Perceived risk of infection and death from COVID-19 among community members of low- and middle-income countries: A cross-sectional study [version 2; peer review: 2 approved]

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Abstract

Background: Risk perceptions of coronavirus disease 2019 (COVID-19) are considered important as they impact community health behaviors. The aim of this study was to determine the perceived risk of infection and death due to COVID-19 and to assess the factors associated with such risk perceptions among community members in low- and...
middle-income countries (LMICs) in Africa, Asia, and South America. **Methods:** An online cross-sectional study was conducted in 10 LMICs in Africa, Asia, and South America from February to May 2021. A questionnaire was utilized to assess the perceived risk of infection and death from COVID-19 and its plausible determinants. A logistic regression model was used to identify the factors associated with such risk perceptions. **Results:** A total of 1,646 responses were included in the analysis of the perceived risk of becoming infected and dying from COVID-19. Our data suggested that 36.4% of participants had a high perceived risk of COVID-19 infection, while only 22.4% had a perceived risk of dying from COVID-19. Being a woman, working in healthcare-related sectors, contracting pulmonary disease, knowing people in the immediate social environment who are or have been infected with COVID-19, as well as seeing or reading about individuals infected with COVID-19 on social media or TV were all associated with a higher perceived risk of becoming infected with COVID-19. In addition, being a woman, elderly, having heart disease and pulmonary disease, knowing people in the immediate social environment who are or have been infected with COVID-19, and seeing or reading about individuals infected with COVID-19 on social media or TV had a higher perceived risk of dying from COVID-19. **Conclusions:** The perceived risk of infection and death due to COVID-19 are relatively low among respondents; this suggests the need to conduct health campaigns to disseminate knowledge and information on the ongoing pandemic. **Keywords** COVID-19, perceived risk, online cross-sectional study, preventive measure, determinants

This article is included in the Emerging Diseases and Outbreaks gateway.

This article is included in the Sociology of Health gateway.
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Author roles: Gachabayov M: Validation, Writing – Review & Editing; Sharun K: Writing – Original Draft Preparation, Writing – Review & Editing; Felsenreich DM: Data Curation, Investigation, Validation, Writing – Review & Editing; Nainu F: Data Curation, Investigation, Validation, Writing – Review & Editing; Anwar S: Formal Analysis, Methodology, Resources, Software, Validation, Writing – Original Draft Preparation, Writing – Review & Editing; Yufika A: Methodology, Project Administration, Resources, Validation, Writing – Review & Editing; Ophinni Y: Validation, Writing – Review & Editing; Yamada C: Validation, Writing – Review & Editing; Fahriani M: Data Curation, Investigation, Validation, Writing – Review & Editing; Husnah M: Data Curation, Investigation, Validation, Writing – Review & Editing; Raad R: Data Curation, Investigation, Validation, Writing – Review & Editing; Khiri NM: Data Curation, Investigation, Validation, Writing – Review & Editing; Abdalla RY: Data Curation, Investigation, Validation, Writing – Review & Editing; Ismaeil MI: Data Curation, Investigation, Validation, Writing – Review & Editing; Ismail AY: Data Curation, Investigation, Validation, Writing – Review & Editing; Ferjani M: Data Curation, Investigation, Validation, Writing – Review & Editing; Deeb DA: Data Curation, Investigation, Validation, Writing – Review & Editing; Emad D: Data Curation, Investigation, Validation, Writing – Review & Editing; Monib FA: Data Curation, Investigation, Validation, Writing – Review & Editing; Ramanarayanan S: Data Curation, Investigation, Validation, Writing – Review & Editing; Panchawagh S: Data Curation, Investigation, Validation, Writing – Review & Editing; Haque MA: Data Curation, Investigation, Validation, Writing – Review & Editing; Ferreto LE: Data Curation, Investigation, Validation, Writing – Review & Editing; Morales RB: Data Curation, Investigation, Validation, Writing – Review & Editing; Aburto JT: Data Curation, Investigation, Validation, Writing – Review & Editing; Rojas JE: Data Curation, Investigation, Validation, Writing – Review & Editing; Balogun EO: Data Curation, Investigation, Validation, Writing – Review & Editing; Kusuma HE: Data Curation, Investigation, Validation, Writing – Review & Editing; Utami NA: Data Curation, Investigation, Validation, Writing – Review & Editing; Yeni CM: Data Curation, Investigation, Validation, Writing – Review & Editing; Entan SS: Data Curation, Investigation, Validation, Writing – Review & Editing; Yomi AR: Data Curation, Investigation, Validation, Writing – Review & Editing; Durosinsi A: Data Curation, Investigation, Validation, Writing – Review & Editing; Babadi E: Data Curation, Investigation, Validation, Writing – Review & Editing; Kakemam E: Data Curation, Investigation, Validation, Writing – Review & Editing; Ullah I: Data Curation, Investigation, Validation, Writing – Review & Editing; Malik NI: Data Curation, Investigation, Validation, Writing – Review & Editing; Rosiello F: Data Curation, Investigation, Validation, Writing – Review & Editing; Emran TB: Data Curation, Investigation, Validation, Writing – Review & Editing; Imelda E: Data Curation, Investigation, Validation, Writing – Review & Editing; Wendt GW: Data Curation, Investigation, Validation, Writing – Review & Editing; Arab-Zozani M: Data Curation, Investigation, Validation, Writing – Review & Editing; Dhama K: Data Curation, Investigation, Validation, Writing – Review & Editing; Mudatsir M: Data Curation, Investigation, Project Administration, Validation, Writing – Review & Editing; Harapan H: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: This work was supported by Universitas Sylah Kuala, Ministry of Education, Culture, Research and Technology, H-Index Scheme 2021 (169/UN11/SPK/PNBP/2021), granted to Harapan Harapan.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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How to cite this article: Gachabayov M, Sharun K, Felsenreich DM et al. Perceived risk of infection and death from COVID-19 among community members of low- and middle-income countries: A cross-sectional study [version 2; peer review: 2 approved]
F1000Research 2022, 11:345 https://doi.org/10.12688/f1000research.109575.2
First published: 22 Mar 2022, 11:345 https://doi.org/10.12688/f1000research.109575.1
Introduction

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has had catastrophic effects on the economy, health, and society and is associated with long-term health problems. The risk perceptions of COVID-19 are considered important as they influence health behaviors in the community. According to one study, accessing the media to obtain information on COVID-19 is linked to an increase in COVID-19 perceived risk and severity. In addition, a study found that the willingness to receive COVID-19 vaccination was related to the perceived risk of becoming infected with SARS-CoV-2. Therefore, providing reliable information on the risks of infection and possible adverse health outcomes (including death) could directly influence an individual’s risk perceptions. This, in turn, may affect their decisions to select suitable preventive measures.

Several studies have analyzed risk perceptions during the ongoing pandemic to learn more about their correlates and predictors. In general, the findings from these studies suggest that risk perceptions of SARS-CoV-2 infection are predictive of the adoption of different protective behaviors. Furthermore, strategic interventions aimed at increasing the risk perceptions of individuals can help promote desired protective behaviors. In addition, perceived risks are also considered as important drivers for the adoption of COVID-19 control measures implemented by the government and other responsible agencies.

Studies that assess risk perceptions and the associated determining factors will provide policymakers with critical information that will help to design population-wide health measures to combat the ongoing pandemic. In addition, long-term COVID-19 risk perception studies, especially in low- and middle-income countries (LMICs), will help to develop efficient preventive strategies within the population. The present study was designed to determine the perceived risk of becoming infected and dying as a result of COVID-19, as well as to assess the factors associated with such risk perceptions in the community members of LMICs in Africa, Asia, and South America.

Methods

Study design and setting

We conducted an online cross-sectional study in 10 LMICs in Africa, Asia, and South America between February and May 2021. The survey link, hosted by SurveyMonkey, was shared on Twitter, Facebook, and WhatsApp. This study used nonprobability sampling technique, snowball sampling method, to recruit the respondents. The invited potential respondents were also requested to share the invitation to their friends or phone contacts. The survey consisted of three sections: an introduction page with study information and an informed consent page where respondents had to provide consent to participate, and the main survey, which asked respondents about their demographic background, previous health conditions, perceived risk of infection and death due to COVID-19, and several possible determinants. The survey included an informed consent page that included the benefits of the study, risks and discomforts and information that this study was completely voluntary. All respondents provided consent to participate by clicking “Agree” before the next page could be opened. It took approximately 15 minutes to complete all the questions. Before being utilized in the study, the questions in the questionnaire were evaluated and their validity was confirmed. Most of the questions were adopted from a previous study and during the validity assessment, each question was assessed by experts in the fields of virology and public health. Changes were made to the questionnaire based on the validity assessment. No further reliability or validity tests in the field were made. The inclusion criteria to be eligible in this survey were those who were aged over 18 years old and able to read and understand English in the 10 studied countries. We sought a 95% confidence level and a 5% margin of error to recruit the minimal sample size with a conservative assumption that 50% of respondents having good perceived risk of COVID-19. We employed a convenience sampling approach, a non-probability sampling method, to recruit the samples. We received 1,849 responses during the study of which 203 respondents were excluded due to incomplete information.

The Institutional Review Board of Universitas Syiah Kuala & Zainoel Abidin Hospital (129/EA/FK-RSUDZA/2021) approved the study protocol and it was registered with the Indonesian National Health Research and Development Ethics Commission (1171012P).
Study variables

Response variable

The response variable in this study was the perceived risk of COVID-19. To assess the perceived risk, the respondents were asked two questions: (1) “What do you think are the chances that you will get COVID-19 in the next month?” and (2) “What do you think is your risk of dying from COVID-19 if infected?” A slide bar was provided to the respondents, with which they could move the percentage between 0% and 100%. The perceived risk score was then classified into low (a score equal to or less than 50%) and adequate (a score of more than 50%). Each question was analyzed separately.

Explanatory variables

Age, gender, residency, monthly household income in USD, religion, occupation sector (healthcare- and non-healthcare-related), type of occupation, and the presence of COVID-19 comorbidities based on self-reports, such as hypertension, diabetes, heart disease, and pulmonary disease were all included as explanatory variables. Healthcare-related job included doctor, dentist, nurse, physical therapist, nutritionist, pharmacist, paramedic, and laboratory staff. In addition, the respondents were asked whether they knew anyone in their immediate social environment who were or had been infected with COVID-19. Respondents were also questioned about their exposure to information (have seen or read) of individuals infected with COVID-19 on TV or social media.

Statistical analysis

Logistic regression analysis was used to assess the factors associated with the perceived risk of contracting COVID-19 and the factors associated with the perceived risk of dying from COVID-19 if infected. The unadjusted logistic regressions, crude odds ratio (OR), and 95% confidence interval (CI) of each plausible factor were calculated separately in the first step. Factors with p-values of less than 0.25 in the univariate analysis were included in the adjusted analysis, where the adjusted OR (aOR) was calculated. The analyses were conducted using SPSS software version 24 (SPSS Inc., Chicago, IL, USA) (SPSS, RRID:SCR_019096).

Results

Demographic characteristics

Table 1 presents the characteristics of the 1,646 responses that were analyzed. India and Pakistan had the highest number of respondents. More than half of the participants were between the ages of 21 and 30, and 58% of the total respondents were female. The majority (81%) of the respondents lived in urban areas, and 37.5% were part of a family with a monthly household income of less than $500. Respondents with hypertension, diabetes, heart disease, and pulmonary disease made up 5.9%, 3.5%, 3.3%, and 5.5% of the study participants, respectively. Almost 70% of the respondents knew someone who had been infected with COVID-19 in their immediate social environment, and more than 92.7% had seen or read about individuals infected with COVID-19 on social media or TV.

Perceived risk of becoming infected with COVID-19 and the associated determinants

Of the 1,646 respondents, 36.4% (600/1,646) had adequate perceived risk of being infected with COVID-19. The unadjusted and adjusted logistic regression suggested that the country, age group, religion, type of job, having pulmonary disease, knowing people in the immediate social environment who were or had been infected with COVID-19, seeing or reading about individuals infected with COVID-19 on social media or TV, and type of occupation were associated with a perceived risk of contracting COVID-19 (Table 1). Gender was only associated significantly with perceived risk in adjusted logistic regression.

Females had a greater perceived risk of contracting COVID-19 compared to males (aOR: 1.40; 95% CI: 1.10–1.78, p=0.006) (Table 1). Those working in healthcare-related sectors had almost 1.48 times higher odds of a higher perceived risk of contracting COVID-19 compared to those working in non-healthcare sectors (aOR: 1.48; 95% CI: 1.16–1.89, p=0.002). Our study also found that people with COVID-19 comorbidities, in particular pulmonary disease, had a higher perceived risk compared to those with no pulmonary disease (aOR: 2.44; 95% CI: 1.48–4.05). Participants who knew someone from their immediate social environment who were or had been infected with COVID-19, as well as those who had seen or read about COVID-19 cases on social media or TV, had 2.05 (95% CI: 1.55–2.70) and 1.72 (95% CI: 1.06–2.77) times higher odds of perceived risk of becoming infected with COVID-19 compared to those who did not know and had never seen or read about COVID-19 cases, respectively. Compared to self-employed participants, those who were employed for wages, students, and those who were retired (able to work) had higher odds of contracting COVID-19 (aOR: 2.22, 2.05, and 11.36, respectively) (Table 1).
| Variable                  | n (%) | High perceived risk | Unadjusted | Adjusted |  |
|---------------------------|-------|---------------------|------------|----------|---|
|                           |       | n (%)               | OR (95% CI) | p-value  | OR (95% CI) | p-value |
| **Country**               |       |                     |            |          |             |         |
| Pakistan (R)              | 263 (15.9) | 52 (19.8) | 1 | 1 |
| Brazil                    | 107 (6.5)  | 40 (37.4)  | 2.42 (1.48 – 3.98) | <0.001 | 2.32 (1.13 – 4.77) | 0.022 |
| Chile                     | 106 (6.4)  | 23 (21.7)   | 1.12 (0.65 – 1.95) | 0.677 | 1.40 (0.66 – 2.97) | 0.379 |
| Egypt                     | 98 (6.0)    | 50 (51.0)  | 4.23 (2.57 – 6.96) | <0.001 | 2.35 (1.36 – 4.07) | 0.002 |
| India                     | 339 (20.6)  | 149 (44.0) | 3.18 (2.19 – 4.61) | <0.001 | 4.28 (2.33 – 7.86) | <0.001 |
| Iran                      | 141 (8.6)    | 53 (37.6)  | 2.44 (1.55 – 3.86) | <0.001 | 1.30 (0.75 – 2.24) | 0.353 |
| Nigeria                   | 161 (9.8)    | 28 (17.4)  | 0.85 (0.51 – 1.42) | 0.543 | 1.00 (0.50 – 2.00) | 0.995 |
| Bangladesh                | 131 (7.9)    | 54 (41.2)  | 2.85 (1.79 – 4.52) | <0.001 | 2.86 (1.68 – 4.87) | <0.001 |
| Sudan                     | 174 (10.6)   | 76 (43.7)  | 3.15 (2.05 – 4.82) | <0.001 | 1.61 (0.97 – 2.67) | 0.066 |
| Tunisia                   | 129 (7.8)    | 75 (58.1)  | 5.64 (3.55 – 8.96) | <0.001 | 3.66 (2.12 – 6.32) | <0.001 |
| **Age group (year)**      |       |                     |            |          |             |         |
| <20 (R)                   | 280 (17.0)  | 63 (22.5)   | 1 | 1 |
| 21-30                     | 926 (56.2)  | 373 (40.3) | 2.32 (1.70 – 3.17) | <0.001 | 1.50 (1.03 – 2.18) | 0.035 |
| 31-40                     | 270 (16.4)  | 115 (42.6) | 2.56 (1.77 – 3.70) | <0.001 | 1.69 (1.02 – 2.82) | 0.043 |
| 41-50                     | 119 (7.2)   | 33 (27.7)  | 1.32 (0.81 – 2.16) | 0.264 | 0.90 (0.48 – 1.69) | 0.745 |
| >51                       | 54 (3.3)    | 16 (29.6)  | 1.45 (0.76 – 2.77) | 0.261 | 0.71 (0.31 – 1.63) | 0.423 |
| **Sex**                   |       |                     |            |          |             |         |
| Male (R)                  | 692 (42.0)  | 234 (33.8) | 1 | 1 |
| Female                    | 957 (58.0)  | 366 (38.2) | 1.21 (0.99 – 1.49) | 0.065 | 1.40 (1.10 – 1.78) | 0.006 |
| **Residency**             |       |                     |            |          |             |         |
| Rural (R)                 | 314 (19.0)  | 116 (36.9) | 1 | 1 |
| Urban                     | 1335 (81.0) | 484 (36.3) | 0.97 (0.75 – 1.25) | 0.820 | |
| **Monthly household income (USD)** |   |                     |            |          |             |         |
| <500 (R)                  | 618 (37.5)  | 228 (36.9) | 1 | 1 |
| 500-999                   | 289 (17.5)  | 110 (38.1) | 1.05 (0.79 – 1.40) | 0.734 | 1.02 (0.74 – 1.40) | 0.921 |
| Variable                  | n (%)         | High perceived risk | Unadjusted     | Adjusted      |
|---------------------------|---------------|---------------------|----------------|---------------|
|                           | n (%)         | OR (95% CI)         | p-value        | OR (95% CI)   | p-value       |
| 1,000-1,999               | 192 (11.6)    | 1.03 (0.73 – 1.43)  | 0.879          | 0.92 (0.63 – 1.35) | 0.665         |
| 2,000-2,999               | 148 (9.0)     | 1.27 (0.88 – 1.83)  | 0.202          | 1.29 (0.85 – 1.98) | 0.236         |
| 3,000-4,999               | 128 (7.8)     | 0.75 (0.50 – 1.13)  | 0.169          | 0.79 (0.50 – 1.26) | 0.319         |
| 5,000-7,999               | 100 (6.1)     | 0.96 (0.62 – 1.49)  | 0.864          | 1.00 (0.60 – 1.64) | 0.984         |
| ≥8,000                    | 174 (10.6)    | 0.73 (0.51 – 1.05)  | 0.088          | 0.67 (0.43 – 1.05) | 0.080         |
| Religion                  |               |                     |                |               |               |
| Islam (R)                 | 915 (55.5)    | 354 (38.7)          | 1              | 1             |
| Christian/Protestant/Methodist/Lutheran/Baptist | 179 (10.9) | 46 (25.7) | 0.55 (0.38 – 0.79) | 0.001 | 0.65 (0.38 – 1.11) | 0.117 |
| Catholic                  | 127 (7.7)     | 41 (32.3)           | 0.76 (0.51 – 1.12) | 0.164 | 0.68 (0.37 – 1.25) | 0.213 |
| Hindu                     | 239 (14.5)    | 92 (38.5)           | 0.99 (0.74 – 1.33) | 0.956 | 0.44 (0.26 – 0.74) | 0.002 |
| Atheist or agnostic       | 87 (5.3)      | 25 (28.7)           | 0.64 (0.39 – 1.04) | 0.069 | 0.50 (0.27 – 0.93) | 0.028 |
| Others                    | 102 (6.2)     | 42 (41.2)           | 1.11 (0.73 – 1.68) | 0.625 | 0.84 (0.49 – 1.43) | 0.510 |
| Healthcare-related job    |               |                     |                |               |               |
| No (R)                    | 908 (55.1)    | 261 (28.7)          | 1              | 1             |
| Yes                       | 741 (44.9)    | 339 (45.7)          | 2.09 (1.71 – 2.56) | <0.001 | 1.48 (1.16 – 1.89) | 0.002 |
| Have hypertension         |               |                     |                |               |               |
| No (R)                    | 1102 (66.8)   | 404 (36.7)          | 1              | 1             |
| Yes                       | 97 (5.9)      | 34 (35.1)           | 0.93 (0.60 – 1.44) | 0.752 |
| Do not know               | 450 (27.3)    | 162 (36.0)          | 0.97 (0.77 – 1.22) | 0.806 |
| Have diabetes             |               |                     |                |               |               |
| No (R)                    | 1190 (72.2)   | 447 (37.6)          | 1              | 1             |
| Yes                       | 58 (3.5)      | 19 (32.8)           | 0.81 (0.46 – 1.42) | 0.461 | 0.79 (0.40 – 1.55) | 0.487 |
| Do not know               | 401 (24.3)    | 134 (33.4)          | 0.83 (0.66 – 1.06) | 0.136 | 0.79 (0.56 – 1.13) | 0.200 |
| Have heart disease        |               |                     |                |               |               |
| No (R)                    | 1093 (66.3)   | 395 (36.1)          | 1              | 1             |
| Yes                       | 55 (3.3)      | 26 (47.3)           | 1.58 (0.92 – 2.73) | 0.097 | 1.59 (0.82 – 3.07) | 0.166 |
| Do not know               | 501 (30.4)    | 179 (35.7)          | 0.98 (0.79 – 1.23) | 0.874 | 1.07 (0.71 – 1.59) | 0.755 |
| Variable                                                                 | High perceived risk | Unadjusted | Adjusted |
|-------------------------------------------------------------------------|---------------------|------------|----------|
|                                                                         | n (%)               | OR (95% CI) | p-value  | OR (95% CI) | p-value |
| Have pulmonary disease                                                  |                     |            |          |            |         |
| No ^ (R)                                                               | 1044 (63.3)         | 1          |          | 1          |         |
| Yes                                                                     | 90 (5.5)            | 2.37 (1.53 - 3.67) | <0.001 | 2.44 (1.48 - 4.05) | 0.001 |
| Do not know                                                             | 515 (31.2)          | 0.96 (0.77 - 1.20) | 0.705  | 1.22 (0.82 - 1.82) | 0.335 |
| Know people in immediate social environment who are or have been infected with COVID-19 |                     |            |          |            |         |
| No (R)                                                                  | 508 (30.8)          | 1          |          | 1          |         |
| Yes                                                                     | 1141 (69.2)         | 2.94 (2.30 - 3.76) | <0.001 | 2.05 (1.55 - 2.70) | <0.001 |
| Have you seen or read about individuals infected with the COVID-19 on social media or TV? |                     |            |          |            |         |
| No (R)                                                                  | 121 (7.3)           | 1          |          | 1          |         |
| Yes                                                                     | 1528 (92.7)         | 2.09 (1.34 - 3.24) | <0.001 | 1.72 (1.06 - 2.77) | 0.027 |
| Occupation                                                              |                     |            |          |            |         |
| Self-employed (R)                                                       | 155 (9.4)           | 1          |          | 1          |         |
| Employed for wages                                                      | 417 (25.3)          | 1.98 (1.33 - 2.97) | <0.001 | 2.22 (1.43 - 3.45) | <0.001 |
| Out of work for less 1 year AND more than 1 year                        | 73 (4.4)            | 1.24 (0.67 - 2.27) | 0.492  | 1.49 (0.77 - 2.89) | 0.241 |
| Homemaker                                                               | 34 (2.1)            | 1.47 (0.67 - 3.23) | 0.340  | 1.65 (0.68 - 4.00) | 0.272 |
| Student                                                                 | 948 (57.5)          | 1.44 (0.98 - 2.10) | 0.061  | 2.05 (1.31 - 3.22) | 0.002 |
| Retired or unable to work                                               | 22 (1.3)            | 7.18 (2.63 - 19.56) | <0.001 | 11.36 (3.81 - 33.87) | <0.001 |
| Has how much your work changed as a result of the COVID-19 pandemic?    |                     |            |          |            |         |
| No change and not applicable (not working) (R)                          | 1009 (61.2)         | 1          |          | 1          |         |
| I work more hours                                                       | 300 (18.2)          | 1.37 (1.05 - 1.78) | 0.019  | 1.17 (0.85 - 1.59) | 0.336 |
| I work fewer hours                                                      | 286 (17.3)          | 1.13 (0.86 - 1.48) | 0.378  | 1.02 (0.75 - 1.39) | 0.900 |
| I was let go from my job                                                | 54 (3.3)            | 0.95 (0.53 - 1.69) | 0.850  | 0.90 (0.46 - 1.74) | 0.753 |

COVID-19, coronavirus disease 2019; OR, odds ratio; CI, confidence interval; R, reference group.
^Have been tested or examined by a doctor but not positive.
^Have been diagnosed by a doctor.
### Table 2. Logistic regression showing factors associated with perceived risk of dying from COVID-19 if infected (n=1,649).

| Variable           | n (%)            | High perceived risk | Unadjusted | Adjusted |
|--------------------|------------------|---------------------|------------|----------|
|                    |                  | n (%)               | OR (95% CI) | p-value  | OR (95% CI) | p-value  |
| Country            |                  |                     |            |          |            |          |
| Pakistan (R)       | 263 (15.9)       | 65 (24.7)           | 1          |          | 1          |          |
| Brazil             | 107 (6.5)        | 25 (23.4)           | 0.93 (0.55 – 1.58) | 0.784    | 0.88 (0.40 – 1.92) | 0.745    |
| Chile              | 106 (6.4)        | 16 (15.1)           | 0.54 (0.30 – 0.99) | 0.045    | 0.70 (0.30 – 1.60) | 0.392    |
| Egypt              | 98 (6.0)         | 26 (26.5)           | 1.10 (0.65 – 1.87) | 0.724    | 1.00 (0.56 – 1.80) | 0.990    |
| India              | 339 (20.6)       | 56 (16.5)           | 0.60 (0.40 – 0.90) | 0.013    | 0.93 (0.49 – 1.78) | 0.823    |
| Iran               | 141 (8.6)        | 32 (22.7)           | 0.89 (0.55 – 1.45) | 0.651    | 0.63 (0.35 – 1.13) | 0.117    |
| Nigeria            | 161 (9.8)        | 25 (15.5)           | 0.56 (0.34 – 0.93) | 0.026    | 0.83 (0.40 – 1.73) | 0.622    |
| Bangladesh         | 131 (7.9)        | 47 (35.9)           | 1.70 (1.08 – 2.68) | 0.021    | 2.10 (1.23 – 3.58) | 0.006    |
| Sudan              | 174 (10.6)       | 44 (25.3)           | 1.03 (0.66 – 1.60) | 0.892    | 0.74 (0.44 – 1.25) | 0.260    |
| Tunisia            | 129 (7.8)        | 34 (26.4)           | 1.09 (0.67 – 1.77) | 0.725    | 0.80 (0.45 – 1.44) | 0.462    |
| Age group (year)   |                  |                     |            |          |            |          |
| <20 (R)            | 280 (17.0)       | 54 (19.3)           | 1          |          | 1          |          |
| 21-30              | 926 (56.2)       | 207 (22.4)          | 1.21 (0.86 – 1.68) | 0.275    | 1.23 (0.83 – 1.85) | 0.305    |
| 31-40              | 270 (16.4)       | 68 (25.2)           | 1.41 (0.94 – 2.11) | 0.097    | 1.57 (0.90 – 2.75) | 0.116    |
| 41-50              | 119 (7.2)        | 22 (18.5)           | 0.95 (0.55 – 1.65) | 0.853    | 1.20 (0.60 – 2.40) | 0.613    |
| >51                | 54 (3.3)         | 19 (35.2)           | 2.27 (1.21 – 4.28) | 0.011    | 2.70 (1.21 – 5.99) | 0.015    |
| Gender             |                  |                     |            |          |            |          |
| Male (R)           | 692 (42.0)       | 137 (19.8)          | 1          |          | 1          |          |
| Female             | 957 (58.0)       | 233 (24.3)          | 1.30 (1.03 – 1.65) | 0.029    | 1.58 (1.20 – 2.08) | 0.001    |
| Residency          |                  |                     |            |          |            |          |
| Rural (R)          | 314 (19.0)       | 70 (22.3)           | 1          |          | 1          |          |
| Urban              | 1335 (81.0)      | 300 (22.5)          | 1.01 (0.75 – 1.36) | 0.945    |            |          |
| Monthly household income (USD) |      |                     |            |          |            |          |
| <500 (R)           | 618 (37.5)       | 167 (27.0)          | 1          |          | 1          |          |
| 500-999            | 289 (17.5)       | 66 (22.8)           | 0.80 (0.58 – 1.11) | 0.179    | 0.80 (0.56 – 1.14) | 0.212    |
| Variable                             | n (%)  | High perceived risk | Unadjusted | Adjusted |
|-------------------------------------|--------|---------------------|------------|----------|
|                                     | n (%)  | OR (95% CI)         | p-value    | OR (95% CI) | p-value |
| 1,000-1,999                         | 192 (11.6) | 0.62 (0.42 – 0.93) | 0.022 | 0.58 (0.38 – 0.90) | 0.015 |
| 2,000-2,999                         | 148 (9.0)  | 0.87 (0.57 – 1.32) | 0.504 | 0.94 (0.59 – 1.49) | 0.777 |
| 3,000-4,999                         | 126 (7.8)  | 0.59 (0.36 – 0.96) | 0.034 | 0.62 (0.36 – 1.05) | 0.076 |
| 5,000-7,999                         | 100 (6.1)  | 0.72 (0.43 – 1.20) | 0.205 | 0.73 (0.42 – 1.28) | 0.267 |
| ≥8,000                              | 174 (10.6) | 0.37 (0.23 – 0.61) | <0.001 | 0.34 (0.19 – 0.60) | <0.001 |
| Religion                            |        |                     |            |          |
| Islam (R)                           | 915 (55.5) | 1                    |          | 1        |
| Christian/Protestant/Methodist/Lutheran/Baptist | 179 (10.9) | 0.43 (0.27 – 0.68) | <0.001 | 0.54 (0.29 – 1.00) | 0.051 |
| Catholic                            | 127 (7.7)  | 0.79 (0.50 – 1.23) | 0.290 | 0.96 (0.50 – 1.85) | 0.902 |
| Hindu                               | 239 (14.5) | 0.43 (0.29 – 0.64) | <0.001 | 0.44 (0.24 – 0.81) | 0.008 |
| Atheist or agnostic                 | 87 (5.3)   | 0.73 (0.42 – 1.24) | 0.243 | 0.93 (0.47 – 1.84) | 0.840 |
| Others                              | 102 (6.2)  | 0.95 (0.60 – 1.52) | 0.835 | 1.05 (0.58 – 1.90) | 0.862 |
| Healthcare-related job              |        |                     |            |          |
| No (R)                              | 908 (55.1) | 198 (21.8)           | 1         |          |
| Yes                                 | 741 (44.9) | 172 (23.2)           | 1.08 (0.86 – 1.37) | 0.496 |
| Have hypertension                   |        |                     |            |          |
| No (R)                              | 1102 (66.8) | 227 (20.6)           | 1         |          |
| Yes *                               | 97 (5.9)   | 32 (33.0)            | 1.90 (1.21 – 2.97) | 0.005 | 1.29 (0.75 – 2.22) | 0.365 |
| Do not know                         | 450 (27.3) | 111 (24.7)           | 1.26 (0.97 – 1.64) | 0.078 | 1.38 (0.96 – 1.99) | 0.087 |
| Have diabetes                       |        |                     |            |          |
| No (R)                              | 1190 (72.2) | 266 (22.4)           | 1         |          |
| Yes *                               | 58 (3.5)   | 16 (27.6)            | 1.32 (0.73 – 2.39) | 0.353 |
| Do not know                         | 401 (24.3) | 88 (21.9)            | 0.98 (0.74 – 1.28) | 0.865 |
| Have heart disease                  |        |                     |            |          |
| No (R)                              | 1093 (66.3) | 233 (21.3)           | 1         |          |
| Yes *                               | 55 (3.3)   | 24 (43.6)            | 2.86 (1.65 – 4.96) | <0.001 | 2.35 (1.20 – 4.60) | 0.013 |
| Do not know                         | 501 (30.4) | 113 (22.6)           | 1.08 (0.83 – 1.39) | 0.578 | 1.03 (0.67 – 1.58) | 0.901 |
| Variable                                                                 | n (%)          | High perceived risk | Unadjusted | Adjusted |                  |                  |
|--------------------------------------------------------------------------|----------------|---------------------|------------|----------|-----------------|-----------------|
|                                                                          |                |                     | OR (95% CI) | p-value  | OR (95% CI)     | p-value         |
| Have pulmonary disease                                                   |                |                     |            |          |                 |                 |
| No \(^a\)(R)                                                            | 1044 (63.3)    | 215 (20.6)          | 1          |          | 1               |                 |
| Yes \(^b\)                                                               | 90 (5.5)       | 42 (46.7)           | 3.37 (2.17 – 5.24) | <0.001  | 2.88 (1.73 – 4.78) | <0.001          |
| Do not know                                                              | 515 (31.2)     | 113 (21.9)          | 1.08 (0.84 – 1.40) | 0.539   | 0.88 (0.57 – 1.37) | 0.578           |
| Know people in immediate social environment who are or have been infected with COVID-19 |                |                     |            |          |                 |                 |
| No (R)                                                                  | 508 (30.8)     | 93 (18.3)           | 1          |          | 1               |                 |
| Yes                                                                      | 1141 (69.2)    | 277 (24.3)          | 1.43 (1.10 – 1.86) | 0.007   | 1.51 (1.11 – 2.05) | 0.008           |
| Have you seen or read about individuals infected with the COVID-19 on social media or TV? |                |                     |            |          |                 |                 |
| No (R)                                                                  | 121 (7.3)      | 33 (27.3)           | 1          |          | 1               |                 |
| Yes                                                                      | 1528 (92.7)    | 337 (22.1)          | 0.76 (0.50 – 1.15) | 0.187   | 0.70 (0.44 – 1.10) | 0.122           |
| Occupation                                                               |                |                     |            |          |                 |                 |
| Self-employed (R)                                                        | 155 (9.4)      | 35 (22.6)           | 1          |          | 1               |                 |
| Employed for wages                                                       | 417 (25.3)     | 103 (24.7)          | 1.13 (0.73 – 1.74) | 0.599   | 1.12 (0.69 – 1.81) | 0.643           |
| Out of work for less 1 year AND more than 1 year                         | 73 (4.4)       | 23 (31.5)           | 1.58 (0.85 – 2.94) | 0.150   | 1.64 (0.83 – 3.25) | 0.153           |
| Homemaker                                                               | 34 (2.1)       | 12 (35.3)           | 1.87 (0.84 – 4.15) | 0.124   | 1.52 (0.63 – 3.68) | 0.351           |
| Student                                                                  | 948 (57.5)     | 192 (20.3)          | 0.87 (0.58 – 1.31) | 0.507   | 0.92 (0.56 – 1.49) | 0.720           |
| Retired or unable to work                                                | 22 (1.3)       | 5 (22.7)            | 1.01 (0.35 – 2.93) | 0.988   | 0.70 (0.21 – 2.31) | 0.558           |
| Has how much your work changed as a result of the COVID-19 pandemic?     |                |                     |            |          |                 |                 |
| No change or not applicable (not working) (R)                            | 1009 (61.2)    | 203 (20.1)          | 1          |          | 1               |                 |
| I work more hours                                                        | 300 (18.2)     | 80 (26.7)           | 1.44 (1.07 – 1.95) | 0.016   | 1.39 (0.99 – 1.96) | 0.056           |
| I work fewer hours                                                       | 286 (17.3)     | 71 (24.8)           | 1.31 (0.96 – 1.79) | 0.086   | 1.25 (0.89 – 1.75) | 0.192           |
| I was let go from my job                                                 | 54 (3.3)       | 16 (29.6)           | 1.67 (0.91 – 3.06) | 0.095   | 1.26 (0.65 – 2.46) | 0.497           |

COVID-19, coronavirus disease 2019; OR, odds ratio; CI, confidence interval; R, reference group.

\(^a^\)Have been tested or examined by a doctor but negative.

\(^b^\)Have been diagnosed by a doctor.
Perceived risk of dying from COVID-19 and associated determinants

Of the total respondents, only 22.4% (370/1,649) had a high (adequate) perceived risk of dying from COVID-19. In the adjusted logistic regression, country, age group, gender, religion, type of job, having pulmonary disease, knowing people in the immediate social environment who were or had been infected with COVID-19, had seen or read about individuals infected with COVID-19 on social media or TV, and type of occupation were associated with a perceived risk of dying from COVID-19 (Table 2).

Our data suggested that the elderly group (those over the age of 51) had a higher perceived risk of dying from COVID-19, if infected, by 2.7 times (95% CI: 1.21–5.99) compared to the youngest age group (those under the age of 20) (Table 2). Compared to male participants, female participants had 1.5 times higher odds of perceived risk of dying from COVID-19 (aOR: 1.58; 95% CI: 1.20–2.08, p=0.001). Participants who had heart disease and pulmonary disease had a 2.3- and 2.8-fold chance of having a perceived risk of dying from COVID-19 compared to those who did not have such comorbidities (aOR: 2.35; 95% CI: 1.20–4.60 and aOR: 2.88; 95% CI: 1.73–4.78, respectively). Our study also found that participants who knew someone from their immediate social environment who were or had been infected with COVID-19 had higher odds of perceiving the risk of dying from COVID-19 with an aOR: 1.51; 95% CI: 1.11–2.05.

Discussion

An individual’s perception of COVID-19-associated risks plays a major role in the ongoing pandemic. At the community level, perceived risk contributes to increased public participation in preventive measures devised by governments and other health organizations. In addition, it encourages voluntary health behaviors that are beneficial in controlling the spread of SARC-CoV-2.

According to our findings, the percentages of participants who had adequate perceived risk of COVID-19 infection and perceived risk of dying from COVID-19 were relatively low, only 36.4% and 22.4%, respectively. These are lower compared to the other studies. In a cross-sectional study conducted in Myanmar, the COVID-19-associated risk perception level was reported to be moderate to high. However, a study conducted in Hong Kong reported high levels of perceived risk among participants. In another study, higher risk perception was found to be associated with spending more time at home. Furthermore, higher risk perception was also observed in individuals living in counties with higher mortality rates. Therefore, governments and other health agencies should focus on increasing the COVID-19 risk perception of the public to enhance voluntary health behaviors. Our study found that female participants had a higher perceived risk of being infected and dying from COVID-19 compared to their male counterparts. Several studies have reported similar findings. Men are less concerned about the potential health consequences associated with COVID-19 and, therefore, express a lower perceived risk of infection.

In an online survey conducted in Ethiopia, perceived risk was found to be dependent on age, occupation, educational status, and place of residence. Our study found that participants working in healthcare-related sectors had a higher perceived risk of contracting COVID-19 compared to those working in non-healthcare sectors. Previous studies have reported that the perceived risk of becoming infected is higher among healthcare professionals. The high perceived risk among individuals working in healthcare-related sectors can be attributed to their better knowledge of COVID-19 than the general population. In addition, being a woman, having pulmonary disease, knowing people in the immediate social environment who were or have been infected with COVID-19, and seeing or reading about individuals infected with COVID-19 on social media or TV were also associated with a higher perceived risk of being infected with COVID-19.

It has been already established that individuals with chronic diseases (such as heart diseases, chronic obstructive pulmonary disease, hypertension, diabetes, and cancer) are at an increased risk for adverse outcomes with COVID-19. In our study, individuals with pulmonary disease had a higher perceived risk of COVID-19 infection than healthy individuals. Furthermore, knowing people in the immediate social environment who were or have been infected with COVID-19, as well as seeing or reading about individuals infected with COVID-19 on social media or TV, were associated with a higher perceived risk. Similarly, being an elderly individual with heart disease and pulmonary disease, knowing people in the immediate social environment who were or had been infected with COVID-19, as well as seeing or reading about individuals infected with COVID-19 on social media or TV, also had a higher perceived risk of death due to COVID-19.

Being an online survey, there are a few limitations that can lead to bias in this study. For example, this survey might have excluded individuals belonging to lower socioeconomic classes, those with lower educational qualifications, and those who are illiterate. In addition, variation in Internet access might have contributed to selection bias across the countries evaluated in this study. Furthermore, the participants may also respond in a manner that may cause a social desirability bias. In addition, since the survey was conducted in English, this could be source of bias because some of the individuals in those studied countries might unable to read and understand English.
Conclusions
Our data suggests that there is a low perceived risk of becoming infected and dying due to COVID-19 among community members in certain LMICs. Factors such as age group, sex, religion, type of job, health status, etc., modify the perceived risk. These determinants can be used to alter and influence community health behaviors. Governments and other health agencies can use the data from this study to target susceptible groups within the community by conducting health campaigns to disseminate knowledge and information on the ongoing pandemic.

Data availability
Underlying data
Figshare: Perceived risk of infection and death from COVID-19 among community members of low- and middle-income countries. https://doi.org/10.6084/m9.figshare.19128134.22

The project contains the following underlying data:
- Perceived Risk Master Data.xlsx
- Questionnaire of Perceived risk of infection and death from COVID-19 among community members of low- and middle-income countries.pdf

Reporting guidelines
Figshare: STROBE checklist for ‘Perceived risk of infection and death from COVID-19 among community members of low- and middle-income countries’. https://doi.org/10.6084/m9.figshare.19128332.23

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Acknowledgements
We would like to thank Narra Studio Jurnal Indonesia for their assistance during the manuscript preparation.

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Open Peer Review

Current Peer Review Status: ✅ ✅

Version 2

Reviewer Report 12 September 2022

https://doi.org/10.5256/f1000research.138139.r149780

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✅ Hesham M Al-Mekhlafi
1 Medical Research Centre, Jazan University, Jazan, Saudi Arabia
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The authors have adequately addressed my comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Infectious Diseases, Epidemiology, Public Health, Biostatistics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 08 September 2022

https://doi.org/10.5256/f1000research.138139.r149781

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✅ Erwin Astha Triyono
Department of Internal Medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

Thanks for your response. Revised article is enough.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Tropical and Infectious Disease, Internal Medicine, Problem Health
Erwin Astha Triyono

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A well-written article by collecting data taken from an online survey of several countries to analyze the perceived risk of infection and death due to Covid-19. Overall, this article is interesting and provides many references for its readers. What I learned from this article is that Covid-19 poses challenges to a country’s health system. These challenges can be related to medical problems and non-medical problems (social problems). Non-medical problems (social problems) arise due to disinformation or hoax issues that make it difficult for medical/scientific information to be conveyed to the public in its entirety. This researcher is very helpful in describing the obstacles, especially in the non-medical aspect (social problems) in handling Covid-19 in a country.

However, there are some comments for improvement:

1. Need to explain the sampling method used, how to determine 10 countries?

2. The researcher explained that the limitations of the survey conducted could bias the results, especially because of the possibility that this survey might have excluded individuals belonging to lower socioeconomic classes, those with lower educational qualifications, and those who are illiterate. Can it be written in the conclusion to be a suggestion for further research?

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Tropical and Infectious Disease, Internal Medicine, Problem Health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 31 Aug 2022

Harapan Harapan, Universitas Syiah Kuala, Banda Aceh, Indonesia

Dear reviewer,

Thank you for reviewing our manuscript. The comments and suggestions have improved the quality of our current manuscript significantly.

1. Need to explain the sampling method used, how to determine 10 countries?

RESPONSE: Thank you for the question. Those countries were selected to cover of those in LMICs in three continents that had limited information of COVID-19. Also based on the availability of the collaborators.

Information about the sampling technique. In the revised manuscript: “This study used nonprobability sampling technique, snowball sampling method, to recruit the respondents. The invited potential respondents were also requested to share the invitation to their friends or phone contacts.”

2. The researcher explained that the limitations of the survey conducted could bias the results, especially because of the possibility that this survey might have excluded individuals belonging to lower socioeconomic classes, those with lower educational qualifications, and those who are illiterate. Can it be written in the conclusion to be a suggestion for further research?

RESPONSE: Thank you for the suggestion. However, we feel this is not part of the conclusion of the study and we would like to provide the actual results of the study within the conclusion.

Thank you for the reviewing our manuscript.

Competing Interests: We do not have conflict of interest in this study.
Hesham M Al-Mekhlafi

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Ref. No: F1KR00CDE F1R-VER121089-R

Title: Perceived risk of infection and death from COVID-19 among community members of low- and middle-income countries: A cross-sectional study

This manuscript describes a cross-sectional online survey on the perceived risk of contracting and dying from COVID-19 among 1,646 respondents from 10 LMICs. The study found relatively low levels of perceived risk of infection and death, and identified some demographic, socio-economic and health factors that significantly associated with high perceived levels. Although, the topic is not novel as many studies on the same topic are available from different countries; however, data at the regional or multinational level are always interesting and appreciated.

Overall, the manuscript is interesting, well-written and straightforward. Some comments are provided below.

SPECIFIC COMMENTS

1. Study design and setting: What is the rationale of selecting the 10 countries included in the study? What was the selection strategy?

2. How was the selection for enrollment process? The questionnaire link was shared on Twitter, Facebook, and WhatsApp. More important information is needed about this process. How to ensure that the link has reached the targeted population? How WhatsApp numbers were selected, etc.?

3. Study design and setting: Other study design elements also need to be clearly described in the manuscript for a better understanding of the studied population and what they represent. For example, what is being considered a healthcare-related job in this study?

4. What is the rationale of choosing Pakistan as a reference group for country variable?

5. Page 5: “able to read and understand English in the 10 studied countries.” Could this be source of bias, in respect to the aim of helping in the design of population-wide preventive measures?
6. Page 13, discussion, 3\textsuperscript{rd} paragraph: working in non-healthcare sectors was the only variable explained while the rest were repeated as results. Why did females have higher perceived risk than males?

7. Page 13, discussion: Some significant variables were omitted in discussion and not explained, e.g. religion, type of occupation. What about country as a predictor? Any explanation?

8. Page 5: “which 203 respondents were excluded due to incomplete information.” An advantage of online questionnaire is that it can be designed as a respondent cannot proceed with incomplete responses!

9. Page 6: “65\% were part of a family with a monthly household income of less than $2,000”. The tables show that 37.5\% of the respondents had a monthly household income of less than $500. I think the later is better representative the studied population and it should be indicated.

10. Page 6, Results, Perceived risk of becoming infected with COVID-19 and the associated determinants, first paragraph: The variables found significant by the unadjusted model were also found significant in the adjusted model. The sentences can be rephrased without repeating the list of variables, especially with the variables and related statistics are mentioned in the next paragraph. Gender was found significant only in the adjusted model and this can be indicated.

11. Urbanicity or residency?

12. Page 6, results: “…… 22.4\% (370/1,649) had a perceived risk of dying from COVID-19, which was classified as high”. This can be rephrased to avoid confusion with a statement in page 3, conclusion “are relatively low”.

13. Page 6, results: “….. knowing or not knowing someone …”, please rephrase.

14. Page 6, results, perceived risk of becoming infected…: again, the sentences can be rephrased without repeating the list of variables, especially with the variables and related statistics are mentioned in the next paragraph in page 13.

15. Page 13, discussion: “This is lower compared to the other studies”. Before this comparison, it should be indicated that the overall reported rates were relatively low.

\textbf{Is the work clearly and accurately presented and does it cite the current literature?}
Yes

\textbf{Is the study design appropriate and is the work technically sound?}
Yes

\textbf{Are sufficient details of methods and analysis provided to allow replication by others?}
Partly
If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Infectious Disease, Epidemiology, Public Health, Biostatistics

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 31 Aug 2022
Harapan Harapan, Universitas Syiah Kuala, Banda Aceh, Indonesia

Dear reviewer,

Thank you for reviewing our manuscript. The comments and suggestions have improved the quality of our current manuscript significantly.

1. Study design and setting: What is the rationale of selecting the 10 countries included in the study? What was the selection strategy?

RESPONSE: Thank you for the question. Those countries were selected to cover those in LMICs in three continents that had limited information of COVID-19. Also based on the availability of the collaborators.

2. How was the selection for enrollment process? The questionnaire link was shared on Twitter, Facebook, and WhatsApp. More important information is needed about this process. How to ensure that the link has reached the targeted population? How WhatsApp numbers were selected, etc.?

RESPONSE: Thank you we have provided the information about the sampling technique. In the revised manuscript: “This study used nonprobability sampling technique, snowball sampling method, to recruit the respondents. The invited potential respondents were also requested to share the invitation to their friends or phone contacts.”

Due to the this in the Discussion we discussed this as limitation of our study. “...this survey might have excluded individuals belonging to lower socioeconomic classes, those with lower educational qualifications, and those who are illiterate”.


3. Study design and setting: Other study design elements also need to be clearly described in the manuscript for a better understanding of the studied population and what they represent. For example, what is being considered a healthcare-related job in this study?

RESPONSE: We have explained in some parts of the Study design and setting. The explanation of healthcare-related job has been provided under sub-heading “Explanatory variables”. We stated that “Healthcare-related job included doctor, dentist, nurse, physical therapist, nutritionist, pharmacist, paramedic, and laboratory staff.”

4. What is the rationale of choosing Pakistan as a reference group for country variable?

RESPONSE: Pakistan was chosen after the initial analyzing showing Pakistan had the lowest perceived risk rate.

5. Page 5: “able to read and understand English in the 10 studied countries.” Could this be source of bias, in respect to the aim of helping in the design of population-wide preventive measures?

RESPONSE: We appreciate this. We acknowledged for this potential bias and we have included this as one of limitations of our study. “In addition, since the survey was conducted in English, this could be source of bias because some of the individuals in those studied countries might unable to read and understand English.”

6. Page 13, discussion, 3rd paragraph: working in non-healthcare sectors was the only variable explained while the rest were repeated as results. Why did females have higher perceived risk than males?

RESPONSE: We have explained some explanatory variable. However, we focused to discuss the variables to determine the groups that could be targeted.

In our article, we provided the possible explanation why the females had higher perceived risk: “Men are less concerned about the potential health consequences associated with COVID-19 and, therefore, express a lower perceived risk of infection”.

7. Page 13, discussion: Some significant variables were omitted in discussion and not explained, e.g. religion, type of occupation. What about country as a predictor? Any explanation?

RESPONSE: Thank you for you question. We aim to provide general overview in Discussion not too detailed and discussed the factors to determine the specific groups that are able to targeted to increase the perceived risk in the future. We have discussed the factors associated with perceived risk such as gender, type of occupation, having the comorbid and soon in the Discussion.

8. Page 5: “which 203 respondents were excluded due to incomplete information.” An advantage of online questionnaire is that it can be designed as a respondent cannot proceed with incomplete responses!
RESPONSE: Thank you. The survey has been set that all question should be answer to be able to go to the next questions. However, some respondents stopped the survey in the middle of the survey, of which this was classified as incomplete responses.

9. Page 6: “65% were part of a family with a monthly household income of less than $2,000”. The tables show that 37.5% of the respondents had a monthly household income of less than $500. I think the later is better representative the studied population and it should be indicated.

RESPONSE: I think both of the statements are correct. We would like not to repeat what in the table and text. However, the we have revised the text based on the recommendation. In the revised manuscript: "The majority (81%) of the respondents lived in urban areas, and 37.5% were part of a family with a monthly household income of less than $500."

10. Page 6, Results, Perceived risk of becoming infected with COVID-19 and the associated determinants, first paragraph: The variables found significant by the unadjusted model were also found significant in the adjusted model. The sentences can be rephrased without repeating the list of variables, especially with the variables and related statistics are mentioned in the next paragraph. Gender was found significant only in the adjusted model and this can be indicated.

RESPONSE: We have revised this section. We would like to thank you for the suggestion. The revised manuscript: “The unadjusted and adjusted logistic regression suggested that the country, age group, religion, type of job, having pulmonary disease, knowing people in the immediate social environment who were or had been infected with COVID-19, seeing or reading about individuals infected with COVID-19 on social media or TV, and type of occupation were associated with a perceived risk of contracting COVID-19 (Table 1). Gender was only associated significantly with perceived risk in adjusted logistic regression.”

11. Urbanicity or residency?

RESPONSE: Thank you for your suggestion. Now it has been changed to residency.

12. Page 6, results: “….. 22.4% (370/1,649) had a perceived risk of dying from COVID-19, which was classified as high”. This can be rephrased to avoid confusion with a statement in page 3, conclusion “are relatively low”.

RESPONSE: We have revised the manuscript based on the suggestion. The revised manuscript: “Of the total respondents, only 22.4% (370/1,649) had an adequate (high) perceived risk of dying from COVID-19.”

13. Page 6, results: “….. knowing or not knowing someone …”, please rephrase.

RESPONSE: This has been corrected: “In the unadjusted analysis, the level of perceived risk was associated with country, age group, gender, monthly household income, religion, having hypertension, heart disease, and pulmonary disease, and knowing someone in the
immediate social environment who were or had been infected with COVID-19 to varying degrees (Table 2).”

14. Page 6, results, perceived risk of becoming infected...: again, the sentences can be rephrased without repeating the list of variables, especially with the variables and related statistics are mentioned in the next paragraph in page 13.

RESPONSE: We would like to thank you for this. We have corrected this section by providing the adjusted logistic regression only. In the revised manuscript: “In the adjusted logistic regression, country, age group, gender, religion, type of job, having pulmonary disease, knowing people in the immediate social environment who were or had been infected with COVID-19, had seen or read about individuals infected with COVID-19 on social media or TV, and type of occupation were associated with a perceived risk of dying from COVID-19 (Table 2).”

15. Page 13, discussion: “This is lower compared to the other studies”. Before this comparison, it should be indicated that the overall reported rates were relatively low.

RESPONSE: Thank you. We have revised the text to provide the clear information. In the revised manuscript: “According to our findings, the percentages of participants who had adequate perceived risk of COVID-19 infection and perceived risk of dying from COVID-19 were relatively low, only 36.4% and 22.4%, respectively. These are lower compared to the other studies. 14 – 16”

Thank you

**Competing Interests:** We do not have conflict of interest.