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Telemedicine use in Illinois during the weeks leading to the spread of Covid-19, omicron variant: Insight from the Census Bureau's Household Pulse Survey

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Abstract

Based on the reasoning that behavior is adaptable to changing circumstances, this paper explores whether telemedicine has become common among Illinoisans, since the emergence of Covid-19 in January 2020. Micro data from the US Census' Household Pulse Survey were analyzed, comparative statics analysis was performed. Results suggest that telemedicine use has declined in Illinois, but college educated population and households with income above \$75,000 are using the service more. These clusters or segments should be the target for marketing the service.

Introduction

Since its emergence in Hubei Province in China on December 31, 2019, the SARS-CoV-2 virus has continued to evolve with five variants as at January 11, 2022 - Alpha, Beta, Gamma, Delta, and Omicron². While the Omicron variant is spreading rapidly across the nation³, experts argue that protective measures and vaccination will still be the key elements to counter the spread of the new variant and to prevent new waves of severe COVID-19 cases and deaths⁴.

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² World Health Organization. Classification of omicron (B.1.1.529): SARS-CoV-2 variant of concern. 2021.

[https://www.who.int/news/item/26-11-2021-classification-of-omicron-\(b.1.1.529\)-sars-cov-2-variant-of-concern](https://www.who.int/news/item/26-11-2021-classification-of-omicron-(b.1.1.529)-sars-cov-2-variant-of-concern)

³ Omicron was first detected in the US on December 1, 2021. Since then the virus has grown at the rate of 5% per day; see Appendix 1.

⁴ Centers for Disease Prevention and Control. Science brief: omicron (B.1.1.529) variant. 2021.

<https://www.cdc.gov/coronavirus/2019-cov/science/science-briefs/scientific-brief-omicron-variant.html>

In an earlier *Research Brief*, I highlighted the Covid-19 protective beliefs and behavior of the general public⁵; for example, 86% of Illinoisans believe that it is necessary to avoid gatherings in groups of ten or more people. This belief translated to digital engagement with healthcare providers, specifically, the use of telemedicine⁶. This paper continues with this discussion; it explores whether the use of telemedicine has become common among the population now, almost two years since the appearance of Covid-19.

Theory

Behavior is docile; it is adaptable to changing circumstances⁷. Our internal representations of the environment, our cognitive processes, can be described using three-term units called *expectancy*⁸ - in situation S_1 , response R_1 will soon be followed by stimulus S_2 . For example, because of Covid-19 (S_1), I will communicate digitally (R_1) with my healthcare provider for my wellbeing (S_2).

If consulting with the healthcare provider is the goal, then the expectancy gets activated. The expectancy is always there, as *knowledge*. The expectancy gets weaker, if the response, “digital

communications with the healthcare provider” (use of telemedicine), was not followed by S_2 , physical wellbeing.

A person’s knowledge about an environment, in our case, about healthcare, is organized as a cognitive map of that domain. *Ceteris paribus*, the shortest path to the goal would be preferred. Thus, if a person believes that consulting a healthcare provider to achieve wellbeing is best achieved through digital consultation, then telemedicine would be the response to healthcare consultations.

Methodology

Data were from the Household Pulse Survey⁹. The US Census Bureau developed the survey to understand the social and economic impacts of Covid-19 on US households; the survey provides estimates of Covid-19 impacts at the state level as well as for 15 Metropolitan Statistical Areas (MSAs).

This paper uses microdata gathered during the weeks of April 2021 and December 1, 2021. The focus was on telemedicine use at the individual level. The geographical scope of the data was Illinois, categorized into two regions: Chicago-Naperville-Elgin Metro and

⁵ Athiyaman, A. (2020). Illinoisans’ perceptions about the state government, economy, and healthcare during the Covid-19 pandemic. *Research Brief*, 2(7), April 24, 1-6. http://www.iira.org/wp-content/uploads/2020/06/IL_Perceptions_During_Covid_Policy_Brief.pdf.

⁶ Athiyaman, A. (2021). Who uses telemedicine, believers or disbelievers of Covid-19? *Research Brief*, 3(2), January 16, 1-6. <http://www.iira.org/wp->

[content/uploads/2021/01/who_uses_telemedicine_v3_2_2021.pdf](http://www.iira.org/wp-content/uploads/2021/01/who_uses_telemedicine_v3_2_2021.pdf).

⁷ This is a salient premise of ‘molar’ theories of behavior.

⁸ The idea comes from behavioral psychology; a cognitive explanation of the theory can be gleaned from, Tolman, E. C. (1951). *Collected Papers in Psychology*. Berkley: University of California Press.

⁹ See, <https://www.census.gov/data/experimental-data-products/household-pulse-survey.html>.

other Illinois. Table 1 lists the variables used in the analysis. Statistical inferences were confined to tests of

independence in contingency tables. Responses were weighted to be representative of Illinois.

Table 1: Operational Definitions of Variables

Variable	Measure
Telemedicine use	At any time in the last 4 weeks, did you have an appointment with a doctor, nurse, or other health professional by video or phone? Coded, Yes = 1; No = 2.
Week	Week of interview; Week 1, April 14, 2021 – April 26, 2021; Week 2, December 1, 2021 – December 13, 2021. Coded: Week 1 = 1; Week 2 = 2.
Gender	What sex were you assigned at birth, on your original birth certificate? Coded 1 = Male and 2 = Female.
Age	What year were you born? Coded: 2021 – number.
Race	What is your race? Coded, White, alone = 1; Black, alone = 2; Asian, alone = 3; Other = 4.
Education	What is the highest level of school you have completed? Less than high school = 1; Some high school = 2; High school graduate = 3; Some college = 4; Associate degree = 5; Bachelor's degree = 6; Graduate degree = 8.
Mental Health	At any time in the last 4 weeks, did you receive counselling or therapy from a mental health professional ... Yes = 1; No = 2
Income	In 2020, what was your total household income before taxes? Less than \$25,000 = 1; \$25,000 - \$34,999 = 2; \$35,000 - \$49,999 = 3; \$50,000 - \$74,999 = 4; \$75,000 - \$99,999 = 5; \$100,000 - \$149,999 = 6; \$150,000 - \$199,999 = 7, and GTE \$200,000 = 8.

Findings

Compared to April 2021, 16% fewer Illinoisans consulted their healthcare provider using digital means during December 2021. The presence of Covid-19 is a weak stimulus for

individuals to use telemedicine; the correlation between the stimulus (Covid-19) and the response (use of telemedicine) is a low 0.08¹⁰ (Table 2).

Table 2: Impact of Time on Telemedicine Use

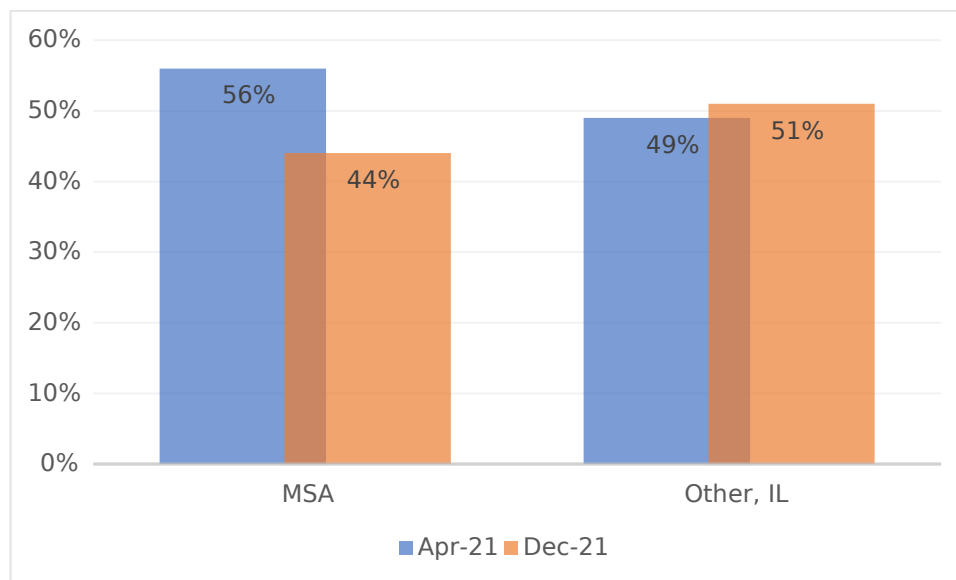
Telemedicine Use	April 2021	December 2021
Yes	25%	18%
No	75%	82%
Number of respondents	5,963,428	6,779,736

Note: χ^2 significant, $p < 0.05$

Is MSA location a determinant for telemedicine use? The answer is “no”. As shown in Figure 1, compared to April 2021, fewer MSA residents patronized

telemedicine during December 2021. In contrast, more rural residents took up telemedicine during December 2021.

Figure 1: Dynamics of Telemedicine Use by Location



Note: N = 2,019,909 for MSA and N = 670,021 for Other, IL. χ^2 significant, $p < 0.05$; Phi = 0.07.

¹⁰ Phi coefficient.

Another correlation of interest is the relationship between the variables “mental health services” and “telemedicine”. The covariation is positive and increasing in strength. Specifically, the proportion of Illinoisans

who have used telemedicine given that they have received counselling or therapy from a mental health professional increased from 44% during April 2021 to 56% during December, 2021 (Table 3).

Table 3: Mental Health Services and Telemedicine

Telemedicine Use	Given the use of Mental Health Services	Given non-use of Mental Health Services
April 2021	44%	58%
December 2021	56%	42%
Number of respondents	744,179	1,938,577

Note: χ^2 significant, $p < 0.05$; Phi = 0.14

Table 4 shows demographic variables as predictors of telemedicine use. While equal proportion of men and women patronize telemedicine, a significant proportion of elderly Illinoisans moved away from telemedicine; for example, in

the 80+ age group, telemedicine use dropped from 80% during April 2021 to 20% during December 2021. In general, the educated and the wealthy favor digital interactions with healthcare providers.

Table 4: Demographic Influences on Telemedicine Use

Variable	April 2021	December 2021	N
Gender (Phi = 0.01)			
• Male	55%		1,238,165
• Female	54%	45%	1,451,766
		46%	
Age (Phi = 0.15)			
• LT65	50%	50%	1,967,645
• 65-69	62%	38%	279,488
• 70-74	63%	37%	178,420
• 75-79	59%	41%	135,310
• GTE80	80%	20%	129,068
Education (Phi = 0.32)			
• LT High School	28%	72%	20,613
• Some High School	57%	43%	180,059
• High School	82%	18%	580,595
• Some College	40%	60%	639,320
• Associate's Degree	43%	57%	189,140
• Bachelor's Degree	42%	58%	548,783
• Graduate Degree	58%	42%	531,420
Income (Phi = 0.22)			
• LT\$25,000	47%	53%	460,936
• \$25K - \$34,999	78%	22%	232,068
• \$35K - \$49,999	54%	46%	271,695
• \$50K - \$74,999	70%	30%	431,062
• \$75K - \$99,999	50%	50%	416,252
• \$100K - \$149,999	49%	51%	433,604
• \$150K - \$199,999	41%	59%	230,462
• GTE \$200,000	47%	53%	213,853

Summary and Conclusion

This paper explored the dynamics of telemedicine use among Illinoisans; specifically, changes in telemedicine use during April 2021 and December 2021 were assessed using micro data from the US Census' Household Pulse Survey. Results suggest that telemedicine use has declined, from 1.46million visits during April 2021 to 1.23million visits during December 2021.

Theory suggests that if a person believes that consulting a healthcare provider to achieve wellbeing is best achieved through digital consultation, then telemedicine would be the response to healthcare consultations. A few segments or clusters of Illinoisans

do believe in telemedicine and use the service. They include:

1. Most college educated population;
2. People with household income of \$75,000 or more, and
3. Younger Illinoisans.

During the Covid-19 pandemic, the Center for Medicare Services (CMS) increased the number of telemedicine services by 80%¹¹; these services are expected to become permanent. This research has uncovered the target market for telemedicine; it is time to apply the selective concentration principle of market segmentation to highlight to these customers the value or utility of telemedicine.

¹¹ Athiyaman, A. (2021). Value of Telemedicine. *Research Brief*, 3(3), 1-26. Available online: <http://www.iira.org/wp->

content/uploads/2021/02/Telemedicine_ResBrief_3_Feb3_2021.pdf.

Appendix 1: New Cases of Covid-19, US, December 2021

Date	Number of Cases
Dec 1, 2021	139,315
Dec 2, 2021	138,712
Dec 4, 2021	58,144
Dec 5, 2021	34,573
Dec 6, 2021	197,444
Dec 7, 2021	113,997
Dec 8, 2021	149,045
Dec 9, 2021	123,505
Dec 11, 2021	51,345
Dec 12, 2021	36,356
Dec 13, 2021	202,883
Dec 14, 2021	116,859
Dec 15, 2021	145,276
Dec 16, 2021	146,319
Dec 18, 2021	75,833
Dec 19, 2021	72,479
Dec 20, 2021	302,899
Dec 21, 2021	189,471
Dec 22, 2021	243,692
Dec 23, 2021	265,215
Dec 25, 2021	58,348
Dec 26, 2021	189,714
Dec 27, 2021	543,540
Dec 28, 2021	380,712
Dec 29, 2021	489,064
Dec 30, 2021	585,055
