I ran/bought air filtration systems in my home.
- Was not affected.

Responses were summed by greatly, slightly or not affected. Three ethnic groups responded "Greatly" much higher than average: Native Hawaiian/Pacific Islander, Black and African American and Middle Eastern/North African. Higher income housing units responded "Greatly" at a much lower rate than average.

Table 11. Impact of 2020 Wildfires on Household

	Greatly		Slightly		Was not affected	
	N	%	N	%	N	%
Total	707	28	1241	50	548	22
Urban	363	34	516	48	203	19
Suburban	195	23	467	55	189	22
Rural	149	26	258	46	156	28
Westside	645	29	1112	50	487	22
Eastside	62	25	129	51	61	24
Wood burner for Heat	86	29	152	51	58	20
Income over $150k	33	15	145	67	39	18
Income $150-100k	152	30	258	51	94	19
Income $99-75k	122	33	179	49	64	18
Income $74-50k	108	30	183	51	70	19
Income $49-25k	110	24	235	51	117	25
Income Less than $25k	83	25	139	41	114	34
Asian	16	20	52	64	13	16
White	598	28	1096	50	477	22
Native Hawaiian/Pacific Islander	26	60	15	35	2	5
Middle Eastern/North African	7	44	8	50	1	6
American Indian/Alaska Native	24	31	39	50	15	19
Black and African American	29	53	20	36	6	11
Hispanic and Latino/a/x	53	30	71	41	50	29

N = Total number
% = Percentage

The survey asked how often respondents were concerned with the air quality. Table 12 summarizes the results. Of note, the highest income groups responded "Never" at a much higher rate than average.

Table 12. How often are You Concerned about Oregon's Air Quality?

	Always		Sometimes		Rarely		Never	
	N	%	N	%	N	%	N	%
Total	741	28	1410	53	405	15	84	3
Urban	334	30	580	51	163	14	55	5
Suburban	249	27	553	58	124	14	10	1
Rural	158	27	297	50	118	20	19	3
Westside	671	28	1253	53	337	16	75	3
Eastside	70	27	157	59	28	11	9	3
Wood burner for Heat	100	32	146	46	56	18	12	4
Income over $150k	62	27	114	49	39	17	18	8
Income $150-100k	136	26	264	50	95	18	34	6
Income $99-75k	89	23	239	62	53	14	2	1
Income $74-50k	112	29	213	56	51	13	5	1
Income $49-25k	132	27	283	57	70	14	8	2
Income Less than $25k	122	34	186	52	43	12	9	3
Asian	24	29	49	60	6	7	3	4
White	641	28	1247	54	347	15	74	3
Native Hawaiian/Pacific Islander	11	26	17	40	12	28	3	7
Middle Eastern/North African	9	56	6	38	1	6	0	0
American Indian/Alaska Native	30	35	39	46	12	14	4	5
Black and African American	17	29	27	47	12	21	2	3
Hispanic and Latino/a/x	57	31	89	49	29	16	7	4

N = Total number
% = Percentage

Respondents were asked to answer "yes" or "no" for five questions about their environmental concerns; Tables 13-17 summarize the results. Concern over wildfires was higher than the other environmental issues. High income groups had least worry about wildfires, drought and climate change.

Table 13. Are You Concerned about Increased Wildfires in Oregon?

	Yes		No	
	N	**%**	**N**	**%**
Total	2423	92	216	8
Urban	996	88	132	12
Suburban	874	96	38	4
Rural	551	92	46	8
Westside	2175	92	198	8
Eastside	248	93	18	7
Wood burner for Heat	299	94	19	6
Income over $150k	191	82	41	18
Income $150-100k	479	91	49	9
Income $99-75k	356	93	26	7
Income $74-50k	353	92	31	8
Income $49-25k	468	95	24	5
Income Less than $25k	334	93	27	7
Asian	77	94	5	6
White	2127	92	182	8
Native Hawaiian/Pacific Islander	40	95	2	5
Middle Eastern/North African	16	100	0	0
American Indian/Alaska Native	76	89	9	11
Black and African American	51	86	8	14
Hispanic and Latino/a/x	165	92	14	8

N = Total number
% = Percentage

Table 14. Are You Concerned about Increased Drought in parts of Oregon?

	Yes		No	
	N	**%**	**N**	**%**
Total	2240	85	399	15
Urban	922	82	208	18
Suburban	829	91	85	9
Rural	489	82	106	18
Westside	2006	85	367	15
Eastside	234	88	32	12
Wood burner for Heat	271	85	46	15
Income over $150k	189	81	43	19
Income $150-100k	446	84	81	15
Income $99-75k	333	87	51	13
Income $74-50k	323	84	61	16
Income $49-25k	492	89	53	11
Income Less than $25k	361	88	43	12
Asian	77	88	10	12
White	1977	86	333	14
Native Hawaiian/Pacific Islander	35	83	7	17
Middle Eastern/North African	14	88	2	13
American Indian/Alaska Native	72	86	12	14
Black and African American	43	73	16	27
Hispanic and Latino/a/x	146	81	35	19

N = Total number
% = Percentage

Table 15. Are You Concerned about Severe Weather Events?

	Yes		No	
	N	**%**	**N**	**%**
Total	2088	79	550	21
Urban	908	80	221	20
Suburban	723	79	192	21
Rural	457	77	137	23
Westside	1879	79	492	21
Eastside	209	78	58	22
Wood burner for Heat	247	78	70	22
Income over $150k	177	76	55	24
Income $150-100k	430	81	99	19
Income $99-75k	299	78	83	22
Income $74-50k	311	81	72	19
Income $49-25k	381	77	111	23
Income Less than $25k	300	83	61	17
Asian	74	90	8	10
White	1830	79	479	21
Native Hawaiian/Pacific Islander	22	52	20	48
Middle Eastern/North African	14	88	2	13
American Indian/Alaska Native	62	74	22	26
Black and African American	46	78	13	22
Hispanic and Latino/a/x	147	82	33	18

N = Total number
% = Percentage

Table 16. Are You Concerned about Hotter, Longer Summers and Shorter Drier Winters?

	Yes		No	
	N	**%**	**N**	**%**
Total	2139	81	498	19
Urban	876	78	253	22
Suburban	787	86	126	14
Rural	476	80	119	20
Westside	1919	81	453	19
Eastside	220	83	45	17
Wood burner for Heat	263	83	54	17
Income over $150k	181	78	51	22
Income $150-100k	395	75	131	25
Income $99-75k	294	77	98	23
Income $74-50k	336	88	48	13
Income $49-25k	418	85	75	15
Income Less than $25k	304	84	57	16
Asian	70	85	12	15
White	1881	81	427	19
Native Hawaiian/Pacific Islander	26	62	16	38
Middle Eastern/North African	16	100	0	0
American Indian/Alaska Native	66	79	18	21
Black and African American	49	83	10	17
Hispanic and Latino/a/x	150	84	29	16

N = Total number
% = Percentage

Table 17. Are You Concerned Wildfires, Drought, and Weather will be Worsened by Climate Change?

	Yes		No	
	N	**%**	**N**	**%**
Total	2197	83	436	17
Urban	944	84	182	16
Suburban	798	87	116	13
Rural	455	77	138	23
Westside	1990	84	380	16
Eastside	207	79	56	21
Wood burner for Heat	249	79	68	21
Income over $150k	179	77	52	23
Income $150-100k	435	83	91	17
Income $99-75k	320	84	61	16
Income $74-50k	331	86	53	14
Income $49-25k	429	87	63	13
Income Less than $25k	304	84	57	16
Asian	74	90	8	10
White	1926	84	378	16
Native Hawaiian/Pacific Islander	30	71	12	29
Middle Eastern/North African	14	88	2	13
American Indian/Alaska Native	61	73	23	27
Black and African American	52	88	7	12
Hispanic and Latino/a/x	153	85	26	15

N = Total number
% = Percentage

The next section of questions asked respondents about their opinion of alternative heat/fuel sources. Table 18 summarizes the question about heat pumps and whether they would be interested in installing one if it was free or made affordable.

Less than 50% said yes that they would add a heat pump if it was free or low cost, 41% responded maybe or need more information.

Table 18. Would You Install a Heat Pump if Affordable?

	Yes		No		Maybe		Need More Info	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Total	1198	49	247	10	595	24	416	17
Urban	561	52	96	9	228	21	186	17
Suburban	389	47	79	9	218	26	146	17
Rural	239	44	72	13	149	27	84	15
Westside	1074	49	228	10	528	24	378	17
Eastside	124	50	19	8	67	27	38	15
Wood burner for Heat	162	55	34	11	51	17	49	17
Income over $150k	132	62	19	9	42	20	20	9
Income $150-100k	243	49	39	8	108	22	109	22
Income $99-75k	197	55	23	6	93	26	42	12
Income $74-50k	196	55	33	9	90	25	40	11
Income $49-25k	196	44	44	10	126	28	77	17
Income Less than $25k	131	40	58	18	73	22	69	21
Asian	49	62	3	4	19	24	8	10
White	1034	49	206	10	524	25	356	17
Native Hawaiian/Pacific Islander	20	48	3	7	10	24	9	21
Middle Eastern/North African	11	73	1	7	2	13	1	7
American Indian/Alaska Native	35	44	13	16	18	23	13	16
Black and African American	23	39	5	8	22	37	9	15
Hispanic and Latino/a/x	95	53	18	10	32	18	33	19

N = Total number
% = Percentage

Table 19 shows the results to the question of whether a respondent would add solar if it was affordable. The "yes" response, that respondents would be interested in adding solar, was significantly higher than for adding a heat pump. Also, a higher income level corresponded to a higher result of already having solar panels.

Table 19. Would You Install Solar Panels if Affordable?

	Yes		No		Have	
	N	**%**	**N**	**%**	**N**	**%**
Total	1978	75	510	19	161	6
Urban	822	73	209	18	101	9
Suburban	708	77	166	18	42	5
Rural	447	75	135	23	18	3
Westside	1779	75	461	19	143	6
Eastside	199	75	49	18	18	7
Wood burner for Heat	248	79	53	17	14	4
Income over $150k	158	68	28	12	48	21
Income $150-100k	379	72	93	18	55	10
Income $99-75k	311	83	55	15	10	3
Income $74-50k	299	78	67	17	18	5
Income $49-25k	381	77	105	21	8	2
Income Less than $25k	259	72	95	26	6	2
Asian	73	89	7	9	2	2
White	1707	74	452	20	144	6
Native Hawaiian/Pacific Islander	34	79	6	14	3	7
Middle Eastern/North African	14	88	1	6	1	6
American Indian/Alaska Native	61	71	22	26	3	3
Black and African American	48	81	9	15	2	3
Hispanic and Latino/a/x	146	80	31	17	5	3

N = Total number
% = Percentage

Respondents were asked if they would use biofuel in their oil burning furnace to heat their home; Table 20 summarizes the results.

More people answered this question than responded that their home had a fuel oil furnace. Higher income groups corresponded to a higher response that they already are using biofuel to heat their home.

Table 20. Would You Use Biofuel in Your Oil Furnace?

	Yes		No		Already Do	
	N	**%**	**N**	**%**	**N**	**%**
Total	617	46	635	47	87	6
Urban	307	46	285	43	71	11
Suburban	181	47	192	50	10	3
Rural	129	44	158	54	6	2
Westside	541	45	576	48	77	6
Eastside	76	52	59	41	10	7
Wood burner for Heat	80	50	76	48	4	3
Income over $150k	51	44	46	40	19	16
Income $150-100k	137	45	141	46	28	9
Income $99-75k	105	47	105	47	13	6
Income $74-50k	94	51	84	45	8	4
Income $49-25k	102	47	112	51	5	2
Income Less than $25k	59	40	84	56	6	4
Asian	24	59	16	39	1	2
White	515	46	543	48	71	6
Native Hawaiian/Pacific Islander	22	65	7	21	5	15
Middle Eastern/North African	7	64	4	36	0	0
American Indian/Alaska Native	23	48	25	52	0	0
Black and African American	28	65	15	35	0	0
Hispanic and Latino/a/x	51	48	46	43	10	9

N = Total number
% = Percentage

Table 21 summarizes the responses to the survey question if respondents would use renewable diesel, if it was available, in their diesel-powered vehicle. Higher income respondents had higher response that they already use renewable diesel.

Table 21. Would You Use Renewable Diesel in Your Diesel Vehicle?

	Yes		No		Already do	
	N	%	N	%	N	%
Total	703	63	318	29	89	8
Urban	354	64	133	24	66	12
Suburban	202	67	89	29	12	4
Rural	147	58	96	38	11	4
Westside	617	63	287	29	78	8
Eastside	86	67	31	24	11	9
Wood burner for Heat	100	67	43	29	6	4
Income over $150k	53	65	20	25	8	10
Income $150-100k	182	66	52	19	41	15
Income $99-75k	130	65	57	28	14	7
Income $74-50k	110	72	37	24	6	4
Income $49-25k	95	58	61	37	9	5
Income Less than $25k	73	62	44	37	1	1
Asian	21	75	6	21	1	4
White	598	64	254	27	77	8
Native Hawaiian/Pacific Islander	25	69	7	19	4	11
Middle Eastern/North African	5	83	1	17	0	0
American Indian/Alaska Native	28	68	12	29	1	2
Black and African American	25	63	15	38	0	0
Hispanic and Latino/a/x	59	62	33	35	3	3

N = Total number
% = Percentage

2.4 Ethnic and Language Demographics

This section of the results documents the self-identified ethnic demographics and the languages spoken in each household. Many households responded with multiple ethnic identifications; each response was counted as 1. For example, if a respondent completed the survey with both White and Hispanic identification, then both ethnic categories received a count. This was done to determine the ethnic and language demographics that each survey response represented. Counting this way makes it difficult to compare directly to the US Census ethnic population. The two numbers cannot be directly compared as some ethnic groups may have more, or less, individuals per housing unit and some ethnic groups may have a higher rate of living in mixed ethnic housing units. Even though the results don't compare directly, the survey results and the US Census Ethnic populations are similar enough to demonstrate good survey coverage. US Census numbers are from July 1, 2021 (https://www.census.gov/quickfacts/OR). Results of the survey demographics and the US Census are shown in Table 22. Figure 9 shows the survey's ethnic identification result graphically. Table 23 is a summary of the languages spoken in each home.

Table 22. Ethnic Demographics Represented in Household

	Survey Results		US Census
	N	%	%
White	2321	82	86
Hispanic and Latino/a/x	182	6	14
American Indian and Alaska Native	86	3	2
Asian	82	3	5
Black and African American	59	2	2
Native Hawaiian and Pacific Islander	43	2	1
Prefer not to answer	40	1	--
Middle Eastern/North African	16	1	--
Other	2	0.1	--

N = Total number
% = Percentage

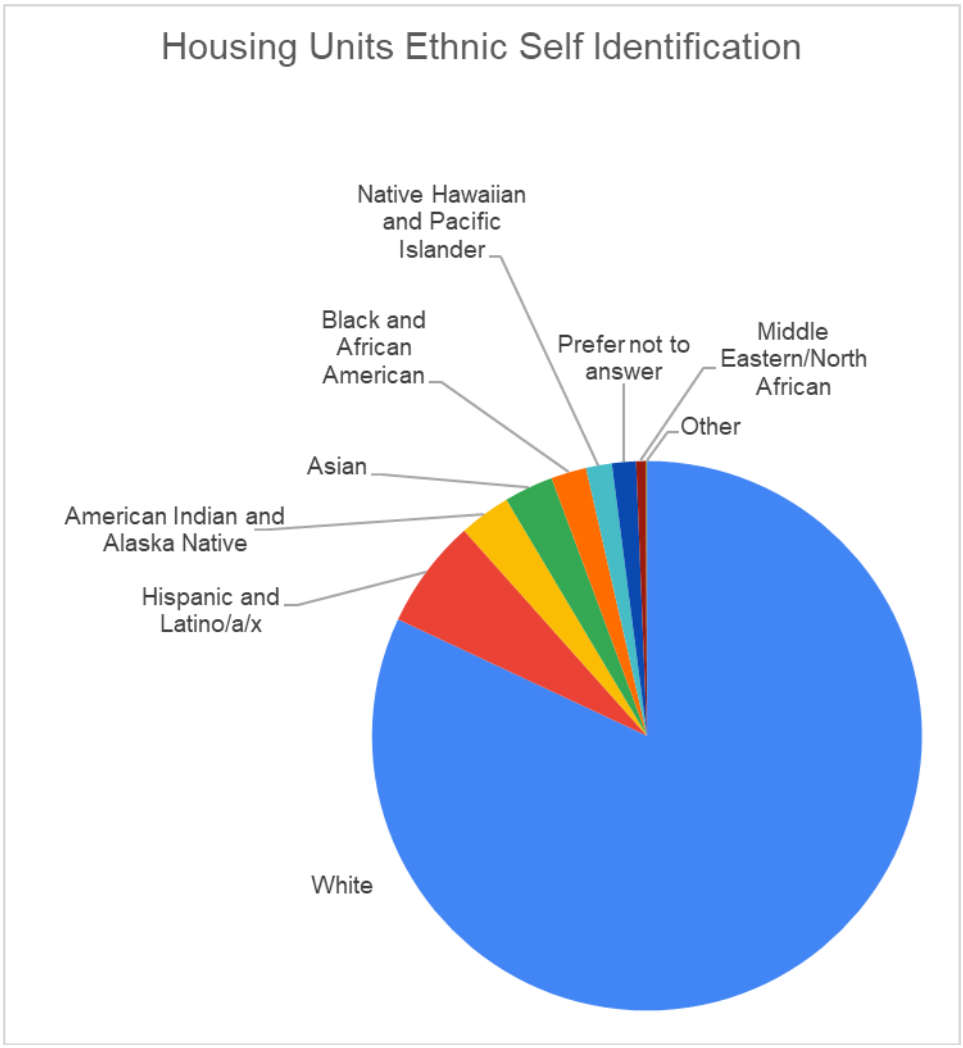


Figure 9. Survey Ethnic Identification

Table 23. Language Demographics of Housing Units

	N	%
English	2603	90
Spanish	133	5
German	18	0.6
French (Incl. Cajun)	16	0.6
Other Indo-European Languages	12	0.4
Other Languages of Asia	12	0.4
Korean	11	0.4
Chinese (Incl. Mandarin Cantonese)	10	0.3
Japanese	10	0.3
Italian	9	0.3
Russian	9	0.3
Vietnamese	8	0.3
Hindi	7	0.2
Amharic, Somali or Other Afro-Asiatic Languages	5	0.2
Arabic	5	0.2
Tagalog (Incl. Filipino)	5	0.2
Ukrainian or Other Slavic Languages	3	0.1
Telugu	2	0.07
Thai, Lao or Other Tai-Kadai Languages	2	0.07
Ilocano Samoan Hawaiian or Other Austronesian Languages	1	0.03

N = Total number
% = Percentage

The Survey results showed that for respondents there is an average of 2.5 people per housing unit. The percent of each person in the household, by age, of is represented in Table 24.

Table 24. Age of members of Housing Unit

Age	N	%
0-17 years old	1384	19
18-35 years old	2192	30
36-50 years old	1523	21
51-65 years old	1194	16
Over 65	927	13
Did not answer	55	1

N = Total number
% = Percentage

3 Comments, Recommendations and Key Learnings

Survey responses geographically represented the state well. There was balanced representation from both the east and west sides of Oregon on a population basis (Table 1). Only Grant County was not represented in the results, however Grant County contains only 0.2% of Oregon's population. Lane, Wasco and Multnomah Counties contributed more surveys than their percent of the total population. Clackamas, Deschutes, Umatilla, Washington and Yamhill Counties are underrepresented, see Figure 2. The Portland

Metro Area was just slightly overrepresented (about 3%) as Multnomah County contributed more surveys while Clackamas, Washington and Yamhill Counties were underrepresented. Using a criterion of +/-3% as the condition of good representation, every county was well represented except Multnomah County (over 3%), however the Portland Metro area was within that criterion.

Ethnic and age distribution questions were asked for all members of the household. These results are not directly comparable to US Census values, but close proximations, because the individual demographics of each person in the household was not documented. Both ethnic identification (Table 22) and age distribution (Table 24) shows that the survey results closely represented Oregon as a whole.

There were 2,921 responses used in the analysis. The results presented in this report are all "raw" counts directly from the survey results. Adjustments can be done based on demographics, but because the responses to this state-wide survey did a good job of representing the whole state, the adjustments would not add significant improvements.

The survey utilized a voluntary, online questionnaire, which was easy to execute and cost effective. However, this method biased the results due to the demographic of the type of person who would do (or not do) an online, voluntary survey. The overall affect is unknown but indicators, such as county response rates, east/west coverage, ethnic identification, and age distribution, confirm that the survey is valid.

Ways to improve the results of future surveys would include conducting a hybrid survey where, for example, 80% of responses are online and 20% are targeted to the demographics who are underrepresented. The first step would be to identify the groups or areas that are underrepresented. Set goals for each category or area and then use focused telephone, mailed or in-person surveys for these groups or areas. This would require more resources (effort, cost, time).

A future survey tool could have improved logic that would preclude "unrealistic" data and require some answer/data before moving on. For example, a pop-up screen that explains how big a cord of wood is could open if someone enters 75 cords (which is not realistic). Additionally, logic could prompt people for missing data, for example before respondent moves on to the next section, it could highlight in red the questions not answered with the option to enter a response or click "prefer not to answer." The open text boxes are hard to utilize; design future questions to avoid open text answers. Adding photos to more questions will make the instrument easier to use, for example a photo of what a cord of wood looks like. The questions on home heating appliance type used photos to click-on and were very user friendly. That technique could be used for more questions. Logic that will not allow text in number boxes (and vice versa) would also be a good improvement.

The number of housing units responding that they conduct outdoor, recreational burning increased significant from past surveys. Two reasons have been identified: when designing the survey, outdoor, recreation burning was known to be an area of high public interest, so special attention was paid to those questions (in the past it may have been treated as an ancillary question). And the second reason is that the survey period was the first year of lockdown due to the Covid-19 virus. During that time, people were encouraged to stay home and only go out for essential reasons. Many people spent more time at home with just the people in their household. When John Crouch, of the Hearth, Patio and Barbeque Association, was asked about the state of the hearth industry on 9/24/21 he commented "Over the last 2 years, many of our stores shut down due to the pandemic. But the consumers that stayed home and had jobs started spending money on their homes, on things like firepits." The conversation was part of an EPA Zoom call and was not specifically about outdoor burning, so the unsolicited comment about that part of the sector demonstrates that the wood burning appliance manufacturers had noted an increase in outdoor burning. Similarly, backyard fire pits and roasting marshmallows were featured on numerous national

media ad campaigns in 2021-2022 (Wal-Mart, Target and Hersey's are examples of large corporations depicting outdoor recreational burning on ads).

The questions about respondent's opinion of alternative heat/fuel, specifically heat pumps, show that there is a lack of understanding and that there is a lot of opportunity for education. Of the responses, 24% said they would "maybe" install a heat pump if it was made affordable or free, and 17% said they would need more information, see Table 18. The cost-effectiveness of heat pumps is well established, but the results indicate that they may not be widely known.

Rural homes are heated with electricity or wood at significantly higher rates than the average (see Table 6). This is due in large part to the availability and cost of adding Natural Gas in rural areas (mostly Eastern Oregon). There are large areas of the state that have no Natural Gas utilities. Reviewing just the east-side responses, homes were much more likely to heat with wood, propane, and fuel oil/kerosene and much less likely to rely on electric heat.

The ethnic groups with the highest rates of home heating with the expensive method of electricity (and the lowest rates of Natural Gas heating) are American Indian/Alaska Native, Black and African American and Hispanic and Latino/a/x. See Figure 6 for a graph of primary heat source by ethnic group.

Higher income groups are more likely to have Natural Gas (Figure 5) and solar (Table 19).