

## **COVID-19 RESPONSE**

# IMPACT OF COVID-19 UPDATE AND VACCINE INTENTION FOR OKLAHOMA AND SURROUNDING STATES

Learn about the impact of COVID-19 and vaccination efforts.

### INTRODUCTION

Over a year since its emergence, COVID-19 continues to be part of everyday life. This current report aims to re-evaluate the impact of COVID-19 on daily life, originally presented in CR-1991. In addition to impact on daily life, preferences for behaviors that may mitigate the spread of COVID-19 and vaccine intention are evaluated.

The behavior and management of COVID-19 are unlikely to stop at a state's border; therefore, a regional approach (which included Oklahoma and the surrounding states) was employed in this analysis. Oklahoma and the surrounding states felt the highest level of impact from COVID-19 on their ability to execute travel plans. Amongst the behaviors related to potentially decreasing the spread of COVID-19, those from Oklahoma and the surrounding states were most likely to wear a mask or face covering. A higher percentage of respondents from the Oklahoma region (8%) reported they had received both doses of the COVID-19 vaccine when compared to the rest of the U.S.

### **METHODS**

Data collection occurred from Jan. 13, 2021 through Jan. 23, 2021. Qualtrics<sup>1</sup>, an online survey platform, was used to create the survey. A company that hosts an online panel, Kantar<sup>2</sup>, was used to obtain opt-in survey respondents. All survey respondents were required to be 18 years or older to participate. Quotas were set in Qualtrics to target the proportion of respondents to match the U.S. census<sup>3,4</sup> proportions for sex, age, education, income and U.S. region of residence. For this analysis, respondents were separated into two groups. The first group included those who re-

ported residence in Oklahoma or nearby states: Texas, New Mexico, Colorado, Kansas, Missouri and Arkansas. These responses were collectively referred to as the "Oklahoma region." All other responses are collectively referred to as "the rest of the U.S." for this report.

The demographics of the Oklahoma region and the rest of the U.S. were statistically compared using the test of proportion<sup>5</sup>. Respondents were asked to indicate on a scale from 1 (not impacted) to 5 (impacted) the level of impact they felt COVID-19 had on eight lifestyle statements. Respondents also could indicate the lifestyle statement did not apply to them. For example, one statement "I took on education-related responsibilities for my child," would not apply to those without children in their household. The mean score for those who did not select "does not apply" was determined for each statement. The mean scores were statistically compared between the lifestyle statements, and between those in the Oklahoma region and the rest of the U.S. using a t-test<sup>6,7</sup>.

# **CONTACT**

► Courtney Bir Extension Specialist for Farm Management courtney.bir@okstate.edu 405-744-6161 Respondents were presented with five different behaviors that may decrease the spread of COVID-19 and were asked to indicate how likely they were to participate in that behavior on a scale from 1 (extremely unlikely) to 5 (extremely likely). Again, the mean scores were statistically compared between those in the Oklahoma region and the rest of the U.S. Finally, respondents were asked to indicate their vaccine status or intention. The proportion of respondents who selected each option, which ranged from "I have received both doses of the vaccination" to "I do not intend to obtain the vaccine" were statistically compared between the Oklahoma region and the rest of the U.S. using the test of proportions.

### **RESULTS AND DISCUSSION**

When comparing demographics between the Oklahoma region and the rest of the U.S. (Table 1), there were few statistical differences. The Oklahoma region had a higher percentage of respondents aged 35 to 44, and a higher percentage of respondents with an income of \$75,000 to \$99,000 when compared to the rest of the U.S. Respondents were asked to indicate the level of impact of COVID-19 from a scale of 1 (not impacted) to 5 (impacted), and the level of impact differed greatly between the lifestyle statements (Table 2). Those in the Oklahoma region indicated COVID-19 impacted their ability to execute travel plans more than the other lifestyle areas studied (mean 3.365). This is unsurprising, given the Centers for Disease Control and Prevention (CDC) recommendation to delay travel and stay at home to protect from COVID-198. Additional COVID-19 testing surrounding international travel<sup>8</sup> and closure/minimization of crowds at popular vacation destinations also likely contributed to the impact on travel. Business travel across the world was reported to be down 54% in 20209.

Tied for second-most impacted lifestyle area were 1) taking on education-related responsibilities for their child (mean 2.846) and 2) taking on care responsibilities for an adult family member (mean 2.866). Whether children have online schooling or in-person classes varies widely by state and even county. Many states, including Oklahoma, have left the mode of education up to the individual school districts, although they may provide guidelines or recommendations<sup>10</sup>. Other studies indicate there are a multitude of issues parents face with online learning, including balancing responsibilities, motivating their children and accessibility<sup>11</sup>. Accessibility is a particularly grave issue in Oklahoma where it is estimated that 24% of students do not have internet connectivity at home<sup>12</sup>. Illness in their family/household from COVID-19 (mean 2.423) and ability to buy paper products (e.g. toilet paper, paper towels) (mean 2.572) were tied for third. By the end of the data collection period, it was reported that 334,643 Oklahomans had recovered from COVID-19 and 3,231 Oklahomans had died of COVID-19<sup>13</sup>. Although COVID-19

Table 1. Demographics for Oklahoma region and the rest of the country.

(	Oklahoma and surrounding states n=146	Rest of the U.S. n=783	U.S. Census
Gender			
Male	49	46	49
Female	51	54	51
Age			
18 to 24	10	8	12
25 to 34	15	13	18
35 to 44	271	18¹	16
45 to 54	12	17	16
55 to 64	16	20	17
65+	19	24	21
Income		10	10
\$0 to \$24,999	20	19	18
\$25,000 to \$49,999		22	20
\$50,000-to \$74,999 \$75,000 to \$99,999		17 111	17 13
\$100,000 to \$99,999		31	31
Education	:1 24	31	31
Did not graduate			
from high school	1	2	11
Graduated from hig		_	
school, did not			
attend college	27	27	27
Attended college,			
no degree earne	d 21	22	21
Attended college,			
Associate's or			
Bachelor's degre			
earned	38	34	29
Attended College,			
Graduate or			
Professional Deg		16	17
earned	12	16	13

<sup>1</sup> Indicates the percentage of respondents from that category from Oklahoma and the surrounding states is statistically different than the rest of the country at the <0.05 level.

illness has touched many Oklahomans, it ranked relatively low in terms of impact. Ability to buy paper products had the only mean response statistically different for the Oklahoma region when compared to the rest of the U.S. Paper towel shortages were still being reported as a common issue through September 2020, due to supply chain issues and lean manufacturing<sup>14</sup>. Lean manufacturing means producers of a product only make what they believe consumers will buy on a certain day<sup>14</sup>.

Table 2. Impact of COVID-19 on lifestyle.

### Percentage of Respondents OK n=146 Other n=783

	1 (Not impacted)		2		3		4		5 (Impacted)		Does not apply to me		Mean <sup>1</sup>	
•	OK	Other	OK	Other	OK	Other	OK	Other	ОК	Other	OK	Other	OK	Other
Ability to buy paper products (e.g., toilet paper, paper towels)	38	37	10	12	14	15	11	10	18	15	10	11	2.572ab¹ n=131	2.500a n=698
Ability to find meat, milk and perishable grocery items	41	45	10	10	12	12	12	9	13	9	11	15	2.392a n=130	2.139b n=668
Ability to execute travel plan	s 18	18	8	5	5	7	12	7	29	26	29	38	3.365c n=104	3.280d n =487
Illness in my family/househol from COVID-19	d 32	32	8	4	5	6	9	5	12	8	34	45	2.423ab n=97	2.160b n =430
Death of family member(s) from COVID-19	34	29	4	2	3	3	5	4	14	7	40	54	2.368a n=87	2.091b n =361
Lack of childcare impacted my ability to work	28	20	3	2	7	5	6	4	6	6	49	63	2.189a n=74	2.284bo n =292
I took on education-related responsibilities for my child	20	20	2	2	10	6	10	5	12	9	47	58	2.846b n=78	2.549a n =326
I took on care responsibilities for an adult family member	21	24	5	3	8	5	5	6	17	8	44	54	2.866b n=82	2.353a n =360

<sup>1</sup> Matching letters down a column indicate the means are not statistically different at the 0.05 level. For example, the mean score for ability to buy paper products is not statistically different from ability to find meat, milk and perishable grocery items for OK and the surrounding states. Differing letters indicate the means are statistically different at the 0.05 level. For example, the mean score for ability to buy paper products is statistically different from the mean score for ability to execute travel plans.

Note: There were no statistical differences in the mean level of impact between Oklahoma and the surrounding states and the rest of the U.S.

Table 3. Likelihood of participating in personal behaviors that may prevent the spread of COVID-19 in the next 9 months.

### Percentage of Respondents OK n=146 Other n=783

	<i>1</i> (Extremely Unlikely)		2		3		4		<i>5</i> (Extremely Likely)		Mean <sup>1</sup>	
_	OK	Other	OK	Other	OK	Other	OK	Other	OK	Other	OK	Other
Wear a mask or face covering in public	4	5	2	4	9	10	17	13	68	69	4.425a¹ n=146	4.377a² n=782
Reduce number of non-essential errands/ interactions around town	10	11	7	7	21	21	25	22	36	39	3.692b n=146	3.701b n=782
Reduce out-of-town travel	10	10	5	6	19	19	17	16	50	48	3.917bc n=145	3.854c n=782
Comply with governmental orders regarding closures or lock downs  Comply with government	4	7	8	5	17	18	19	17	52	53	4.062c n=145	4.046d n=782
recommendations regarding social distancing	5	6	4	4	14	13	20	19	57	58	4.199ac n=146	4.191e n=781

<sup>1</sup> Matching letters down a column indicate the means are not statistically different at the 0.05 level. For example, the mean for wear a mask or face covering in public is not statistically different from comply with government recommendations regarding social distancing for Oklahoma and the surrounding states. Differing letters indicate the means are statistically different at the 0.05 level. For example, the mean for wear a mask or face covering in public is statistically different from reduce number of non-essential errands/interactions around town for Oklahoma and the surrounding states.

<sup>2</sup> The mean responses for each personal behavior are not statistically different between the those in Oklahoma and the surrounding states and the rest of the U.S.

Three lifestyle areas were of lowest impact for the Oklahoma region: ability to find meat, milk and perishable grocery items, lack of childcare impacting their ability to work and death of family members from COVID-19. In Oklahoma, the age group with the highest number of COVID-19 deaths were residents 65 and older, which made up 79.27% of COVID-related deaths<sup>15</sup>. Oklahoma City was the city with the highest absolute number of deaths with 602 residents lost<sup>15</sup>. On a more positive note for Oklahoma, COVID-19 had a lower impact on ability to find agricultural products including meat, milk and perishable grocery items. Oklahoma historically has generated \$2.54 billion in gross income from cattle, \$209 million in cash receipts from milk production and in general, agriculture had a total of \$28 billion in output<sup>16</sup>. With agriculture having an important impact on the state economy, the availability of such items even during the pandemic is good news.

Respondents were asked on a scale from 1 (extremely unlikely) to 5 (extremely likely) how likely they were to participate in a behavior that was likely to decrease the spread of COVID-19 in the next nine months (Table 2). For all behaviors studied, the mean response was not statistically different between the Oklahoma region and the rest of the U.S. Wearing a mask or face covering in public was the most likely behavior respondents in which the Oklahoma region would participate, with a mean of 4.425. Governor Stitt encouraged Oklahomans to wear a mask in public, but has stated that he would not issue a mask mandate<sup>17</sup>. Many Oklahoma cities, including major cities like Oklahoma City and Tulsa, have mask mandates<sup>18</sup>. Many chain stores and businesses including places like Target, CVS and Walgreens require mask usage in their stores, regardless of the state policy<sup>19</sup>. Research regarding mask wearing continues and the CDC reports there is evidence that masking protects both the wearer of the mask and those around them through source control<sup>20</sup>. Complying with government recommendations regarding social distancing (mean 4.199) did not have a statistically different mean from wearing a face covering in public. The CDC defines social distancing as staying at least 6 feet from people who are not part of your household<sup>21</sup>. The reason is the distance will limit the number of potentially infected droplets that could reach a person you are standing near<sup>21</sup>. The preferred distance people naturally stand apart is called interpersonal distance and varies between age, gender and country<sup>22</sup>. People in North America have been documented to prefer a greater distance between individuals<sup>22</sup>. Already having a preference for a greater distance, in addition to the fun ways people can be reminded to distance, such as the "stand one Komodo dragon apart" signs at the Tulsa zoo, may make this behavior easier to adopt.

People were less likely to adopt behaviors including complying with government orders regarding closures or lock downs (mean 4.062), reducing out-of-town travel (mean 3.917) and reducing number of nonessential errands/interactions around town (mean 3.692). It was interesting that respondents were less likely to reduce travel, but also indicated travel was most impacted by COVID-19. Additional precautions and travel limitations may be wearing on people, but not causing them to stop all travel. The rural nature of many Oklahoma communities also may make reducing out-of-town travel more difficult, as many people may need to travel to another town for shopping, repair parts for homes or machinery or other common needs.

One bright spot for the Oklahoma region is the vaccination effort (Figure 1). A higher percentage of respondents from the Oklahoma region has received both doses of the

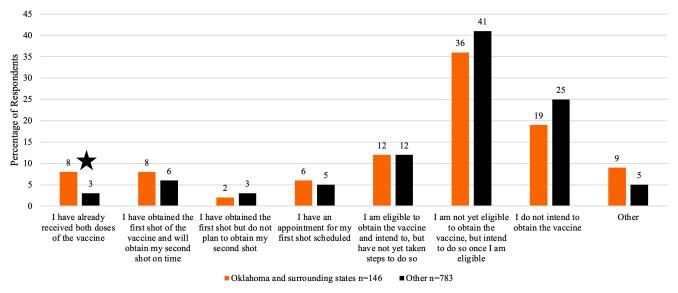


Figure 1. Vaccine intention, percentage of respondents. Star indicates statistically different percentages at the 0.05 level.

COVID-19 vaccination (8%) when compared to the rest of the U.S. (3%). Eight percent of those from the Oklahoma region have obtained the first shot of the vaccine and will obtain the second shot on time, and only 2% who received the first vaccine do not plan to obtain the second. A high percentage of respondents (36%) were not yet eligible to obtain the vaccine at the time of data collection, but intended to do so once they are eligible. On March 9, the state of Oklahoma expanded COVID-19 eligibility to Phase 3 which includes educators and essential workers<sup>23</sup>. Most states reported a phase system for vaccine distribution, while the exact make-up of the three groups differed between states 24,25,26,27,28,29. For the states in the Oklahoma region, the general set-up for vaccine distribution was three major phases, with phase one having additional sub-tiers in an effort to have the vaccine reach the most vulnerable populations first. For example, Texas has identified three main phases for vaccination distribution, with Phase 1 including those in healthcare, long-term care facilities, 65 and older, 16 and older with a chronic medical condition and school and licensed child care personnel. Phase 2 for Texas includes persons between the age 50 to 64, and Phase 3 is broad distribution<sup>24</sup>. Although the vaccination plans for each state are well documented, additional research is needed to determine the distribution of the vaccine across the states and even within individual counties.

It is important to note the percentage of respondents who already received the vaccine is more a reflection of individual states and communities being able to vaccinate quicker than others and not a reflection of vaccination intent. In the Oklahoma region, 19% of respondents did not intend to obtain the vaccine. Herd immunity is when most people are immune to a disease, which provides indirect protection to those who are not immune<sup>30</sup>. Research is being conducted to determine what level of immunity is required to reach herd immunity, with the current estimate being that 70% of the population would need to be immune to achieve herd immunity to COVID-19<sup>24</sup>. To reach a conclusive number, additional information including the level and duration of immunity a person can acquire after having COVID-19 either with or without the vaccine is needed<sup>30</sup>. Another piece of the immunity puzzle is children. Currently, one vaccine has been authorized for 16 and older, with the others authorized for over 18<sup>31</sup>. Researchers are hopeful the pediatric vaccine will be available by late 202131.

### **CONCLUSIONS**

Everyone has been impacted by COVID-19, and those in the Oklahoma region have been impacted in much the same way as the rest of the U.S. Ability to travel emerged as the activity with the largest impact from COVID-19. Despite this impact, respondents indicated they were

less likely to decrease travel when compared to other potentially COVID-19 mitigating behaviors. Taking on education-related responsibilities for children remains an impactful issue for many respondents. Interestingly, despite the debates surrounding mask mandates, wearing a mask was the most likely behavior respondents would participate in to mitigate the spread of COVID-19 in the next nine months. A larger proportion of respondents from the Oklahoma region indicated they had received both doses of the vaccine when compared to the rest of the U.S. Hopefully, as the vaccination effort continues, in conjunction with other mitigating effects, the COVID-19-related restrictions can ease and a return to normal, or a new version of normal, activity participation can begin.

### References

- Qualtrics. Online Survey Tool. Qualtrics. 2021 [cited 2021 Feb 16]. Available from: qualtrics.com/core-xm/ survey-software/.
- Kantar. About Kantar. Kantar. 2021 [cited 2021 Feb 16]. Available from: kantar.com/about
- U.S. Census Bureau. 2019b. U.S. Regions. Accessed 11-11-20. Available from: hcensus.gov/popclock/ data\_tables.php?component=growth
- 4. USDA. 2020. 2013 Rural-Urban Continuum Codes Documentation. Available from: ers.usda.gov/data-products/rural-urban-continuum-codes/documentation/
- Acock, A. C. A Gentle Introduction to Stata 6th ed. College Station: Stata Press; 2018.
- 6. Gosset, WS. The probable error of a mean. *Biometrika*. 1908; 6: 1–25.
- 7. Welch, BL. The generalization of 'student's' problem when several different population variances are involved. *Biometrika*. 1947; 34: 28–35.
- CDC. 2021. Travel During COVID-19. Available online from: cdc.gov/coronavirus/2019-ncov/travelers/ travel-during-covid19.html Accessed March 8, 2021.
- Wood, Laura. 2020. Global Business Travel Market Report 2020: Market is Expected to Decline by -54% in 2020 but Recover to Reach \$829.5 Billion by the Year 2027. Available online from: businesswire.com/ news/home/20201211005329/en/Global-Business-Travel-Market-Report-2020-Market-is-Expectedto-Decline-by--54-in-2020-but-Recover-to-Reach-829.5-Billion-by-the-Year-2027---ResearchAndMarkets.com Accessed March 8, 2021.
- OSSBA. 2021. COVID-19 Resources. Available online from: ossba.org/resources/coronavirus/ Accessed March 8, 2021
- Garbe, A., Ogurlu, U., Logan, N. and Cook, P. 2020. Parents' experiences with remote education during COVID-19 school closures. *American Journal of Qual-itative* Research, 4(3), pp.45-65.

- Whitacre, Brian. Broadband Access Across Oklahoma During COVID-19. Available online from: extension. okstate.edu/coronavirus/media/household/broad-band-access.pdf Accessed March 8, 2021
- Oklahoma State Department of Health. 2021. COVID-19 Cases. Available online from: oklahoma.gov/covid19. html Accessed March 8, 2021.
- Benveniste, Alex. 2020. Why it's hard to find paper towels again. Available online from: cnn. com/2020/09/13/business/paper-towel-shortage/ index.html Accessed March 9, 2021.
- Oklahoma State Department of Health. 2021. COVID-19 Deaths. Available online from: looker-dashboards. oklahoma.gov/embed/dashboards/76 Accessed March 8, 2021
- Foundation for Agriculture. 2021. Oklahoma Agriculture at a Glance. Available online from: okfb-foundationforagriculture.org/oklahoma-agriculture-at-a-glance/ Accessed March 8, 2021
- KFOR. 2021. Oklahoma legislator proposes statewide mask mandate. Available online from: kfor.com/ news/local/oklahoma-state-representative-proposes-statewide-mask-mandate/ Accessed March 9, 2021
- Douglas, Kaylee. 2020. List: Oklahoma cities with mask mandates. Available online from: kfor.com/ news/list-oklahoma-cities-with-mask-mandates/ Accessed March 9, 2021
- KWTX. 2021. Some retail, grocery stores in Texas to still require face masks after mandate expires. Available from: kwtx.com/2021/03/03/some-retailgrocery-stores-in-texas-to-still-require-face-masksafter-mandate-expires/ Accessed March 9, 2021
- CDC. 2020. Science brief: community use of cloth masks to control the spread of SARS-CoV-2. Available online from: cdc.gov/coronavirus/2019-ncov/more/ masking-science-sars-cov2.html Accessed March 9, 2021
- CDC. 2020. Social Distancing. Available online: cdc. gov/coronavirus/2019-ncov/prevent-getting-sick/ social-distancing.html Accessed March 9, 2021
- Sorokowska, A., Sorokowski, P., Hilpert, P., Cantarero, K., Frackowiak, T., Ahmadi, K., Alghraibeh, A.M., Aryeetey, R., Bertoni, A., Bettache, K. and Blumen, S. 2017. Preferred interpersonal distances: a global comparison. *Journal of Cross-Cultural Psychology*, 48(4), pp.577-592.

- 23. KOCO. 2021. Oklahoma to open COVID-19 vaccine eligibility to Phase 3 priority groups starting Tuesday. Available online: koco.com/article/live-oklahomahealth-officials-give-update-on-when-phase-3-priority-groups-can-get-covid-19-vaccine/35770803 Accessed March 9, 2021
- 24. Texas Health and Human Services. COVID-19 Vaccine Information. Available online from: hdshs.texas.gov/coronavirus/immunize/vaccine.aspx Accessed March 15, 2021
- Arkansas Department of Health. Vaccine plan in response to COVID-19 pandemic. Available online from: healthy.arkansas.gov/images/uploads/pdf/ ADH\_COVID-19\_Vaccination\_Plan.pdf Accessed March 15, 2021
- Colorado Department of Public Health and Environment. Find out when you're eligible for a COVID-19 vaccine. Available online from: covid19.colorado.gov/for-coloradans/vaccine/find-out-when-youre-eligible-for-a-covid-19-vaccine Accessed March 15, 2021
- 27. Johnson County Kansas. What Phase am I in? Available online from: jocogov.org/covid-19-vaccine/what-phase-am-I-in Accessed March 15, 2021
- New Mexico Department of Health. State of New Mexico COVID-19 Vaccine Allocation Plan Phases 1A, 1B, 1C and 2. Available online from: cv.nmhealth.org/ wp-content/uploads/2021/02/2021.1.28-DOH-Phase-Guidance.pdf Accessed March 15, 2021
- Missouri Stronger Together. COVID-19 Vaccine Information. Available online from: covidvaccine.mo.gov/ Accessed March 15, 2021
- University of Maryland Medical System. Coronavirus Immunity. Available online: umms.org/coronavirus/ covid-vaccine/facts/immunity Accessed March 9, 2021
- 31. Salazar, Juan. 2021. When will the COVID-19 Vaccine be available for kids, and will it be safe for your family. Available online: connecticutchildrens.org/coronavirus/when-will-the-covid-19-vaccine-be-available-for-kids-and-will-it-be-safe-for-your-family/