Social networks and COVID-19 vaccination hesitancy in Mexican older adults

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ABSTRACT

Introduction: The importance of social networks is growing, impacting everyday life. At this stage of global COVID-19 vaccination roll-out, hesitancy to get immunized is slowing this process; it is thought that this decision could be impacted by information shared on social networks. **Objective:** Determine whether the use of social networks is associated with the willingness to get the COVID-19 vaccine. **Methods:** This is a secondary analysis of the ENSANUT COVID-19 study, that measures the impact of the pandemic on the Mexican population. Only older adults, aged 65 years or older, were included in this work. Face to face interviews were performed to determine social network utilization, willingness to get vaccinated, and socio-demographic information on health and COVID-19. Bivariate analysis and logistic regression were performed. **Results:** From a total of 1,490 older adults, 59.3 % were women whose mean age was 73.5 (SD 6.8), and 53.3% (n = 795) were willing to get a COVID-19 vaccine when available. In an adjusted multivariate logistic regression model, WhatsApp was found to be a significant variable related to lower risk of vaccine hesitancy (OR 0.43, 95% CI, 0.2–0.85; p = 0.016). Other variables related to vaccine hesitancy were being a woman (OR 1.58, 95% CI, 2–1.23; p < 0.001) and COVID-19 literacy (OR 1.32, 95% CI, 1.01–1.74; p = 0.047). **Conclusion:** The use of social networks such as WhatsApp is a factor that can influence older adult vaccination against COVID-19. Social networks, among other variables, should be taken into account when analyzing factors that lead to vaccination hesitancy in older adults.

Key words: ageing; social networks; COVID-19 vaccination; SARS-CoV-2; older adults.

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RESUMEN

Introducción: Las redes sociales ganaron importancia con la pandemia de COVID-19. Con la disponibilidad de vacuna COVID-19, la indecisión para vacunarse frena este proceso; uno de los factores que se estudian es la información compartida en las redes sociales. **Objetivo:** Determinar si el uso de las redes sociales está asociado con la disposición a recibir la vacuna COVID-19. **Métodos:** Este es un análisis secundario de ENSANUT-COVID-19, que midió el impacto de la pandemia en la población mexicana. Se realizaron modelos bivariados y regresiones logísticas. **Resultados:** De un total de 1490 adultos mayores, el 59,3% eran mujeres, cuya edad media fue de 73,5 (DE 6,8), y el 53,3% (n = 795) estaban dispuestos a vacunarse para COVID-19. En un modelo de regresión logística multivariada ajustado por variables sociodemográficas, se encontró que el uso de WhatsApp era una variable significativa relacionada con menor riesgo de indecisión para vacunarse (OR 0,43; IC de 95%; 0,2–0,85; p = 0,016). Otras variables relacionadas con la indecisión para vacunarse fueron ser mujer (OR 1,58; IC 95%; 2–1,23, p < 0,001) y conocimiento sobre COVID-19 (OR 1,32; IC 95%; 1,01–1,74, p = 0,047). **Conclusión:** El uso de redes sociales como WhatsApp es un factor que puede influir en la elección de vacunarse contra COVID-19 en adultos mayores. El uso de redes sociales, entre otras variables, debe tenerse en cuenta al analizar los factores que conducen a la indecisión de los adultos mayores para vacunarse.

Palabras clave: envejecimiento; redes sociales; vacunación COVID-19; SARS-CoV-2; adultos mayores.

INTRODUCTION

The emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the COVID-19 pandemic has changed the lifestyle of millions worldwide due to the implementation and adoption of preventive measures to ensure lower morbidity and mortality (lockdowns, social isolation).[1] The beginning of a massive worldwide COVID-19 immunization campaign has led to a continuous reduction in infections and hospitalization rates, along with other positive consequences, especially for populations at risk.[2,3] However, there are still groups of individuals—including older adults—reluctant to getting vaccinated, posing a risk not only for themselves but also for those around them, which fuels new waves of infections around the globe.[4] Vaccine hesitancy has different rates and varies according to availability and sociocultural and economic factors in countries across the world[5]; for example, in an international survey among low- and middle-income countries, vaccine acceptance was only 78.4% (Oct 2020–Dec 2020).[6]

Reports explore characteristics associated with the acceptance of the COVID-19 vaccine, evidencing that multiple factors play a role when it comes to making these complex health decisions.[7] For example, a study in the United States showed that 1 in 11 older adults were not willing to get vaccinated for COVID-19. Factors associated with acceptance were believing in the safety and efficacy of the COVID-19 vaccine (i.e., the belief that it would help protect oneself and others), willingness to accept possible side effects, opinion about the importance of vaccines, and safety concerns.[8] Furthermore, a study in Brazilian older adults showed a prevalence of vaccine hesitancy (17.5%) in which associated factors for not wanting the vaccine were the absence of COVID-19 symptoms, evangelical religion, and female sex.[9]

In addition to knowledge from past vaccination campaigns, the hesitancy to get immunized, and the recommendation for social isolation, the role of social networks (SN) has earned importance. It is linked to increased health misinformation[10] and affects health literacy, a well-known factor related to vaccination choices.[11] A worldwide study in the last year evidenced that Mexico is among the countries that share the most 'fake news' related to the current global health crisis.[12]

This phenomenon is evolving since older adults have to adopt SN to keep important interpersonal relationships during the pandemic.[13] There are a few reports on how SN could impact vaccine hesitancy; therefore, our aim was to analyze how, in the context of other factors, SN could affect Mexican older adults when deciding to get the COVID-19 vaccine.

MATERIALS AND METHODS

This is a secondary analysis of the ENSANUT COVID-19 (National survey of health and nutrition), a cross-sectional study aiming to determine the impact of the SARS-CoV-2 pandemic on a probabilistic sample of Mexican population. The methods and further information can be found in the ENSANUT COVID-19 executive report.[14] Our study focuses on the available data on the use of SN. only asked to older adults, which were defined as a person 65-years or older (n = 1,490). This survey was done from August 17, 2020 to November 14, 2020, including face-to-face questions on the individuals' health and social and lifestyle behaviors. The survey was carried out following the study protocols and recommendations to safely perform interviews. Importantly, the interviews were performed at the end of the first COVID wave in Mexico and just before the

beginning of the second wave and a full lockdown (spring–summer of 2020).[15]

To evaluate the willingness to get a COVID-19 vaccine when available, a single question was asked "Will you accept to get the vaccine against COVID-19 when it becomes available?" The possible answers were "yes", "no", or "I don't know". We further collapsed the answer into "yes" and "no/I don't know." The SN variables included a first question in which the subject was asked "Do you use any SN?" It was followed by the specifications "WhatsApp (WA)", "Facebook (FB)", "Twitter", "YouTube", "chats (not specified)", and "other". The sum of the specific SN led to an ordinal variable for the total of social networks used. Other variables included: sociodemographic factors (age, sex, marital status, schooling level, indigenous language as first language/second language, household income, employment status, living situation), multimorbidity (two or more chronic diseases from a list of 14)[16], lifestyle behaviors (physical activity, alcohol binge drinking [≥ 5 alcoholic beverages for males and ≥ 4 alcoholic beverages for females], smoking status, vaccination against influenza and/or pneumococcus), and COVID-related factors (knowledge of COVID-19, preventive actions, and have/had COVID-19).

In the first step of the statistical analysis, the variables by willingness to get the vaccine were described, including means and standard deviations for continuous variables and frequencies (relative and absolute) for binary/ordinal variables, with t- and chi-squared tests accordingly. A logistic regression adjusted for all the variables was performed, followed by a regression for each specific network. The strength of the association was reported as odds ratios (OR) with 95% confidence intervals (CI). A term of interaction between the use of SN and financial status was used to prevent the moderating effect between finances or socioeconomic status and SN use (higher income-increased cellphone use). Finally, sampling weights provided in the data sets were used for all the analyses. The statistical software STATA/SE 17.0 (Copyright 1985–2021 StataCorp LLC; 4905 Lakeway Drive College Station, Texas, 77845, USA) was used. All the participants in the study signed an informed consent. ENSANUT COVID-19 follows the Helsinki declaration, and it was approved by the institutional ethics review board.

RESULTS

A total of 1,490 individuals (mean age 73.6 years, ± SD 6.8) were included, representing 4,162,301 older adults (> 65 years of age), of which 59.3% (n = 884) were women. The hesitancy to get the vaccine had a prevalence of 46.6% (n = 695). A total of 1,197 individuals (80.3%) reported no use of SN, while 9.5% (n = 142) used one and 10.1%, two or more (n = 151). According

to the bivariate analysis, the individuals not implementing preventive measures showed the highest rate of hesitancy (59.2%), followed by those with low COVID-19 literacy (55.4%) and women (50.3%). On the other hand, individuals that had COVID-19 in the previous months presented the lowest rate of hesitancy (29.1%), followed by those with a higher income and using two or more SN (Table 1).

Regarding the use of specific SN, WA was the most frequently used (17.12%, n = 256), followed by FB (9.9%, n = 147) and YouTube (6.1%, n = 91). The "other" SN (Instagram, TikTok, among others) were reported to be used scarcely. As shown in Table 1, a lower hesitancy rate was found among those using chats (30.8%) and WA (36.7%), while those not using any SN in general showed ≥ 46.6%. The difference between WA users and non-users was the only one statistically significant (p < 0.001).

According to the fully adjusted logistic regression, the main factors associated with COVID-19 vaccine hesitancy were being a woman (OR 1.58; 95% CI, 1.23–2; p < 0.001), low COVID-19 literacy (OR 1.32; 95% CI, 1.01–1.74; p = 0.047), and income of 300–499 USD (OR 0.45; 95% CI, 0.29–67; p < 0.001). A positive effect on vaccine hesitancy was associated with previous vaccination (OR 0.62; 95% CI, 0.49–0.7; p < 0.001), multimorbidity (OR 0.74; 95% CI, 0.57–0.97; p = 0.031), and the use of two or more SN (OR 0.51; 95% CI, 0.27–0.97; p = 0.041).

In addition, the interaction term between income and SN use was also significant. This was included to prevent bias regarding income and SN access (Table 2). When including each specific SN, one at a time, into the regression, only WA remained significant (OR 0.43; 95% CI, 0.2–0.85; p = 0.016) (Table 3).

DISCUSSION

According to the results, the use of SN could play a role in the process leading to hesitancy to get COVID-19 vaccination. Those older adults who use two or more SN or WA presented the strongest association with the willingness to get vaccinated, even after adjusting by other variables and evaluating the possible interaction term between SN use and socioeconomical status. On the other hand, factors such as income, low COVID-19 literacy, previous COVID-19 infection, multimorbidity, and being female were independently associated with hesitancy.

The COVID-19 vaccine has been developed collaboratively between the CEPI (Coalition for Epidemic Preparedness Innovations), the WHO (World Health Organization), and the NIH (U.S National institute of health) to accelerate the process.

TABLE 1. Description and association between sociodemographic variables and vaccine acceptance.

	Total (n = 1,490)	Willing to get vaccinated?		
		Yes (n = 795 [53.3%])	No (n = 695 [46.6%])	p-value
Age, mean (SD)	73.6 (6.8)	73.3 (6.7)	73.8 (7)	0.1
Women, n (%)	884 (59.3)	440 (49.7)	444 (50.3)	Chi^2 = 14 p = 0.001
Men n (%)	606 (40.67)	355 (58.8)	191 (31.5)	
Indigenous language, n (%)	89 (5.9)	50 (56.2)	39 (43.8)	0.582
Employment status, n (%)	237 (15.9)	125 (52.7)	112 (47.3)	0.76
Marital status, n (%)	649 (43.6)	361 (55.6)	288 (44.4)	0.123
Schooling level, median (IQR)	3 (2)	3 (5)	3 (2)	< 0.001
Living situation, n (%)	324 (21.7)	160 (49.4)	164 (50.6)	0.105
Income*, n (%) None 0.1–299 USD 300–499 USD 500–699 USD 700–1,099 USD 1,100 USD or higher	235 (15.8) 766 (51.4) 273 (18.3) 97 (6.5) 71 (4.7) 48 (3.2)	104 (44.2) 384 (50.1) 171 (62.6) 64 (65.9) 40 (56.3) 32 (66.6)	131 (55.8) 382 (49.9) 102 (37.4) 33 (34.1) 31 (43.7) 16 (33.4)	0.001
Physical activity, n (%)	313 (21.1)	183 (58.5)	130 (41.5)	0.045
Smoking, n (%)	125 (8.4)	73 (58.4)	52 (41.6)	0.238
Binge drinking, n (%)	234 (15.7)	130 (55.5)	104 (44.5)	0.463
Low COVID-19 literacy, n (%)	392 (26.3)	175 (44.6)	217 (55.4)	< 0.001
No preventive measures, n (%)	125 (8.4)	51 (40.8)	74 (59.2)	0.003
Previous COVID-19, n (%)	31 (2.1)	22 (70.9)	9 (29.1)	0.047
Previous vaccines, n (%)	963 (64.6)	549 (57)	414 (43)	< 0.001
Multimorbidity, n (%)	310 (20.8)	186 (60)	124 (40)	0.008
Social networks used, n (%) 0 1 2	1,197 (80.3) 142 (9.5) 151 (10.1)	620 (51.8) 82 (57.7) 93 (61.6)	577 (48.2) 60 (42.3) 58 (38.4)	0.041

* Income converted to USD with an exchange rate of 20.01 according to the Mexican National Bank exchange (26/07/2021).

The solidarity trial was made to evaluate risks of each COVID-19 candidate vaccine within 3–6 months.[17] Now that the vaccine is available, there is a continuous rollout around the world.[2] In Mexico, the first vaccination wave (February–April 2021) started with those at higher risk, such as sanitary workers and older adults aged +60 years.

Even as the vaccination against COVID-19 seems to gain relevance and different countries establish strategies to reach most of the population, only 26.5% of the world seems to have received at least one dose of the vaccine.[18] In Mexico, by the end of July, 2021, only 20% of the population had received the full immunization and 30% had at least one shot of the vaccine against COVID-19.[18]

According to data from the Mexican Health Ministry, 74% of the adults aged 60 years or older are currently fully vaccinated. The percentage exceeds the expectations from the hesitancy prevalence in late 2020. Following the Mexican national plan for vaccination, efforts are made so adults and young adults can access the vaccine. This is performed assuming that the older population has now been vaccinated and ensuring that every unvaccinated older adult has open access to the vaccine at any given time.

However, approximately 4 millions of older adults remain hesitant to get vaccinated[19], which is important due to the higher risk they face and the prevalence of frailty and higher mortality rates against COVID-19.[20] Similar trends are shown

TABLE 2. Factors associated with hesitancy to get COVID-19 vaccination using fully adjusted logistic regression.

	Odds ratio	95% confidence interval	p-value
Age	1.01	0.9–1.02	0.238
Women	1.58	2–1.23	< 0.001
Indigenous language	0.8	0.51–1.25	0.34
Employment situation	1.12	0.82–1.7	0.169
Marital status	1.01	0.78–1.29	0.949
Schooling level	0.97	0.93–1.02	0.393
Living situation	1.01	0.75–1.34	0.946
Income* None 0.1–299 USD 300–499 USD 500–699 USD 700–1,099 USD 1,100 USD or higher	 Reference 0.71 0.45 0.5 0.59 0.24	 0.51–0.9 0.29–67 0.27–0.91 0.26–1.34 0.08–0.73	 0.04 < 0.001 0.024 0.212 0.01
Physical activity	0.95	0.72–1.25	0.747
Current smoking	0.87	0.58–1.29	0.491
Binge drinking	1.1	0.81–1.52	0.485
Low COVID-19 literacy	1.32	1.01–1.74	0.047
No preventive measures	1.2	0.76–1.84	0.38
Previous COVID-19	0.51	0.23–1.14	0.104
Previous vaccines	0.62	0.49–0.7	< 0.001
Multimorbidity	0.74	0.57–0.97	0.031
Number of social networks used 0 1 2	 Reference 0.82 0.51	 0.4–1.54 0.27–0.97	 0.553 0.041
Interaction term income* network use	1.16	1.03–1.3	0.012

* Income converted to USD at an exchange rate of 20.01 according to the Mexican National Bank exchange (26/07/2021).

TABLE 3. Specific social networks association with hesitancy to get COVID-19 vaccination adjusted logistic regression*.

	Odds ratio	95% confidence interval	p-value
WhatsApp	0.43	0.2–0.85	0.016
Facebook	1.07	0.5–2.09	0.83
YouTube	1.31	0.7–2.31	0.348
Twitter	1.5	0.6–3.74	0.37
Chats	0.7	0.2–2.43	0.584
Other	2.04	0.46–9.02	0.343

* Entered one social network at a time in the regression and adjusted for the same variables in Table 2.

in different regions according to data available on the website Our World in Data.[21]

It is impossible to deny that vaccination efforts face challenges, such as those related to vaccine supply, vaccination logistics, access, and specially those related to the willingness of the population.[22]

Factors linked to a lower willingness to vaccinate were mostly tied to beliefs about safety and efficacy of the vaccine.[8] The findings in this study show that misconceptions about COVID-19 could lead to a higher hesitancy. In contrast, being previously vaccinated against influenza and pneumococcal pneumonia had a better disposition towards getting the vaccine (i.e., those individuals are aware of the positive effect of vaccines and the lower adverse effects).[23,24]

Moreover, this hesitancy has been partly attributed to the spread of misinformation and false beliefs that transform into fake news and anti-vaccine data.[24] The reach of misinformation depends on how believable and extended it is. Then, SN can be a channel for sharing these harmful views as they ensure that conceptions against vaccination reach a considerable number of people. [25,26] Still, in this study WA had the opposite effect, which could indicate that the value of communication, social interaction, and better SN takes a heavier toll on hesitancy than the risk of receiving harmful information.[27] Older adults prefer WA over other SN because of its special features: It is a direct channel between two or more individuals, provides sources of information usually identifiable (e.g., person, group), and has a user-friendly interface, among others.[28]

The COVID-19 pandemic has presented challenges for socialization; for example, one study found that adults who live alone were more reactive to social contact during the COVID-19 outbreak.[13] However, our results show that older adults could get positive impact from SN usage. Further studies on the effects of increased SN use and adaptation are needed to understand this relationship and could be considered for public health policies.[27]

In addition to vaccine hesitancy, other factors can affect the vaccination rates, such as the Peltzman Effect (i.e., people typically adjust their behavior in response to perceived levels of risk) in which the vaccination programs and the previous low rates of COVID-19 gave a "false sense of security" and increasing exposure to potential infection risks.[4] Therefore, France, the United States, and Mexico, among others, have recently made serious calls to their population to stop hesitating and get vaccinated.[29-31]

Vaccination is a choice, but it must be an informed one; misconceptions and information without scientific evidence can be seen as a risk against the freedom of choice in older adults. This population is vulnerable to misinformation but also to verified information, given the current need for SN to keep relationships during lockdowns. Then, efforts could be made to improve this situation.

Some studies have shown that information and communication through technology can impact health, mediated by the effect of loneliness and social isolation.[32] This seems to be true, since other studies evidenced that the use of technology by older adults is primarily a way to make and keep social connections.[33] A recent report argues in favor of a better use of technology in the older adults and the creation of infrastructure that allows implementation of benefits, such as information in a controlled fashion and for those already vulnerable, such as Low- and Middle-income Countries.[34]

Indeed, SN can be seen as a useful with several benefits when used correctly, as they would help with sharing and communicating updated and relevant information. So, older adults play an active role in the decision to get vaccinated against COVID-19. The way these channels can influence older adults is elegantly approached in a recent manuscript[35] in which loneliness, lower life satisfaction, and more depressive symptoms were improved with the use of internet. Then, SN could be a mediator for vaccine hesitancy.

To the best of our knowledge this is the first report to explore the impact of SN in older adults when making decisions related to getting the COVID-19 vaccination. This is a large representative sample, while the latest national sample of COVID-19 information shows important relationships and information that could be of interest for public health policies. Furthermore, it helps to reduce the gaps in knowledge and increases opportunities for future studies.

The limitations of our study are related to the misconceptions among the population on what COVID-19 is and the lack of qualitative data to improve the knowledge of social network use in older adults. This, in turn, can be seen as a gap that could be bridged with further studies on this phenomenon. The information on COVID-19 vaccination was obtained before the efficacy of the vaccine had been proven. Still, these data are important due to the sample size and being one of the few larger studies made in Latin American populations.

CONCLUSIONS

Keeping in mind the new infection outbreak and the potential risk for older adults, stronger campaigns to reach out and convince them seem to be a matter of life and death. Considering the results and understanding the multifactorial nature of the decision process, social networks, particularly WhatsApp, could be useful in lowering the numbers of hesitant older adults.

Similar strategies could be also implemented in regions where hesitancy is even higher and authorities struggle to advance in the vaccination campaigns.

DATA AVAILABILITY STATEMENT

Publicly available datasets were used in this study. These can be found in ENSANUT at https://ensanut.insp.mx/encuestas/ensanutcontinua2020/index.php[36]

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