

## Health-Related Social Needs Following Onset of the COVID-19 Pandemic in Oregon

Jean Hiebert Larson, MS<sup>1</sup>

Anna L. Steeves-Reece, PhD, MPH<sup>2</sup>

Zoe Major-McDowall<sup>1</sup> Bruce Goldberg, MD<sup>1</sup>

Anne King, MBA<sup>1</sup>

<sup>1</sup>Oregon Rural Practice-based Research Network, Oregon Health & Science University, Portland, Oregon

<sup>2</sup>OCHIN, Portland, Oregon

<https://doi.org/10.1370/afm.3167>

### Supplemental Appendix: Statistical Analysis

**Variable recoding for Table 1 (Study Sample Characteristics).** Age, rurality, and type of insurance were extracted from the individual's beneficiary information. The authors used date of birth to create a three-category variable for age (under the age of 18, aged 18-64, and aged 65 or older), using cut-points to reflect the age at which Medicare begins for older adults and Oregon's statutory definition of a child.<sup>1,2</sup> Rurality (urban, rural, or remote [i.e., frontier]) was calculated by zip code using designations provided by the Oregon Office of Rural Health.<sup>3</sup> Individuals were coded as Medicaid beneficiaries when a Medicaid ID was provided and as Medicare beneficiaries when a Medicare ID was provided as of the day that they were screened.

Gender, race, and ethnicity were collected as self-reported survey responses. Race was self-reported as a check-all-that-apply response and were summarized using "The Ampersand Approach" (i.e., analyzing aspects of a person's identity)<sup>4</sup> by assigning dummy codes to selected categorical responses, resulting in eight subgroups: (1) American Indian or Alaska Native *or* American Indian or Alaska Native and White; (2) Asian *or* Asian and White; (3) Black or African American *or* Black or African American and White; (4) Native Hawaiian or other

Pacific Islander *or* Native Hawaiian or other Pacific Islander and White; (5) White only; (6) another race not listed only; (7) a combination of two or more races not listed above; or (8) Unknown. Individuals were counted as “Hispanic or Latino/a/e” if at least one of the “Yes” response-options were selected (Puerto Rican; Mexican, Mexican American, Chicano; Cuban; another Hispanic, Latino, or Spanish origin), as “not Hispanic or Latino/a/e” if “Not, not of Hispanic, Latino, or Spanish origin” was selected, and “Unknown” ethnicity if no response was provided.

**Interrupted time series model.** Interrupted time series (ITS) analysis requires four conditions be met: (1) a clear intervention point; (2) data is regularly collected; (3) the outcome variable is at the population-level (e.g., an average, proportion, or rate); and (4) there is an approximately linear distribution of the data. The authors tested both a change in level and a change in slope at the date of Oregon Governor Brown’s stay-at-home order (Executive Order 20–12), March 23, 2020,<sup>4</sup> (i.e., the “intervention” in the model). Study data were collected daily throughout the period of analysis, satisfying the second requirement. Data are analyzed at the population level rather than the individual level: the outcome variable in the ITS model is a proportion of positive screens per week. Lastly, Figures 1 and 2 provide evidence of an approximately linear distribution of the data. The ITS analysis included data from nearly one year prior to the stay-at-home order through nearly two years following the stay-at-home order (May 13, 2019–December 24, 2021).

The ITS hypotheses were tested using segmented linear regression, modeled with the equation:

$$y_t = \beta_0 + \beta_1 \text{time}_t + \beta_2 \text{SAHO}_t + \beta_3 \text{timeafterSAHO}_t + \varepsilon_t$$

where

$y_t$  is the proportion of beneficiaries who reported HRSN on the screening tool (aggregated by week; at least one for primary analysis, specified HRSN type in secondary analyses),

$time_t$  is a numeric representation of the week,

$SAHO_t$  is an indicator variable for before the stay-at-home order (0) and after the stay-at-home order (1),

$timeafterSAHO_t$  is an interaction term of  $time_t$  and  $SAHO_t$ , and

$\varepsilon_t$  is a random error term.

A statistically significant coefficient for  $SAHO_t$  indicates a change in level at the time of the stay-at-home order. A statistically significant coefficient to  $time_t$  indicates a trend in the period before the stay-at-home order. A statistically significant coefficient for  $timeafterSAHO_t$  indicates a trend following the stay-at-home order. Coefficients were considered statistically significant at  $p < 0.05$ .

R version 4.0.0 was used for all data management, analysis, and figures.

**Supplemental Table 1.** Health Related Social Needs [HRSN] before and after Oregon’s Stay-at-Home Order

Start Date	N	Overall HRSN	Food	Housing	Transportation	Utilities	Safety
5/13/2019	34	38%	29%	24%	12%	6%	9%
5/20/2019	43	58%	47%	26%	14%	14%	0%
5/28/2019	90	52%	41%	29%	17%	10%	2%
6/3/2019	188	37%	26%	19%	11%	9%	4%
6/10/2019	156	40%	24%	23%	11%	13%	4%
6/17/2019	175	37%	27%	18%	7%	10%	1%
6/24/2019	168	40%	29%	20%	10%	14%	3%
7/1/2019	104	35%	27%	13%	10%	7%	2%
7/8/2019	139	40%	32%	19%	14%	9%	3%
7/15/2019	99	40%	26%	24%	15%	9%	4%
7/22/2019	127	39%	30%	16%	8%	11%	1%
7/29/2019	192	34%	21%	18%	7%	10%	2%
8/5/2019	247	36%	24%	19%	8%	9%	2%
8/12/2019	266	37%	23%	21%	10%	8%	2%
8/19/2019	312	41%	30%	21%	16%	8%	2%
8/26/2019	327	41%	30%	18%	13%	8%	3%

<b>Start Date</b>	<b>N</b>	<b>Overall HRSN</b>	<b>Food</b>	<b>Housing</b>	<b>Transportation</b>	<b>Utilities</b>	<b>Safety</b>
9/1/2019	204	36%	26%	20%	12%	7%	3%
9/9/2019	226	38%	27%	21%	14%	11%	3%
9/16/2019	199	50%	33%	21%	17%	11%	3%
9/23/2019	156	41%	28%	17%	13%	11%	2%
9/30/2019	222	40%	27%	20%	11%	14%	1%
10/7/2019	224	42%	28%	18%	10%	11%	2%
10/14/2019	238	40%	25%	20%	14%	4%	2%
10/21/2019	228	34%	21%	16%	10%	8%	2%
10/28/2019	252	38%	22%	23%	7%	9%	1%
11/4/2019	244	32%	21%	16%	11%	5%	2%
11/11/2019	188	38%	24%	19%	14%	10%	2%
11/18/2019	143	40%	29%	17%	15%	7%	1%
11/25/2019	53	38%	28%	23%	11%	6%	2%
12/2/2019	215	39%	25%	20%	11%	8%	1%
12/9/2019	155	41%	33%	17%	13%	10%	2%
12/16/2019	148	34%	23%	16%	8%	8%	1%
12/23/2019	35	31%	14%	17%	17%	6%	3%
12/30/2019	75	39%	29%	9%	20%	9%	3%
1/6/2020	191	32%	21%	17%	8%	5%	1%
1/13/2020	255	35%	25%	18%	12%	10%	4%
1/20/2020	242	39%	28%	19%	12%	11%	2%
1/27/2020	281	46%	29%	23%	20%	14%	3%
2/3/2020	267	35%	24%	18%	11%	7%	1%
2/10/2020	217	38%	24%	24%	13%	11%	4%
2/17/2020	253	35%	24%	18%	13%	9%	2%
2/24/2020	254	33%	22%	14%	9%	7%	0%
3/2/2020	204	38%	28%	18%	12%	10%	1%
3/9/2020	146	47%	24%	23%	16%	6%	3%
3/16/2020	47	57%	40%	34%	34%	26%	4%
3/23/2020	61	54%	41%	18%	21%	15%	2%
3/30/2020	71	51%	35%	30%	18%	13%	6%
4/6/2020	45	58%	40%	42%	24%	22%	7%
4/13/2020	52	54%	31%	35%	27%	19%	10%
4/20/2020	47	55%	43%	34%	30%	11%	11%
4/27/2020	45	64%	44%	29%	36%	16%	7%
5/4/2020	69	59%	46%	33%	22%	12%	4%
5/11/2020	59	59%	41%	32%	32%	24%	5%
5/18/2020	46	63%	50%	48%	20%	13%	7%
5/25/2020	100	55%	46%	34%	20%	13%	7%
6/1/2020	130	63%	45%	42%	28%	19%	9%
6/8/2020	156	49%	34%	33%	19%	19%	8%
6/15/2020	135	57%	36%	34%	22%	16%	6%
6/22/2020	118	53%	36%	28%	21%	14%	4%

<b>Start Date</b>	<b>N</b>	<b>Overall HRSN</b>	<b>Food</b>	<b>Housing</b>	<b>Transportation</b>	<b>Utilities</b>	<b>Safety</b>
6/29/2020	92	67%	50%	42%	27%	23%	3%
7/6/2020	148	50%	39%	23%	19%	19%	3%
7/13/2020	233	48%	34%	23%	22%	17%	8%
7/20/2020	231	52%	39%	30%	20%	19%	3%
7/27/2020	250	49%	31%	28%	18%	16%	4%
8/3/2020	385	35%	22%	20%	13%	10%	2%
8/10/2020	198	57%	39%	36%	21%	17%	4%
8/17/2020	238	50%	32%	27%	19%	13%	3%
8/24/2020	149	56%	43%	31%	25%	13%	7%
8/31/2020	131	57%	42%	28%	26%	18%	8%
9/7/2020	77	55%	30%	35%	14%	18%	4%
9/14/2020	141	55%	38%	33%	21%	16%	4%
9/21/2020	108	54%	39%	32%	27%	11%	3%
9/28/2020	69	58%	46%	39%	22%	26%	6%
10/5/2020	83	48%	27%	27%	11%	12%	6%
10/12/2020	65	72%	46%	45%	26%	22%	8%
10/19/2020	149	62%	47%	38%	26%	25%	2%
10/26/2020	220	59%	46%	36%	29%	15%	5%
11/2/2020	248	52%	38%	33%	22%	15%	5%
11/9/2020	255	58%	42%	38%	24%	21%	5%
11/15/2020	252	58%	39%	35%	26%	12%	5%
11/23/2020	167	51%	37%	27%	25%	16%	3%
11/30/2020	200	63%	47%	44%	28%	14%	6%
12/7/2020	191	62%	45%	36%	25%	17%	6%
12/14/2020	147	63%	51%	37%	25%	20%	9%
12/21/2020	107	58%	37%	36%	23%	21%	6%
12/28/2020	97	51%	39%	31%	19%	18%	4%
1/4/2021	102	70%	48%	47%	28%	16%	7%
1/11/2021	92	67%	40%	40%	26%	14%	7%
1/18/2021	144	70%	53%	42%	28%	19%	7%
1/25/2021	211	45%	32%	28%	17%	15%	2%
2/1/2021	230	63%	46%	46%	22%	20%	5%
2/8/2021	223	49%	35%	26%	21%	15%	4%
2/15/2021	254	57%	39%	33%	24%	16%	3%
2/22/2021	272	60%	37%	37%	18%	15%	3%
3/1/2021	244	55%	38%	33%	16%	14%	4%
3/7/2021	245	56%	42%	36%	19%	15%	4%
3/14/2021	174	54%	35%	35%	28%	16%	3%
3/22/2021	201	59%	37%	36%	23%	17%	5%
3/29/2021	215	46%	29%	35%	14%	10%	4%
4/5/2021	179	55%	35%	37%	19%	18%	6%
4/12/2021	175	56%	33%	39%	18%	13%	2%
4/19/2021	176	51%	28%	33%	17%	14%	4%

Start Date	N	Overall HRSN	Food	Housing	Transportation	Utilities	Safety
4/26/2021	149	58%	36%	42%	20%	19%	2%
5/3/2021	128	48%	27%	34%	19%	12%	3%
5/10/2021	156	59%	42%	47%	22%	13%	4%
5/17/2021	143	49%	31%	31%	19%	14%	4%
5/24/2021	139	48%	33%	32%	17%	10%	1%
5/31/2021	125	60%	42%	38%	28%	14%	5%
6/7/2021	123	54%	38%	36%	20%	18%	3%
6/14/2021	113	53%	24%	35%	20%	15%	4%
6/21/2021	146	53%	36%	38%	19%	12%	4%
6/28/2021	108	72%	51%	49%	33%	19%	6%
7/5/2021	115	68%	43%	53%	24%	21%	2%
7/12/2021	127	57%	31%	39%	29%	20%	2%
7/19/2021	167	51%	34%	34%	20%	11%	2%
7/25/2021	109	61%	37%	40%	34%	17%	6%
8/2/2021	121	55%	39%	44%	25%	13%	5%
8/9/2021	102	65%	38%	52%	19%	13%	6%
8/16/2021	64	56%	27%	45%	27%	13%	3%
8/23/2021	147	48%	29%	29%	20%	9%	3%
8/30/2021	200	60%	38%	39%	17%	16%	4%
9/6/2021	166	45%	27%	31%	19%	9%	1%
9/13/2021	216	44%	30%	31%	16%	11%	4%
9/20/2021	168	55%	35%	38%	18%	13%	5%
9/27/2021	170	55%	35%	40%	19%	15%	3%
10/4/2021	148	51%	36%	36%	16%	11%	4%
10/11/2021	130	51%	31%	36%	13%	15%	2%
10/18/2021	101	54%	36%	39%	18%	16%	1%
10/25/2021	96	42%	26%	25%	13%	13%	3%
11/1/2021	128	53%	32%	33%	21%	16%	3%
11/8/2021	115	51%	33%	30%	17%	10%	3%
11/15/2021	127	50%	31%	30%	18%	16%	2%
11/22/2021	53	53%	26%	38%	11%	9%	0%
11/29/2021	59	46%	24%	32%	15%	14%	2%
12/6/2021	84	45%	31%	25%	18%	8%	5%
12/13/2021	103	50%	35%	31%	19%	8%	3%
12/20/2021	45	47%	29%	29%	20%	4%	4%

## References

1. OregonLaws. Oregon Administrative Rules: Oregon Revised Statutes. OAR 407-045-0820. 2023. Child-in-Care Abuse Rules: Definitions. [https://oregon.public.law/rules/oar\\_407-045-0820#google\\_vignette](https://oregon.public.law/rules/oar_407-045-0820#google_vignette)

2. Oregon Office of Rural Health. Oregon Office of Rural Health Geographic Definitions. Nov. 3, 2023. <https://www.ohsu.edu/oregon-office-of-rural-health/about-rural-and-frontier>

data#:~:text=Rural%20as%20any%20geographic%20areas,fewer%20people%20per%20square%20mile

3. Krause H. 4 Approaches to Multiple-Race Questions. 2022 Oct. 27, 2022 Nov. 2, 2022. <https://weallcount.com/2022/10/27/4-approaches-to-multiple-race-questions/>

4. State of Oregon. Office of the Governor. Executive Order 20-12: Stay Home, Save Lives: Ordering Oregonians to Stay at Home, Closing Specified Retail Businesses, Requiring Social Distancing Measures for Other Public and Private Facilities, and Imposing Requirements for Outdoor Areas and Licensed Childcare Facilities. 2020.

[https://www.oregon.gov/gov/eo/eo\\_20-12.pdf](https://www.oregon.gov/gov/eo/eo_20-12.pdf)