North Dakota COVID-19 Impact Survey Report

Conducted by:

NISTLER COLLEGE
OF BUSINESS & PUBLIC ADMINISTRATION
UNIVERSITY OF NORTH DAKOTA.

Institute of Policy and Business Analytics

Project Participants:
Jason L. Jensen, Ph.D.
Executive Director | Institute for Policy and Business Analytics
Professor | Department of Political Science and Public Administration
Overall Project Administration, Project Conceptualization and Survey Design, Reporting

David T. Flynn, Ph.D.
Research Director | Institute for Policy and Business Analytics
Professor | Department of Economics & Finance
Project Conceptualization and Survey Design; Data Analysis

Cordell A. Fontaine, M.A.
Survey Coordinator | Institute for Policy and Business Analytics
University of North Dakota | Business.UND.edu
Survey Design, Implementation & Management; Data Analysis and Reporting

Chih Ming Tan, Ph.D.
Associate Dean for Research | Nistler College of Business & Public Administration
Professor and Page Endowed Chair | Department of Economics & Finance
Project Conceptualization

Sheila K. Hanson, Ph.D.
Affiliated Faculty | Institute for Policy and Business Analytics
Assistant Professor | Middleton School of Entrepreneurship and Management
Research Conceptualization, Survey Design, Data Analysis

Brian Urlacher, Ph. D
Professor & Chair | Department of Political Science and Public Administration
Sample Weighting

May, 2022

Executive Summary

The COVID-19 pandemic has led to significant disruptions to economic activity in North Dakota. To ascertain the opinions and behaviors of North Dakotans in relation to the COVID-19 pandemic, a survey was developed and administered by phone to 556 randomly selected adult North Dakotans. The interviews were conducted from March 10 through 29, 2022.

The following is a summary of the major findings related to the COVID-19 pandemic:

COVID-19
- 67% of respondents reported having received a COVID-19 vaccine, and 62% of those have received a booster.
- When unvaccinated respondents were asked what their deciding factor for them not to receive the vaccine, being *undecided about their choice* was the most common reason (20%), followed by *lack of confidence in research and testing* (17%), and *belief they have natural immunity* because they previously had COVID-19 (15%).
- 40% of respondents indicated a test-confirmed (previous or current) case of COVID-19.
  - 20% of the respondents who have had COVID-19 report experiencing lasting health impacts.
- 26% percent of respondents said they had lost a family member, a close friend, or both, due to COVID-19.
- Although we didn't assess it directly, this level of COVID-19 infection implies a significant loss of productivity in terms of work days lost due to illness and quarantine, and then the lingering loss of productivity due to symptoms of what has come to be known as "long COVID."

North Dakota COVID-19 Impact

Purpose and Methodology Overview[1]

To ascertain the opinions and behaviors of North Dakotans related to the impact of the COVID-19 pandemic, a survey was developed and administered by phone to 556 randomly selected adult North Dakotans. The interviews were conducted from March 10 through 29, 2022. A cell only sample was utilized to provide a probability-based sample representative of all such individuals. The sample yields an error margin[2] of +/- 4.4%.

Report Format

The report is divided into three sections.

- Section I includes a summary of the major survey findings.

- Section II presents tables which provide the percentage of all respondents who gave various responses to each question, as well as the proportion of demographic sample segments (i.e. gender, age, educational attainment, residence location, years living in North Dakota, and household type) that provided a particular response.

- Section III presents the survey methodology and the weighting methodology report.

---

[1] Weighting methodology at end of report.

[2] This means that one can be 95 percent confident that the mean response for any question in the statewide sample of adults will not vary more than 4.4% in either direction from the actual mean for the response if all adults age 18 or older in the target area were surveyed.

NORTH DAKOTA COVID-19 IMPACTS

COVID-19 Vaccination Status. Two-thirds of respondents (67%) report receiving the COVID-19 vaccine. Significant statistical differences across demographic groups were identified.

Reasons for Not Receiving the Vaccine. When respondents were asked what their deciding factor for them not to receive the vaccine, being undecided about their choice was the most common reason (20%). Other reasons included:
- Lack of confidence in research and testing (17%),
- Belief they have natural immunity because they previously had COVID-19 (15%),
- Lack of confidence in vaccines and large pharmaceutical companies (9%),
- Worried about health side and long-term effects (9%),
- COVID-19 is a mild disease, few or no symptoms (6%),
- No trust in government health organizations (5%), and
- Having a medical condition that prevents receiving the vaccine (3%).

Received COVID-19 Vaccine

■ Yes
■ No

33%

67%
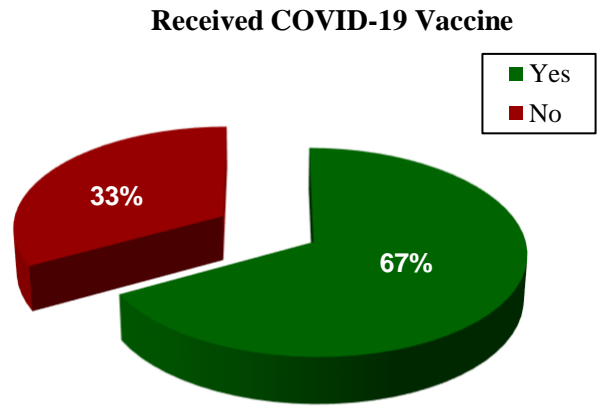
Received COVID-19 Vaccine

Demographic Profile	Percent	
	Yes	No
Overall	67%	33%
Gender*		
Men	58%	42%
Women	77%	23%
Age*		
18 to 34	56%	44%
35 to 54	62%	48%
55 or Older	82%	28%
Education*		
HS or Less	59%	41%
Vocational, Some College, Associates	64%	36%
Bachelors or Higher	82%	18%
ND Duration*		
1 to 10 Years	60%	40%
11 to 30	59%	41%
31 Years or Longer	74%	26%
Political Affiliation*		
Very Liberal or Liberal	84%	16%
Moderate	79%	21%
Conservative or Very Conservative	56%	44%
Undisclosed	60%	40%
* Statistically significant		

NORTH DAKOTA COVID-19 IMPACTS

## Comparing Reasons for Non-Vaccination to Demographics

|		Undecided		Lack of Confidence in Research - Testing		Have Natural Immunity		Lack of Confidence in Big Pharma	
		N	Row N%	N	Row N%	N	Row N%	N	Row N%
OVERALL		**34**	**20%**	**30**	**17%**	**26**	**15%**	**16**	**9%**
GENDER	Male	21	11%	19	10%	17	9%	10	5%
	Female	12	5%	11	5%	9	4%	6	3%
AGE	18 to 34	14	11%	11	9%	16	13%	9	7%
	35 to 54	14	12%	12	10%	6	5%	5	5%
	Over 55	6	3%	7	4%	4	2%	2	1%
EDUCATION	HS or Less	11	8%	19	13%	13	10%	7	5%
	Vocational, Some College, Associates	19	13%	4	3%	8	6%	8	6%
	Bachelors or Higher	4	3%	7	5%	4	3%	1	0%
ND DURATION	1 to 10 Years	7	12%	11	17%	1	2%	6	10%
	11 to 30	14	11%	5	4%	14	12%	7	7%
	31 or More	13	6%	15	6%	10	4%	3	1%
STATUS	Employed	22	8%	24	9%	14	5%	9	3%
	Not Working	12	9%	6	4%	11	9%	6	5%
POLITICS	Very Liberal or Liberal	1	2%	0	0%	0	0%	3	8%
	Moderate	10	7%	8	5%	4	3%	2	2%
	Conservative or Very Conservative	14	10%	16	11%	17	11%	10	7%
	Undisclosed	8	10%	6	8%	5	7%	0	0%

NORTH DAKOTA COVID-19 IMPACTS

COVID-19 Booster Status. Sixty-two percent of respondents report receiving a COVID-19 booster. Significant statistical differences across demographic groups were identified.

COVID-19 in North Dakota. Thirty-seven percent of respondents reported previously having COVID-19, and three percent currently have COVID-19 confirmed by a test.

Received COVID-19 Booster
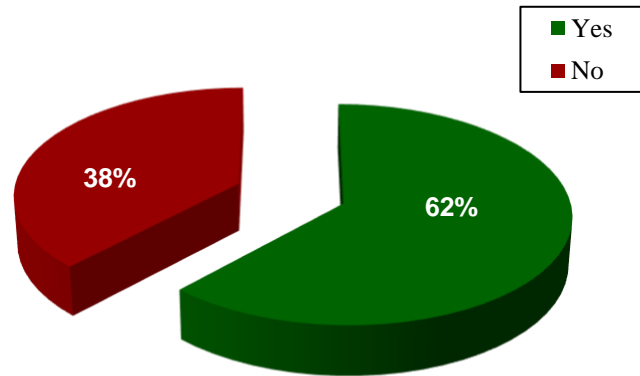
COVID-19 in North Dakota
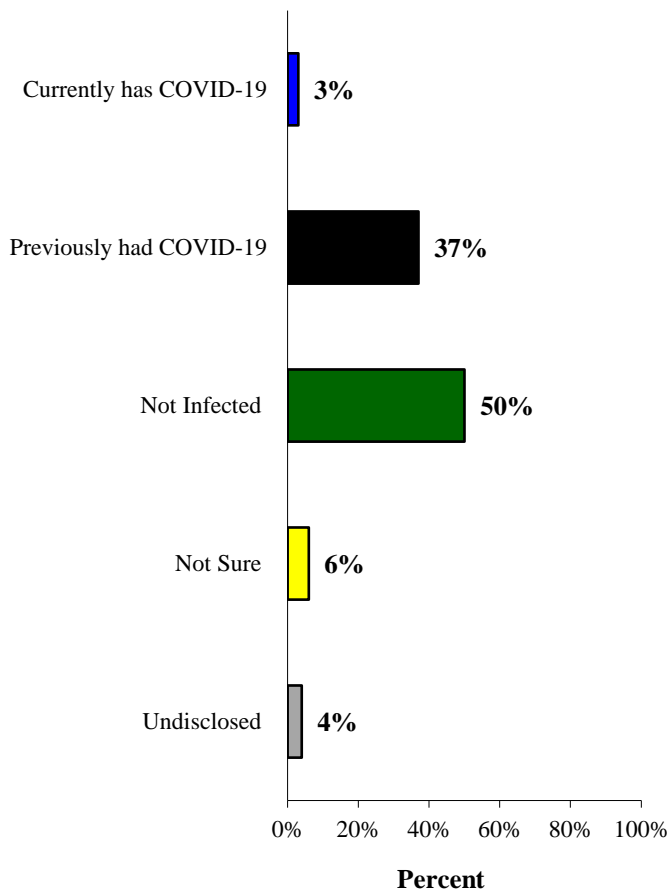
Received COVID-19 Booster

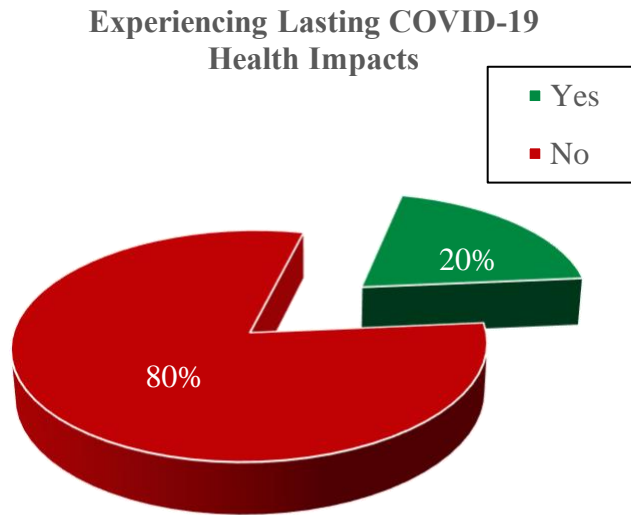| Demographic Profile	Percent	
	Yes	**No**
Overall	62%	38%
Gender		
Men	57%	43%
Women	66%	34%
Age*		
18 to 34	37%	63%
35 to 54	61%	39%
55 or Older	80%	20%
Education*		
HS or Less	54%	46%
Vocational, Some College, Associates	62%	38%
Bachelors or Higher	70%	30%
ND Duration*		
1 to 10 Years	38%	62%
11 to 30	53%	47%
31 Years or Longer	72%	28%
Political Affiliation*		
Very Liberal or Liberal	76%	24%
Moderate	70%	30%
Conservative or Very Conservative	57%	43%
Undisclosed	44%	56%
* Statistically significant		

NORTH DAKOTA COVID-19 IMPACTS

Comparing COVID-19 Status to Demographics

		Currently has COVID-19		Previously had COVID-19		Not Infected		Not Sure		Undisclosed	
		N	Row N%	N	Row N%	N	Row N%	N	Row N%	N	Row N%
OVERALL		**14**	**3%**	**203**	**37%**	**281**	**50%**	**34**	**6%**	**26**	**4%**
GENDER	Male	7	2%	107	38%	138	49%	19	7%	13	5%
	Female	7	3%	96	35%	142	52%	15	5%	12	4%
AGE	18 to 34	2	1%	87	45%	83	43%	13	7%	6	3%
	35 to 54	4	3%	66	40%	71	44%	13	8%	10	6%
	Over 55	8	4%	50	25%	127	63%	8	4%	9	5%
EDUCATION	HS or Less	8	4%	78	38%	100	48%	11	6%	9	4%
	Vocational, Some College, Associates	3	1%	71	36%	93	48%	16	8%	11	6%
	Bachelors or Higher	4	2%	54	35%	88	56%	7	4%	5	3%
ND DURATION	1 to 10 Years	1	1%	26	30%	48	56%	9	11%	1	1%
	11 to 30	4	2%	81	47%	71	42%	8	5%	7	4%
	31 or More	9	3%	96	32%	162	54%	16	5%	16	6%
STATUS	Employed	11	3%	162	41%	173	44%	25	6%	24	6%
	Not Working	3	2%	41	25%	108	67%	8	5%	2	1%
POLITICS	Very Liberal or Liberal	0	0%	15	35%	22	50%	7	15%	0	0%
	Moderate	4	2%	58	32%	106	58%	12	7%	2	1%
	Conservative or Very Conservative	8	4%	101	45%	102	45%	12	5%	3	1%
	Undisclosed	2	2%	28	27%	51	49%	3	3%	20	19%

NORTH DAKOTA COVID-19 IMPACTS

Experiencing Lasting COVID-19 Health Impacts. Of all respondents, seven percent reported experiencing lasting health impacts due to COVID-19. Significant statistical differences across demographic groups were identified. Important to note, however, is that 20% of the respondents who have had test-confirmed COVID-19 report experiencing lasting health impacts.

Experiencing Lasting COVID-19 Health Impacts

■ Yes
■ No

20%

80%

Experiencing Lasting COVID-19 Health Impacts
All Respondents

Demographic Profile	Percent	
	Yes	No
Overall	7%	93%
Gender		
Men	20%	80%
Women	20%	80%
Age*		
18 to 34	17%	83%
35 to 54	20%	80%
55 or Older	26%	74%
Education*		
HS or Less	17%	83%
Vocational, Some College, Associates	26%	74%
Bachelors or Higher	20%	80%
ND Duration*		
1 to 10 Years	28%	72%
11 to 30	11%	89%
31 Years or Longer	25%	75%
Political Affiliation*		
Very Liberal or Liberal	41%	59%
Moderate	16%	84%
Conservative or Very Conservative	20%	80%
Undisclosed	18%	82%
* Statistically significant		

NORTH DAKOTA COVID-19 IMPACTS

Family and Personal Losses Due to COVID-19.
Thirteen percent of respondents said they had
lost a family member due to COVID-19, and
the same percent (13%) stated they had also lost a
close friend.

Comparing COVID-19 Personal Losses to Demographics

		Lost a Family Member		Lost a Close Friend	
		Count	Row N %	Count	Row N %
OVERALL		**72**	**13%**	**70**	**13%**
GENDER	Male	40	14%	32	11%
	Female	32	12%	38	14%
AGE	18 to 34	9	5%	15	8%
	35 to 54	33	20%	29	18%
	Over 55	30	15%	26	13%
EDUCATION	HS or Less	27	13%	27	13%
	Vocational, Some College, Associates	20	11%	26	13%
	Bachelors or Higher	25	16%	17	11%
ND DURATION	1 to 10 Years	8	9%	7	9%
	11 to 30	16	9%	19	11%
	31 or More	48	16%	44	15%
STATUS	Employed	50	13%	46	12%
	Not Working	22	14%	24	15%
POLITICS	Very Liberal or Liberal	9	20%	6	13%
	Moderate	23	13%	22	12%
	Conservative or Very Conservative	29	13%	28	13%
	Undisclosed	10	10%	14	14%

Survey Methodology

Target Population. The target population was defined as adults 18 years of age or older residing in North Dakota with a cellular phone.

Field Period. The survey was pre-tested March 4 through 9 and the data were collected from March 10 through 29, 2022.

Urlacher Consulting   *Ideas, Research, Technology*
www.urlacherconsulting.com

Weighting Methodology Report

General Discussion

For decades random sampling of telephone lines through random digit dialing (RDD) has offered the most systematic and efficient method for drawing a sample; however, this approach often produces samples that differ somewhat from the general population.

Many survey firms have shifted to mixed cellphone and landline surveys or cell phone only surveys. A cell phone only sample solves many of the problems that were commonly associated with landline surveys – such as determining household size. Yet, all random digit dialing sampling methods produce results slightly divergent from known population patterns. Statisticians have developed a range of approaches to weight survey data to correct these differences.

The process used for this survey to bring results into alignment with the patterns in the general population is a type of weighting known as "raking." Raking is an iterative process in which the weight of each case is incrementally adjusted by a random amount. These random adjustments are carried out until weighted results converge on the desired distributions. The statistical software platform R is used along with the raking algorithm in the *anesrake package*.[3]

Four demographic factors were incorporated into the creation of sample weights (Age, Education, Race, and Gender). Data for Age, Gender, Race and Education were taken from the 2020 Current Population Survey produced by the U.S. Census Bureau. The distribution of the survey weights are presented in Figure 1. Table 1 describes the original distribution and the weighted distribution of Census categories for Age, Gender, Race, and Education.

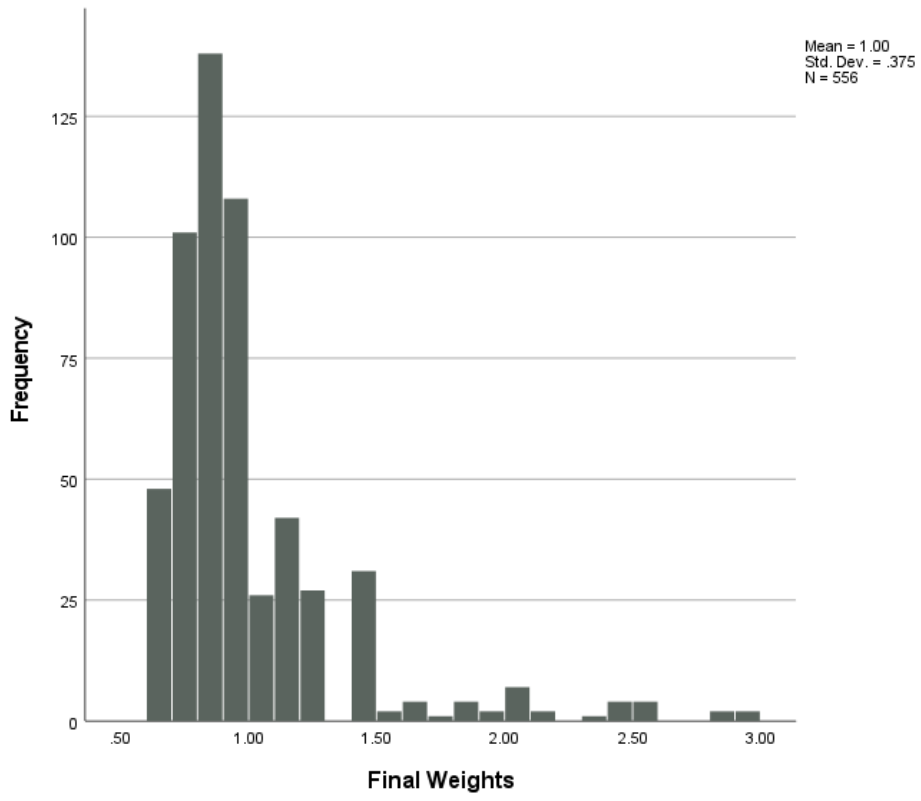[3] Pasek, Josh. 2011. "ANES Raking Implementation." CRAN. http://cran.r-project.org/

Mean = 1.00
Std. Dev. = .375
N = 556

Figure 1: Distribution of Survey Weights

Table 1: Survey Weights Relative to Census Data and Survey Distributions

Race	Respondents		Weighted Results		Population	
White	518	93.17%	476.35	85.68%	498,943	85.68%
Non-White	38	6.83%	79.65	14.32%	83,422	14.32%
Education Level						
High School or Less	133	23.92%	156.71	28.19%	164,145	28.19%
Some College/Associates/Vocational	184	33.09%	172.55	31.03%	180,727	31.03%
Bachelor's Degree or Higher	184	33.09%	145.74	26.21%	152,653	26.21%
Under 25 (No Census Differentiation)	55	9.89%	81.00	14.57%	84,840	14.57%
Gender						
Male	303	54.50%	284.46	51.16%	297,945	51.16%
Female	253	45.50%	271.54	48.84%	284,420	48.84%
Age Group						
18 – 24	55	9.89%	81.00	14.57%	84,840	14.57%
25 – 34	94	16.91%	110.23	19.83%	115,456	19.83%
35 – 44	100	17.99%	86.48	15.55%	90,584	15.55%
45 – 54	86	15.47%	77.18	13.88%	80,843	13.88%
55 – 64	91	16.37%	89.97	16.18%	94,236	16.18%
65+	130	23.38%	111.14	19.99%	116,406	19.99%
Total	**556**	**100.0%**	**556**	**100.0%**	**582,365**	**100.0%**

Interpreting Weighted Data

While weighted data helps to correct for potential sources of bias that may result from a sampling process, this improvement is not without its drawbacks. Namely, weighted data often has a larger variance than un-weighted data. This increase in variance is known as the design effect and slightly alters the process of drawing inferences from the survey data to the general population.

Many statistical packages are able to adjust calculations of standard errors and confidence intervals to account for the increased variance of weighted data. Before carrying out statistical analysis of weighted data, it is generally good practice to review the documentation for the statistical software package being used to see how weighted data are handled.

For less technical uses of weighted survey data there are fairly straight forward techniques for adjusting confidence intervals and standard errors to account for increased variance. The approach recommended here is based on the formula provided by Heeringa *et al*. (2010).

The default formula for the standard error of a proportion is provided in Equation 1. The variable *p* corresponds to a specific percentage value and *N* corresponds to the sample size. For a sample of 511, this value can be multiplied by 1.96 to get a margin of error corresponding to 95% confidence level.

$$SE = \sqrt{\frac{p \times (1-p)}{N}}$$
Equation 1

The standard error formula in Equation 1 can be adjusted by multiplying it by the square root of the design effect (δ). The design effect for a single set of weights can be calculated using Equation 2. Again, *N* is the size of the sample. The variable *w* is the weight for the jth case.

$$\delta = \frac{N \times \sum w_j^2}{\left(\sum w_j\right)^2}$$
Equation 2

Combining Equation 1 and Equation 2, the corrected standard error can be calculated using Equation 3. For this set of sample weights the design effect (δ) equals 1.14. The corrected standard error depends upon the proportion being tested but is at its maximum value when *p* = .5.

$$CorrectedSE = \sqrt{\delta \times \frac{p \times (1-p)}{N}}$$
Equation 3

Table 2 provides the distribution of margins of error corresponding to different confidence levels and different proportions; however***, the most straight forward statement regarding margin of error for this study is that for a 95% confidence level, ± 4.44% is the largest margin of error*** that would result from Equation 3 and a δ value of 1.14 and a sample of 556.

Table 2: Margin of Error Given Different Confidence Levels

Proportions	50/50%	60/40%	70/30%	80/20%	90/10%
90% Confidence Level	± 3.72%	± 3.65%	± 3.41%	± 2.98%	± 2.23%
95% Confidence Level	± 4.44%	± 4.35%	± 4.07%	± 3.55%	± 2.66%
99% Confidence Level	± 5.83%	± 5.71%	± 5.35%	± 4.67%	± 3.50%