Social media exposure, risk perception, preventive behaviors and attitudes during the COVID-19 epidemic in La Paz, Bolivia: A cross sectional study

Diana Reyna Zeballos Rivas¹, ²*, Marinalda Lidia Lopez Jaldin³, Blanca Nina Canaviri³, Luisa Fabiola Portugal Escalante⁴, Angela M. C. Alanes Fernández¹, Juan Pablo Aguilar Ticona¹, ²*

¹ Public Health Department, Higher University of San Andres, La Paz, Bolivia, ² Post-graduate Program of Collective Health, Federal University of Bahia, Salvador, Brazil, ³ Scientific Society of Medicine Students, Higher University of San Andres, La Paz, Bolivia, ⁴ Hospital de Clínicas Dr. Manuel Quintela, University of the Republic, Montevideo, Uruguay

These authors contributed equally to this work.
* pkjpablo@gmail.com

Abstract

Social media has an important role in diffusion of information, during COVID-19 pandemic it could help to promote preventive behaviors, however its role and the pathway is still unclear.

Objective

To investigate the association among social media exposure, risk perception, preventive behaviors, and attitudes toward the COVID-19 epidemic in Bolivia.

Methods

We launched an online survey in La Paz and El Alto, Bolivia, during April and May 2020. The questionnaire examined: Socio-demographic factors, Social media use, Risk Perception, Preventive behaviors, attitudes and the willingness to use a vaccine if it were available in the context of the COVID-19 epidemic. A logistic regression was used to evaluate factors associated with risk perception and a structural equation model (SEM) was performed to explore the pathway of the relationship among social media exposure, risk perception and preventive behaviors and attitudes.

Results

Among 886 participants, the most were young adults, between 18–25 years old (73.4%) and 577 (65.1%) were female. During the the week before the survey 387 (43.7%) reported be exposure to social media Covid-19 information almost always or always. Moreover 304 (34.3%) were categorized as with a high risk perception. The multivariable analyses show that being female (aOR = 1.5, CI 95% 1.1–2.1) and having high exposure to Covid-19 information on social media (aOR = 2.5, CI 95% 1.3–5.3) were associated with a higher risk
perception for Covid-19. Furthermore, SEM results indicated that risk perception is associated with the adoption of preventive behaviors and attitudes ($\beta = 0.605, p < 0.001$) including the acceptance of a vaccine if one were available ($\beta = 0.388, p < 0.001$).

**Conclusion**

Social media exposure to COVID-19 information influences the adoption of preventive attitudes and behaviors through shaping risk perception. Understanding the role of social media during the pandemic could help policymakers and communicators to develop better communication strategies that enable the population to adopt appropriate attitudes and behaviors.

**Introduction**

In December 2019, the first pneumonia cases caused by an unknown agent were identified in Wuhan, China [1]. Later, it was established that the new entity was a novel type of coronavirus, which received the name of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [2]. Within a few months, this disease spread through the five continents turning the epidemic into a pandemic [3]. In Bolivia, the first case was diagnosed and notified in March, with a rising number of new cases since then [4].

Coronaviruses are similar to the influenza virus, due to its contagion and its high transmissibility and they have triggered epidemics, such as SARS-CoV in 2002–2004 [5] and the MERS-CoV in 2015 [2, 6]. The experience of these previous epidemics shows that a modification in behavior to adopt protective measures is required, such as the use of masks, washing hands, and isolation, principally among the affected populations [7]. Furthermore, social media has become a firsthand information channel during epidemics and more so in the pandemic. People can obtain new data about the disease and the current situation to share it with others. Its role in previous epidemics has been studied, demonstrating that social media information can influence people’s own risk perception and behaviors [8, 9]. In this new scenario, the traditional media has reported the progression of the Covid-19 pandemic and social media has assumed an important role in the faster diffusion of information and further and in some cases with fear-mongering [10]. The challenge with such an infodemic we are experiencing is not to get people informed but to get people informed with accurate information that enables them to act properly [11]. Risk perception would motivate individuals to adopt new attitudes and behaviors in order to protect their health [12, 13]. A model explored during the MERS epidemics concluded that risk perception was influenced by social media promoting two self-relevant emotions; fear and anger. At the same time, risk perception was also related to the adoption of protective behaviors such as social distancing and mask use [8]. Facing the new pandemic, the role of social media and risk perception in the implementation of protective measures against the COVID-19 is still unknown.

More than a seventeen million COVID-19 cases have been confirmed worldwide. Facing this health emergency, in Bolivia, as in other countries, a nationwide quarantine has been established on a mandatory basis since March 22th, 2020 (Decrees 4196 and 4199) in addition to mask use and hand washing [4, 14]. Accomplishment of the control measures was a challenge and its reception has been heterogeneous among the population. We hypothesize that the acceptance of the preventive measures could be explained by risk perception and social media exposure. We therefore aimed to investigate the factors associated with risk perception to COVID-19. We also explored the association among risk perception with preventive attitudes and behaviors during the first stage of this epidemic in La Paz and El Alto.
Materials and methods

We conducted a cross-sectional study in La Paz and El Alto in La Paz department, in Bolivia. La Paz is the second department with the highest incidence of COVID-19, corresponding to 12.35% of the cases reported until April 9, 2020 [15]. The study included participants aged 18 years old or older, with residence in either of the cities mentioned above.

We launched an online survey through social media, available since April 29th to May 9th of 2020. The questionnaire was adapted from Oh et al. study [8] and structured in four sections including 1) sociodemographics and clinical history; 2) social media exposure; 3) risk perception, 4) attitudes and behaviors to prevent COVID-19 including the acceptance of a future vaccine.

To assess risk perception we used a 7-item Likert scale, 1 corresponding to totally disagree and 7 to totally agree, for the following questions: The COVID-19 problem is serious to me; I am worried being affected by the new virus; it is probable that I will be affected by COVID-19; I feel that COVID-19 is dangerous. The mean of the four questions was summarized in low (1–3), mild (4–5) and high risk perception (6–7). We assessed attitudes toward COVID-19 asking about hand washing, alcohol gel use, mask use, social distancing (aligned with the current WHO and Bolivian Health Ministry recommendation) using a 7-item Likert Scale. Preventive behaviors toward COVID-19 included mask use and hand wash frequency. Acceptability of a future vaccine for SARS-CoV-2 was evaluated with two questions using a 7-item Likert Scale, these questions were: Do you agree with vaccines as a preventive measure toward diseases? Would you use a covid-19 vaccine if it were available?. A third question asked about their use of flu vaccines: Were you vaccinated towards the flu? with three possible answers: 1) never in the life; 2) yes, this year; 3) yes, but not this year.

Social media exposure to COVID-19 information in the week before the survey was assessed using a Likert scale of 5 points (1 = never and 5 = always) with the following questions: “How much information have you seen about COVID-19 on Facebook, WhatsApp, Twitter or YouTube?”. Furthermore, we evaluated the emotions (fear and anger) caused by the information with a Likert scale going from 1 never to 7 all the time. Other covariates, such as age, gender, schooling, employment status, health clinical history and having a relative infected by COVID-19 were considered for the analysis.

For statistical analysis, we use descriptive measures to summarize the principal results. The bivariate association was evaluated using Pearson’s χ2 test for categorical variables and Mann-Whitney U test for continuous variables and Likert scales variables that did not have a normal distribution. There were defined as significant p-values < 0.05. A multivariable analysis (models that have two or more outcome or dependent variables) was developed in two-stages. First, we performed a logistic regression to evaluate factors associated with high-risk perception, including social media exposure, feelings experienced, risk perception and preventive behaviors and attitudes including the acceptance of a future vaccine. For the SEM analysis, a confirmatory factorial analysis (CFA) was developed and three latent variables were created related to risk perception; preventive attitudes and behaviors; and vaccine acceptance with the questions that evaluated these domains. On the other hand, social media exposure, fear and anger were included as single variables. The analysis was performed using R Statistical Software version 3.1.6 using the tableone package to table generation [16], Stats package to develop the logistic regression [17], and the Lavaan package for SEM analyses [18].
The study was approved by the Emergency Epidemiological Committee formed to respond to the COVID-19 pandemic at the school of medicine from the Higher University of San Andres and conducted in accordance with the guidelines of The Declaration of Helsinki. Participants read and accepted a consent document online before completing the online survey. All participant data were anonymized. This study was conducted after the written consent of the anonymous volunteer participants was obtained.

Results

A total of 1100 participants answered the questionnaire; we excluded 214 participants who lived outside the study area. Of the 886 participants included, 673 (76.0%) lived in La Paz and 213 (24.0%) lived in El Alto, the most common group age was 18–25 years old (73.4%), 577 (65.1%) were female, 255 (28.8%) had a formal job. Social media exposure to COVID-19 information in the week before the survey was high, only 6.2% said that they did not receive information about the pandemic on social media (Table 1).

Risk perception to COVID-19 was high in 304 (34.3%) participants and low or moderate in 582 participants (65.7%) (Fig 1 and Table 2). Risk perception was associated with female sex ($p < 0.001$), a high social media exposure ($p = 0.002$), and fear experience ($p < 0.001$) about COVID 19 information in social media (Table 1). Regarding vaccination, acceptance to a future vaccine for SARS-CoV-2 was high in 481 (54.3%) and moderate in 264 (29.8%) participants. In contrast, this year only 6% of the participants had been vaccinated for influenza and 65.8% had received the vaccine before, but not the current year. Acceptance of a

![Table 1. Characteristics of the participants by risk perception. La Paz–Bolivia, 2020.](https://doi.org/10.1371/journal.pone.0245859.t001)
COVID-19 vaccine if one were available was associated with a high risk perception \( (p < 0.001) \) (Table 3).

Participants with positive preventive attitudes (aligned with current recommendations) were more likely to have a high-risk perception \( (p < 0.001 \text{ in all attitudes evaluated}) \). Also, data related to mask use \( (p < 0.001) \) and high frequency of washing hands \((>15 \text{ times per day})\) \( (p = 0.014) \) were superior in participants with a high risk perception. The high-risk perception
group showed a superior acceptance to vaccination in general ($p < 0.001$) and to a future SARS-CoV-2 vaccine ($p < 0.001$) (Table 4).

In the multivariate analysis, we found that being female increased 50% the chances of having a high risk perception ($\text{aOR of 1.5; CI 95\% 1.1–2.1}$). Higher exposure to COVID-19 information on social media was also associated with 2.5 times more chances of having higher risk perception ($\text{aOR 2.5; CI95\% 1.3–5.3}$) (Table 5). The Structural equation model had an acceptable fit ($\text{RMSEA = 0.030; CFI = 0.989; TLI = 0.986}$). Factor loadings ($\beta$) can be interpreted like a regression coefficient. For each unit increase in a latent variable (risk perception; preventive attitudes and behaviors; and vaccine acceptance) the model predicts an increase with the associated variable if was associated positively or decreases if the association was negative (Fig 2).

We could observe that social media exposure is related with fear and anger. Fear was positively related with risk perception ($\beta = 0.226, p < 0.001$), while anger was negatively related ($\beta = -0.098, p < 0.005$). Risk perception is associated positively with preventive behaviors and attitudes ($\beta = 0.605, p < 0.001$), and with the acceptance of a vaccine if one were available ($\beta = 0.388, p < 0.001$) (Fig 2, Table 6). Fear was associated with preventive behaviors and attitudes, although this association was negative and weak ($\beta = -0.053, p = <0.001$). Other associations in the Structural equation model show the same direction as the binary logistic regression, where social media exposure is indirectly related with risk perception through fear experience.
Table 4. Preventive attitudes and behaviors towards COVID-19 by risk perception in La Paz—Bolivia, 2020.

| Prevention attitudes, median (IIQ) | p value |
|-----------------------------------|---------|
| Low—Moderate RP | High RP |
| n = 582 | n = 304 |
| **Shaking hands** | 6.0 (4.0–7.0) | 7.0 (6.0–7.0) | <0.001 |
| **To frequent too crowded places** | 6.0 (5.0–7.0) | 7.0 (6.0–7.0) | <0.001 |
| **Use of masks** | 5.0 (4.0–6.0) | 6.0 (5.0–7.0) | <0.001 |
| **Washing hands** | 6.0 (5.0–7.0) | 7.0 (6.0–7.0) | <0.001 |
| use of alcohol gel | 5.0 (5.0–6.0) | 6.0 (5.0–7.0) | <0.001 |
| **Quarantine as an effective measure** | 6.0 (5.0–7.0) | 7.0 (6.0–7.0) | <0.001 |

Table 5. Factors associated with a high risk perception, logistic regression results.

| p value | aOR (IC 95%) |
|---------|-------------|
| Female | <0.001 | 1.8 (1.3–2.4) |
| La Paz resident | 0.144 | 1.3 (0.9–1.8) |
| Moderate exposure to social media | 0.208 | 1.6 (0.8–3.3) |
| High exposure to social media | 0.010 | 2.5 (1.3–5.3) |

Table 4. Preventive attitudes and behaviors towards COVID-19 by risk perception in La Paz—Bolivia, 2020.

Table 5. Factors associated with a high risk perception, logistic regression results.

Fig 2. Pathway association. Structural equation model analysis results. * < 0.05; ** < 0.001.

https://doi.org/10.1371/journal.pone.0245859.g002

https://doi.org/10.1371/journal.pone.0245859.t004

https://doi.org/10.1371/journal.pone.0245859.t005
We found that high exposure to COVID-19 information on social media is associated with higher risk perception, moreover, fear and anger could influence the shaping of this risk perception. Women were 50% more likely to perceive themselves at risk to COVID-19 when compared to men. Higher risk perception is associated with preventive behaviors and attitudes, including a SARS-CoV-2 vaccine acceptance. The adoption of preventive behaviors and control measures has been fundamental to overcoming previous epidemics, but the success of these actions relied on the population response. Our findings corroborate the literature, risk perception is an important factor that influences the population’s willingness to adopt behaviors such as mask use, frequent hand washing and physical distancing [19–21], especially in a scenario surrounded by uncertainties at the beginning of the epidemic in Bolivia.

During the MERS outbreak in 2015, a study determined that social media exposure to the outbreak information influenced risk perception and population behaviors [8, 9]. Furthermore, similar to our results, social media exposure was positively associated with fear and anger [8]. Experiencing fear during COVID-19 pandemic has been previously reported, and also associated with positive preventive behaviors [22–24]. We also observed that fear was positively associated with risk perception, while anger was negatively associated with risk perception. Anger is related to an optimistic position regarding potential risk [25], as consequence people are confident in controlling the risk and tend to minimize their own risk [8, 21, 25]. Even though COVID-19 was an uncertain and uncontrollable for a while, by the time that the first cases were reported in Bolivia, information about successful experiences of other countries was available [26]. We also observed that fear had a stronger influence on risk perception when compared with anger, as has been previously described in literature [8]. Depoux et al. recommend social media as a tool for information, and in China it was used as a disclosure tool for quarantine, giving advice to the population. Also, social media can help reduce social distancing and mental health problems encountered by people forced into quarantine [10, 25].

Females were more likely to perceive themselves at risk, which is consistent with other studies conducted in previous epidemics [8, 20]. A recent study that surveyed people of ten countries on risk perception of COVID-19 found that being male was associated with lower risk

Table 6. Pathway association of social media exposure, feeling experience, risk perception and preventive attitudes and behaviors. Structural equation model analysis results.

| Relationship (effect) | Standard Error | p value | Estimate (β) | CI 95% |
|----------------------|----------------|---------|--------------|--------|
| Fear ~ Attitudes and behaviors | 0.021 | <0.001 | -0.053 | (-0.15– -0.04) |
| Anger ~ Attitudes and behaviors | 0.022 | 0.409 | 0.026 | (-0.04–0.09) |
| Risk perception ~ Attitudes and behaviors | 0.046 | <0.001 | 0.605 | (0.56–0.65) |
| Fear ~ Vaccine acceptance | 0.023 | 0.943 | 0.003 | (-0.07–0.07) |
| Anger ~ Vaccine acceptance | 0.021 | 0.244 | -0.041 | (-0.11–0.03) |
| Risk perception ~ Vaccine acceptance | 0.038 | <0.001 | 0.388 | (0.33–0.45) |
| Fear ~ Risk perception | 0.021 | <0.001 | 0.226 | (0.16–0.29) |
| Anger ~ Risk perception | 0.020 | 0.005 | -0.098 | (-0.17–-0.03) |
| Social media exposure ~ Fear | 0.249 | <0.001 | 0.889 | (0.60–1.17) |
| Social media exposure ~ Anger | 0.127 | <0.001 | 0.418 | (0.29–0.55) |

https://doi.org/10.1371/journal.pone.0245859.t006
perception and the same pattern was observed in many countries [27]. This is interesting because the novel coronavirus tends to have a more severe and deadly presentation in men. It is unclear whether these higher fatality rates derive from biological or behavioral differences, or if it is due to the heterogeneity of the current data [28, 29]. However, male risky behaviors such as ignoring health preventive measures, smoking and not considering symptoms seriously could be contributing to this difference [29].

Acceptance of a vaccine for SARS-CoV-2 if available, 54% of the participants thought they would and 30% thought they might. The structural equation analysis showed that acceptability is associated with risk perception; it means those who perceived higher risk were more likely to accept the vaccine. As described before, risk perception is heterogeneous and varies according to the disease, the context, and participants. A study conducted in Germany explored attitudes toward the Ebola vaccine and the findings showed a low proportion of people who would actually use the vaccine [30]. These results can stem from the fact that the Ebola epicenter stayed in Africa. A study conducted in Poland where no cases of Ebola were registered, 97% of the participants affirmed that Ebola disease was mortal but just 15% would use a vaccine [31]. This scenario would change if they traveled to to a country where this disease were endemic, 92.5% affirmed that in that case they would use the vaccine [31]. People had the information but the mediator to take an action was risk perception. A recent study investigated the willingness to be vaccinated against COVID-19 in France, a country where vaccination was widely rejected. The authors observed that 77.6% of the participants would certainly or probably use the vaccine. The acceptance of a future vaccine was associated with individual risk perception, principally in those groups that are known to be high-risk such as health care workers and the elderly [32]. However, this scenario can change if the number of cases decreases when COVID-19 vaccine becomes available. It is surprising that barely 6% of the participants declared that they had received the influenza vaccine this year and only 65.8% indicated that they had it sometime in their lives. A study that assessed the relationship between social media use and influenza vaccine uptake found that despite the fact that social media was not a main source of health information, it has a potential role in shaping behaviors to increase influenza vaccination rates [12]. Furthermore, influenza vaccination lessons could be useful when COVID-19 vaccines become available [33], as we could observe, a high percentage of this Bolivian population had been vaccinated against the flu virus before.

Limitations of our study are related to the study design that did not allow us to establish a causal relationship. As we conducted an on-line survey accessibility issues should be addressed, representativity of our population might be limited to those who have access to the internet. In consequence, our sample had a high number of young adults. However, an online survey is a strategy that in the current context gives us the opportunity to do primary research and find a population exposed to social media. The results of this study correspond to the first time period of the COVID-19 in Bolivia; other studies need to be performed to understand the dynamic of attitudes and behaviors during the period of the highest numbers of infections and after the epidemic. We did not evaluate the quality of the content to which the participants were exposed as this could also influence behaviors even negatively [10], this also can be associated with mental health problems [34]. In consequence future studies need to be conducted to understand the influences of the content quality and the association with the factors we addressed. Understanding the determinants of the perception of risk among people is critical to disseminate information on appropriate public health behaviors [35].

In conclusion, our results address an important issue with social media as an information channel and its association with shaping risk perception and behaviors to communicate information to the population. Effective communication with the population by public health
agencies and governments is among the most important components of successful pandemic responses. Successful communication can help the public adopt appropriate behaviors to stop the spread of an outbreak. This findings presented can help policymakers and communicators better understand the complex process of emotions and cognition provoked by infectious disease outbreaks and develop better communication strategies.

Supporting information

S1 Table. Latent variables built and components calculated with confirmatory factor analysis.

(_DOCX)

S1 File. Survey instrument.

(_DOCX)

Acknowledgments

The authors would like to thank the participants for their support and collaboration. We would also like to thank team members from the Emergency Epidemiological Committee and Scientific Society of Medicine Students from the Higher University of San Andres.

Author Contributions

Conceptualization: Diana Reyna Zeballos Rivas, Marinalda Lidia Lopez Jaldín, Blanca Nina Canaviri, Juan Pablo Aguilar Ticona.

Data curation: Diana Reyna Zeballos Rivas, Blanca Nina Canaviri.

Formal analysis: Diana Reyna Zeballos Rivas, Luisa Fabiola Portugal Escalante, Juan Pablo Aguilar Ticona.

Investigation: Diana Reyna Zeballos Rivas, Angela M. C. Alanes Fernández.

Methodology: Diana Reyna Zeballos Rivas, Marinalda Lidia Lopez Jaldín, Blanca Nina Canaviri, Angela M. C. Alanes Fernández, Juan Pablo Aguilar Ticona.

Project administration: Marinalda Lidia Lopez Jaldin.

Supervision: Diana Reyna Zeballos Rivas, Juan Pablo Aguilar Ticona.

Writing – original draft: Diana Reyna Zeballos Rivas, Marinalda Lidia Lopez Jaldín, Juan Pablo Aguilar Ticona.

Writing – review & editing: Diana Reyna Zeballos Rivas, Marinalda Lidia Lopez Jaldín, Blanca Nina Canaviri, Luisa Fabiola Portugal Escalante, Angela M. C. Alanes Fernández, Juan Pablo Aguilar Ticona.

References

1. Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. New England Journal of Medicine. 2020; 382(18):1708–20. https://doi.org/10.1056/NEJMoa2002032 PMID: 32109013

2. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J Autoimmun. 2020; 109:102433. https://doi.org/10.1016/j.jaut.2020.102433 PMID: 32113704

3. Whitworth J. COVID-19: a fast evolving pandemic. Trans R Soc Trop Med Hyg. 2020; 114(4):241–8. https://doi.org/10.1093/trstmh/traa025 PMID: 32198918.
4. Escalera-Antezena JP, Lizon-Ferrufino NF, Maldonado-Alaocoa A, Alarcón-De-la-Vega G, Alvarado-Arnez LE, Balderrama-Saavedra MA, et al. Clinical features of the first cases and a cluster of Coronavirus Disease 2019 (COVID-19) in Bolivia imported from Italy and Spain. Travel Med Infect Dis. 2020;35:101653-. Epub 04/02. https://doi.org/10.1016/j.tmaid.2020.101653 PMID: 32247926.

5. Zhu M. SARS Immunity and Vaccination. Cellular & molecular immunology. 2004; 1(3):193–8. Epub 2005/10/13. PMID: 16219167.

6. Park JE, Jung S, Kim A, Park JE. MERS transmission and risk factors: a systematic review. BMC public health. 2018;18(1):574. Epub 2018/05/03. https://doi.org/10.1186/s12889-018-5484-8 PMID: 29716568.

7. Peeri NC, Shrestha N, Rahman MS, Zaki R, Tan Z, Bibi S, et al. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? International Journal of Epidemiology. 2020; 49(3):717–26. https://doi.org/10.1093/ije/dyaa033 PMID: 32086938

8. Oh SH, Lee SY, Han C. The Effects of Social Media Use on Preventive Behaviors during Infectious Disease Outbreaks: The Mediating Role of Self-relevant Emotions and Public Risk Perception. Health communication. 2020:1–10. Epub 2020/02/18. https://doi.org/10.1080/10410236.2020.1724639 PMID: 32064932.

9. Jang K, Baek YM. When Information from Public Health Officials is Untrustworthy: The Use of Online News, Interpersonal Networks, and Social Media during the MERS Outbreak in South Korea. Health communication. 2019; 34(9):991–8. Epub 2018/03/21. https://doi.org/10.1080/10410236.2018.1449552 PMID: 29558170.

10. Depoux A, Martin S, Karafilakis E, Preet R, Wilder-Smith A, Larson H. The pandemic of social media panic travels faster than the COVID-19 outbreak. Journal of travel medicine. 2020; 27(3). Epub 2020/03/04. https://doi.org/10.1093/jtm/taaa031 PMID: 32125413.

11. Zarocostas J. How to fight an infodemic. Lancet (London, England). 2020; 395(10225):676. Epub 2020/03/03. https://doi.org/10.1016/S0140-6736(20)30461-X PMID: 32113495.

12. Ahmed N, Quinn SC, Hancock GR, Freimuth VS, Jamison A. Social media use and influenza vaccine uptake among White and African American adults. Vaccine. 2018; 36(49):7556–61. Epub 2018/11/06. https://doi.org/10.1016/j.vaccine.2018.10.049 PMID: 30389192.

13. Freimuth VS, Jamison A, Hancock G, Musa D, Hilyard K, Quinn SC. The Role of Risk Perception in Flu Vaccine Behavior among African-American and White Adults in the United States. Risk analysis: an official publication of the Society for Risk Analysis. 2017; 37(11):2150–63. Epub 2017/03/18. https://doi.org/10.1111/risa.12790 PMID: 28314047.

14. Kaplan HS, Trumble BC, Stieglitz J, Marnany RM, Cayuba MG, Moye LM, et al. Voluntary collective isolation as a best response to COVID-19 for indigenous populations? A case study and protocol from the Bolivian Amazon. Lancet (London, England). 2020; 395(10238):1727–34. Epub 2020/05/19. https://doi.org/10.1016/S0140-6736(20)31104-1 PMID: 32422124.

15. MinSal, Bolivia. Sistema Nacional de Informacion en Salud (SNIS) Bolivia2020 [cited 2020 14 Jun]. https://snis.minsalud.gob.bo/.

16. Yoshida K. Tableone: Create 'Table 1' to Describe Baseline Characteristics with or without Propensity Score Weights. 0.12.0 ed2020.

17. Team RC. R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing; 2019.

18. Rosseel Y, Oberski D, Byrnes J, Vanbrabant L, Savalei V, Merkle E, et al. Package ‘lavaan’. Retrieved June. 2017; 17:2017.

19. Smith RD. Responding to global infectious disease outbreaks: Lessons from SARS on the role of risk perception, communication and management. Social Science & Medicine. 2006; 63(12):3113–23. https://doi.org/https://doi.org/10.1016/j.socscimed.2006.08.004 PMID: 16978751

20. Bish A, Michie S. Demographic and attitudinal determinants of protective behaviours during a pandemic: A review. British Journal of Health Psychology. 2010; 15(4):797–824. https://doi.org/10.1348/135910710X485826 PMID: 20109274

21. Brug J, Aro AR, Richards JH. Risk perceptions and behaviour: towards pandemic control of emerging infectious diseases: international research on risk perception in the control of emerging infectious diseases. Int J Behav Med. 2009; 16(1):3–6. Epub 01/06. https://doi.org/10.1007/s12125-008-9000-x PMID: 19127440.

22. Liu PL. COVID-19 Information Seeking on Digital Media and Preventive Behaviors: The Mediation Role of Worry. Cyberspsychology, behavior and social networking. 2020. Epub 2020/06/06. https://doi.org/10.1089/cyber.2020.0250 PMID: 32498549.

23. Pakpour AH, Griffiths MD. The fear of COVID-19 and its role in preventive behaviors. Journal of Concurrent Disorders. 2020. 2(1), 58–63.
24. Pakpour AH, Griffiths MD, Lin C-Y. Assessing Psychological Response to the COVID-19: The Fear of COVID-19 Scale and the COVID Stress Scales. International Journal of Mental Health and Addiction. 2020. https://doi.org/10.1007/s11469-020-00334-9 PMID: 32837424

25. Lerner JS, Han S, Keltner D. Feelings and Consumer Decision Making: Extending the Appraisal-Tendency Framework. Journal of Consumer Psychology. 2007; 17(3):181–7. https://doi.org/https://doi.org/10.1016/S1057-7408(07)70027-X

26. Lu N, Cheng K-W, Qamar N, Huang K-C, Johnson JA. Weathering COVID-19 storm: Successful control measures of five Asian countries. Am J Infect Control. 2020; 48(7):851–2. Epub 04/29. https://doi.org/10.1016/j.ajic.2020.04.021 PMID: 32360746.

27. Dryhurst S, Schneider CR, Kerr J, Freeman ALJ, Recchia G, van der Bles AM, et al. Risk perceptions of COVID-19 around the world. Journal of Risk Research. 2020:1–13. https://doi.org/10.1080/13669877.2020.1758193

28. Pérez-López FR, Tajada M, Savirón-Cornudella R, Sánchez-Prieto M, Chedraui P, Terán E. Coronavirus disease 2019 and gender-related mortality in European countries: A meta-analysis. Maturitas. 2020; 141:59–62. Epub 06/23. https://doi.org/10.1016/j.maturitas.2020.06.017 PMID: 33036704.

29. Rozenberg S, Vandrome J, Martin C. Are we equal in adversity? Does Covid-19 affect women and men differently? Maturitas. 2020; 138:62–8. Epub 2020/05/20. https://doi.org/10.1016/j.maturitas.2020.05.009 PMID: 32425315.

30. Rübsamen N, Castell S, Horn J, Karch A, Ott JJ, Raupach-Rosin H, et al. Ebola risk perception in Germany, 2014. Emerg Infect Dis. 2015; 21(6):1012–8. https://doi.org/10.3201/eid2106.150013 PMID: 25989020.

31. Kuchar E, Ludwikowska K, Marciniak D, Szenborn L, Nitsch-Osuch A. Public Perception of the Risks Associated with Infectious Diseases in Poland: Ebola and Influenza and Their Impact on the Attitude to Vaccination. Advances in experimental medicine and biology. 2017; 980:27–36. Epub 2017/03/16. https://doi.org/10.1007/5584_2016_207 PMID: 28290102.

32. Detoc M, Bruel S, Frappe P, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. medRxiv. 2020;2020.04.23.20076513. https://doi.org/10.1101/2020.04.23.20076513

33. Gostin LO, Salmon DA. The Dual Epidemics of COVID-19 and Influenza: Vaccine Acceptance, Coverage, and Mandates. JAMA. 2020; 324(4):335–6. https://doi.org/10.1001/jama.2020.10802 PMID: 32525519

34. Gao J, Zheng P, Jia Y, Chen H, Mao Y, Chen S, et al. Mental health problems and social media exposure during COVID-19 outbreak. PloS one. 2020; 15(4):e0231924. Epub 2020/04/17. https://doi.org/10.1371/journal.pone.0231924 PMID: 32298385.

35. Huynh TLD. The COVID-19 risk perception: A survey on socioeconomic and media attention. Economics Bulletin. 2020; 40: 758–764.