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Community knowledge, perceptions and practices around COVID-19 in Sierra Leone: a nationwide, cross-sectional survey

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ABSTRACT

Objectives To assess the public's knowledge, attitudes and practices about the novel coronavirus in Sierra Leone to inform an evidence-based communication strategy around COVID-19.

Design Nationwide, cross-sectional Knowledge, Attitudes and Practices survey.

Setting 56 randomly selected communities in all 14 districts in Sierra Leone.

Participants 1253 adults aged 18 years and older of which 52% were men.

Main outcome measures We calculated proportions of core indicators (awareness, knowledge, risk perception, practices). A composite variable for knowledge (based on seven variables) was created, and categorised into low (0–2 correct), medium (3–4) and high (5–7). Predictors of knowledge were analysed with multilevel ordinal regression models. Associations between information sources, knowledge and two practices (washing hands with soap and avoiding crowds) were analysed using multilevel logistic regression models.

Results We found that 75% of the respondents felt at moderate or great risk of contracting coronavirus. A majority (70%) of women did not know you can survive COVID-19, compared with 61% of men. 60% of men and 54% of women had already taken action to avoid infection with the coronavirus, mostly washing hands with soap and water (87%). Radio (73%) was the most used source for COVID-19 information, followed by social media (39%). Having a medium or high level of knowledge was associated with higher odds of washing hands with soap (medium knowledge: adjusted OR (AOR) 2.1, 95% CI 1.0 to 4.4; high knowledge: AOR 4.6, 95% CI 2.1 to 10.2) and avoiding crowds (medium knowledge: AOR 2.0, 95% CI 1.1 to 3.6; high knowledge: AOR 2.3, 95% CI 1.2 to 4.3).

Conclusions This study shows that in the context of COVID-19 in Sierra Leone, there is a strong association between knowledge and practices. Because the knowledge gap differs between genders, regions, educational levels and age, it is important that messages are specifically targeted to these core audiences.

Strengths and limitations of this study

- ► We provide evidence and show the feasibility of a nationwide survey about COVID-19 in a low-income country, to inform risk communication strategies in Sierra Leone.
- ► The response rate of the survey was 99%.
- ► The study is based on cross-sectional data, so reverse causality cannot be ruled out.

INTRODUCTION

The novel coronavirus transformed from a local outbreak into a global pandemic, resulting in millions of people around the world seeing their lives affected, with many suddenly living in quarantine. The virus knows no boundaries and quickly overwhelmed health systems in Italy and Spain in March 2020[1] and has health authorities in many countries scrambling for healthcare staff, intensive care beds and personal protective equipment.[2 3] The current number of confirmed COVID-19 cases is an underestimation, as it only reflects the testing capacity of the countries.[4]

While high-income countries are struggling to contain the virus, using unprecedented measures such as strict lockdowns of the whole society, the virus has also spread to low and middle-income countries.[5] With weaker health systems and overcrowded living conditions, measures such as physical distancing and lockdowns have a different meaning, whereby lost income, increased food prices and less access to non-COVID health services can have dire consequences both in the short and in the long term.[6] In Africa, a partnership between the African Union, Africa Centers for Disease Control and Prevention, WHO and African nations led to the formation of the Africa Taskforce for Coronavirus Preparedness and Response, to support diagnostics, surveillance, infection prevention and control and communication.[7] Border closures across the world and flight

restrictions form logistical problems in delivering essential goods to many African countries.[8]

In Sierra Leone, memories of the devastating West African Ebola epidemic that ravaged the country between 2014 and 2016 are still fresh in people's minds. Not only did almost 4000 people die from Ebola, it is likely that many more people died due to the collapsed health system over the course of the outbreak.[9 10] Many lessons were learnt from curbing the outbreak, such as the importance of community engagement, which can potentially help in mitigating the current pandemic.[11–13] During the Ebola outbreak, radio was the most important source of information in Sierra Leone.[14] Trusted community members such as traditional and religious leaders would use radio as a platform to reach their followers, and interactive programming allowed for a dialogue between listeners and radio makers.[15 16]

The current state of the pandemic is similar to the start of the Ebola outbreak in West Africa: with the lack of a vaccine or a cure, widespread behaviour change of the general public is needed to slow and stop the spread of the virus. Physical distancing and frequent hand washing are among the main actions an individual can take to prevent infection with the novel coronavirus.[17 18]

As part of the preparedness for COVID-19 cases in Sierra Leone, we measured the level of knowledge and uptake of preventive practices through a nationwide Knowledge, Attitudes and Practices (KAP) survey. Results formed the basis for further development and production of an evidence-based communication strategy around COVID-19 in collaboration with the Ministry of Health and Sanitation (MoHS).

METHODS

We administered a cross-sectional, nationwide survey in Sierra Leone between 16 and 25 March 2020. At the time of the survey, there were no confirmed COVID-19 cases in Sierra Leone. The first laboratory-confirmed case in the country was reported on 31 March. We used a multistage cluster sampling design with primary sampling units selected with probability relative to their size. The list of around 1200 peripheral health units (PHUs) formed the sampling frame for the selection of enumeration areas. Sierra Leone is divided into 14 districts: four PHUs were randomly selected from each district. In each of the selected PHUs, a random sample of 25 households from the PHU's catchment population was selected and a resident aged 18 years or older was randomly selected for an interview. The households were selected using a random walk method; in the approximate centre of the sampled community a pen would be thrown in the air. The tip of the pen indicated the sampling direction. A skip interval was determined in advance and was derived from dividing the number of estimated households in the community by the required sample size. Enumerators would walk in the direction of the tip of the pen, counting and selecting households according to the skip interval. Enumerators, wearing identity badges from the Sierra Leonean non-governmental organisation FOCUS1000, explained the study to the targeted participant, after which informed consent was obtained. Enumerators were instructed to immediately stop an interview if a participant showed COVID-19 symptoms or indicated during the survey to have symptoms. The enumerator would encourage the participant to seek care immediately. Consent and the further data collection were captured on 4G-enabled tablets using Open Data Kit. The 14 experienced enumerators received a 2-day training before the start of the data collection, practising the translations of the questionnaire into local languages and getting familiarised with the tablet. The multilingual numerators were district-based staff from FOCUS1000 and dispatched to areas that corresponded to their language skills. The study and training were organised by FOCUS1000. The target sample size of 1400 individuals was set to produce national estimates at a 95% confidence level with a margin of error of ±3.5%.

Whereas we did not directly include patient and public involvement in the design of the study, the tools used in this survey were similar to previously deployed KAP surveys in the Ebola outbreak in Sierra Leone,[14] results of which were widely disseminated during the course of the outbreak and updated based on public feedback. The survey was updated to reflect COVID-19. It contained a mix of closed-ended 'yes/no' questions and open-ended questions, after which the enumerator would tick the corresponding answer on a predefined list on the tablet. A composite variable was created for knowledge, based on seven variables (see online supplemental material for the full questionnaire). Three of those variables related to closed-ended questions about the modes of transmission of COVID-19 (eg, 'Can the coronavirus disease be transmitted through the air?'). A further three variables related to an open-ended question about the main symptoms ('What are some of the signs and symptoms of someone infected with the coronavirus disease?'), whereby the enumerator would not read the alternatives out loud, but tick the boxes that corresponded to the answers of the participants. Finally, a closed-ended question asked about the possibility of surviving COVID-19. Depending on the number of correct answers, respondents could score between 0 and 7. The knowledge score was categorised into 0–2 correct answers (low), 3–4 (medium) and 5–7 (high). The two preventive practice questions (washing your hand with soap and water more often and avoiding crowds) were answered only by respondents who indicated that they had taken action to avoid infection with COVID-19.

Statistical analysis

Due to the sampling strategy, there was an overrepresentation of the Northern and Eastern Province, this was adjusted for by using sampling weights based on population sizes of the four regions of Sierra Leone. We summarised the demographic data and calculated proportions with their 95% CIs of the core indicators

(awareness, risk perception, knowledge, practices and information sources) for the overall sample as well as by gender. Predictors of the three-level knowledge variable were analysed using multilevel ordinal regression models, adjusted for the geographic clusters on the first level. We specified crude and models adjusted for region (North, West, South, East), gender (male/female), age (18–29, 30–39, 40–49, 50–59, 60+), education (no formal education, primary, secondary and above) and religion (Islam/Christianity). Results were reported in ORs and their 95% CIs. Associations with preventive practices (hand washing with soap and water and avoiding crowds) were analysed using multilevel logistic regression models, adjusted for the above-mentioned covariates. Data were analysed using StataMP V.15.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

RESULTS

The overall response rate of the KAP survey was 99%, yielding a total sample size of 1399. Due to missing variables, 146 participants (10%) were excluded, bringing the sample size for the analysis to 1253. The distribution across the four regions reflects the number of districts per region; the Northern Province contains five districts as opposed to two districts in the Western Area. More than half of the sample (58%) was between 18 and 39 years old and 52% had at least secondary education (see table 1).

The awareness of the novel coronavirus was high, with 91% (95% CI 88.2% to 93.2%) indicating that they had heard of COVID-19 (table 2). Seventy-five per cent (95% CI 64.7% to 82.5%) of the sample felt at moderate or great risk of contracting the virus in the next 6 months, but this varied greatly across regions; 96% in the Eastern Province felt at moderate or high risk compared with 58% in the Western Area (where capital Freetown is located). Knowledge about how the virus spreads was relatively high (61%–74%); however, knowledge about important symptoms of COVID-19 such as difficulty breathing was relatively low (33%, 95% CI 24.8% to 41.9%). Only 35% (95% CI 28.5% to 41.3%) knew that you can survive COVID-19. This differed significantly by gender, whereby more men (39%, 95% CI 31.7% to 46.9%) knew about COVID-19 survival than women (30%, 95% CI 23.8% to 36.5%) (see online supplemental material). A bit more than half of the respondents (57%, 95% CI 50.9% to 63.0%) said they have already taken action to avoid COVID-19 infection. More men than women reported doing so (men: 60%, 95% CI 52.9% to 66.4% vs women: 54%, 95% CI 47.4% to 60.6%). The most commonly mentioned action taken was washing hands with soap and water more often (87%, 95% CI 81.9% to 90.5%). Radio (73%, 95% CI 69.2% to 77.2%) was the most used source for COVID-19 information, followed by social media (39%, 95% CI 31.4% to 46.3%). Social media use was significantly more common by men (45%, 95% CI 37.9% to 52.9%) than by women (31%, 95% CI 23.6% to 39.9%). Print media (11%, 95% CI 5.9% to 18.3%) and traditional leaders (9%, 95% CI 4.4% to 17.2%) were the least commonly reported sources of COVID-19 information. Ninety-three per cent

Table 1 Demographics

	Eastern Province	Northern Province	Southern Province	Western Area	Total
Sex					
Female	133 (47)	221 (47)	181 (52)	89 (47)	604 (48)
Male	127 (53)	254 (53)	165 (48)	102 (53)	648 (52)
Age (years)					
<20	27 (11)	43 (9)	41 (12)	13 (7)	124 (10)
20–29	55 (23)	138 (29)	58 (17)	66 (35)	317 (25)
30–39	57 (24)	117 (25)	69 (20)	50 (26)	293 (23)
40–49	46 (19)	83 (17)	57 (16)	36 (19)	222 (18)
50–59	26 (11)	62 (13)	48 (14)	16 (8)	152 (12)
≥60	28 (12)	32 (7)	73 (21)	10 (5)	143 (11)
Education					
No formal	79 (33)	154 (32)	131 (38)	40 (21)	404 (32)
Primary	39 (16)	58 (12)	73 (21)	19 (10)	189 (15)
Secondary	120 (50)	263 (55)	140 (41)	132 (69)	655 (52)
Religion					
Islam	145 (61)	378 (80)	229 (66)	91 (48)	843 (67)
Christianity	94 (39)	97 (20)	117 (34)	100 (52)	408 (33)

Table 2 COVID-19 awareness, knowledge, practices and information sources

Indicator	%*	95% CI*
Awareness and attitudes		
Heard of COVID-19	91	88.2 to 93.2
Moderate–great risk perception	75	64.7 to 82.5
Knowledge		
Mode of transmission: air	61	54.6 to 66.1
Mode of transmission: body fluids	74	68.3 to 78.8
Mode of transmission: touch	66	59.4 to 71.2
Symptoms: fever	38	30.0 to 46.4
Symptoms: cough	54	47.5 to 61.3
Symptoms: difficulty breathing	33	24.8 to 41.9
Possible to survive COVID-19	35	28.5 to 41.3
Practices		
Taken any action	57	50.9 to 63.0
Wash hands with soap and water	87	81.9 to 90.5
Avoid crowded places	62	53.7 to 69.0
Drink traditional herbs	9	3.7 to 21.6
Medicines from pharmacy	10	4.0 to 22.1
Drink a lot of water/juice	22	14.0 to 31.8
Information sources		
Social media	39	31.4 to 46.3
Radio	73	69.2 to 77.2
Church/mosque	24	17.3 to 31.7
Community meetings	18	11.8 to 26.7
Print media	11	5.9 to 18.3
Traditional leaders	9	4.4 to 17.2
Ministry of Health and Sanitation	13	7.5 to 20.6

*Adjusted for sampling weights.

of respondents indicated that they would like to have more information on COVID-19, mostly about signs and symptoms of the disease and ways to prevent it.

Respondents who felt at moderate or high risk of contracting COVID-19 were more likely to have a higher level of knowledge (adjusted OR (AOR) 2.82, 95% CI 1.84 to 4.32) (see table 3). Those living in the Northern and Southern Province were more likely to have more knowledge about the novel coronavirus. Men were 45% (95% CI 1.13% to 1.86%) more likely than women to demonstrate knowledge. Respondents who attained at least secondary education were three times more likely (95% CI 2.22 to 4.22) than respondents with no formal education to have more knowledge about COVID-19.

Respondents who had a medium level of knowledge about the novel coronavirus were two times more likely to say that they wash their hands with water and soap more often (AOR 2.10, 95% CI 1.00 to 4.39); those with a high level of knowledge were more than four times more likely to say so (AOR 4.60, 95% CI 2.08 to 10.18) (see table 4). A similar pattern can be observed for the association between knowledge and the self-reported practice of avoiding crowds. Having a medium or high level of knowledge was associated with avoiding crowds (medium knowledge: AOR 1.95, 95% CI 1.07 to 3.57; high knowledge: AOR 2.30, 95% CI 1.23 to 4.30).

All information sources, apart from community meetings, were associated with increased knowledge about COVID-19 (see table 5). However, only radio was significantly associated with a higher likelihood of reporting more frequent hand washing with water and soap (AOR 2.64, 95% CI 1.40 to 4.95). Three information sources were associated with avoiding crowds: social media (AOR 1.90, 95% CI 1.20 to 3.01), print media (AOR 3.52, 95% CI 1.57 to 7.90) and the MoHS (AOR 2.88, 95% CI 1.28 to 6.47).

DISCUSSION

This cross-sectional nationwide survey in Sierra Leone gives insights in the knowledge, attitudes and practices around COVID-19. Whereas at the time of the study there were no confirmed cases in Sierra Leone, awareness of COVID-19 was high—likely due to the ongoing worldwide health emergency. There was a strong demand for more information among the respondents. We found strong associations between increased knowledge and important preventive practices such as frequent hand washing with soap and water and avoiding crowds. Significant gender differences in knowledge and taking preventive actions indicate that outbreak communication should specifically target women, as well as those with lower educational levels. Furthermore, the Southern Province differed significantly from the other provinces in terms of their level of knowledge about COVID-19. It can be speculated that this difference might be due the relatively high exposure to media (such as radio and mobile phones) in the Southern Province and the presence of a university, which might have brought more awareness to the ongoing pandemic.[19]

The results of this study were used to upgrade the communication strategies of the MoHS and national organisations in Sierra Leone. Key messages targeting women, young people and across various platforms are currently being developed. Use of mass media is intensified and trusted leaders such as religious leaders and traditional healers are engaged to disseminate standardised messages. Measures are developed to track and debunk rumours, especially via social media.

The perception of risk of contracting COVID-19 was relatively high—higher than reported in a similar KAP survey during the first months of the Ebola outbreak, when 58% felt at risk of contracting Ebola.[14] Whereas Ebola's mortality rate is estimated to be around 50% among confirmed cases,[20] COVID-19 has a much lower case fatality rate of around 4.1%.[21] Given the substantial under-reporting of COVID-19 cases, the true infection fatality rate is likely much lower. The ongoing pandemic

Table 3 Predictors of COVID-19 knowledge

	Crude OR (95% CI)	P value	Adjusted* OR (95% CI)	P value
Risk perception				
No and small	Reference	–	Reference	–
Moderate and great	3.56 (2.04 to 6.25)	0.000	2.82 (1.84 to 4.32)	0.000
Region				
East	Reference	–	Reference	–
North	3.54 (1.14 to 10.96)	0.029	3.05 (1.05 to 8.86)	0.040
South	7.78 (2.71 to 22.30)	0.000	10.84 (3.52 to 33.39)	0.000
West	4.14 (1.99 to 8.62)	0.000	3.65 (0.89 to 14.98)	0.072
Sex				
Female	Reference	–	Reference	–
Male	1.65 (1.27 to 2.14)	0.000	1.45 (1.13 to 1.86)	0.003
Age				
18–29	Reference	–	Reference	–
30–39	0.96 (0.66 to 1.39)	0.808	1.42 (1.02 to 1.99)	0.040
40–49	0.89 (0.58 to 1.38)	0.605	1.45 (1.01 to 2.09)	0.043
50–59	0.67 (0.40 to 1.11)	0.119	1.06 (0.70 to 1.62)	0.774
>60	0.57 (0.32 to 1.00)	0.051	0.80 (0.51 to 1.23)	0.298
Education				
No formal	Reference	–	Reference	-
Primary	1.78 (1.00 to 3.18)	0.050	1.39 (0.95 to 2.03)	0.090
Secondary	3.32 (2.11 to 5.21)	0.000	3.06 (2.22 to 4.22)	0.000
Religion				
Islam	Reference	–	Reference	-
Christianity	1.77 (1.24 to 2.52)	0.002	1.38 (1.02 to 1.85)	0.035

*Adjusted for risk perception, region, sex, age, education and religion.

elsewhere in the world and the memories of the devastating Ebola outbreak have likely exacerbated the perception of risk.[22] The finding that only 35% of the respondents knew that you can survive COVID-19, shows that more sensitisation needs to be done so that risk perceptions reflect the actual risk. For instance, messages could highlight

Table 4 Association between knowledge and practices

	Hand washing			
	Crude OR (95% CI)	P value	Adjusted* OR (95% CI)	P value
Knowledge				
Low	Reference	–	Reference	-
Medium	1.84 (0.91 to 3.73)	0.089	2.10 (1.00 to 4.39)	0.049
High	4.63 (2.18 to 9.84)	0.000	4.60 (2.08 to 10.18)	0.000
	Avoiding crowds			
Knowledge				
Low	Reference	–	Reference	–
Medium	1.86 (1.03 to 3.36)	0.039	1.95 (1.07 to 3.57)	0.030
High	2.21 (1.21 to 4.02)	0.010	2.30 (1.23 to 4.30)	0.009

*Adjusted for region, sex, age, education and religion.

Table 5 Association between information sources and knowledge and preventive practices

	Knowledge			
	Crude OR (95% CI)	P value	Adjusted* OR (95% CI)	P value
Information sources				
Social media	3.78 (2.66 to 5.38)	0.000	2.97 (2.12 to 4.16)	0.000
Radio	1.93 (1.40 to 2.66)	0.000	1.75 (1.26 to 2.43)	0.001
Church/mosque	1.72 (1.21 to 2.44)	0.003	1.87 (1.30 to 2.70)	0.001
Community meetings	1.41 (0.89 to 2.34)	0.144	1.53 (0.95 to 2.48)	0.080
Print media	2.79 (1.42 to 5.47)	0.004	2.63 (1.34 to 5.17)	0.006
Traditional leaders	1.98 (1.17 to 3.35)	0.012	2.04 (1.13 to 3.70)	0.019
MoHS	3.09 (1.84 to 5.19)	0.000	3.13 (1.85 to 5.30)	0.000
	Hand washing			
Information sources				
Social media	1.03 (0.55 to 1.93)	0.935	0.79 (0.37 to 1.68)	0.537
Radio	2.72 (1.46 to 5.05)	0.002	2.64 (1.40 to 4.95)	0.003
Church/mosque	1.88 (0.87 to 4.07)	0.108	1.76 (0.83 to 3.71)	0.135
Community meetings	2.73 (1.23 to 6.05)	0.015	2.03 (0.85 to 4.90)	0.110
Print media	3.54 (0.80 to 15.68)	0.094	2.91 (0.62 to 13.60)	0.171
Traditional leaders	1.66 (0.49 to 5.68)	0.411	1.58 (0.52 to 4.85)	0.415
MoHS	2.26 (0.71 to 7.18)	0.164	1.96 (0.55 to 6.96)	0.289
	Avoiding crowds			
Information sources				
Social media	1.65 (1.04 to 2.60)	0.032	1.90 (1.20 to 3.01)	0.007
Radio	1.64 (1.02 to 2.65)	0.042	1.59 (0.97 to 2.61)	0.064
Church/mosque	1.69 (0.93 to 3.04)	0.082	1.62 (0.88 to 2.98)	0.117
Community meetings	1.49 (0.82 to 2.70)	0.191	1.56 (0.84 to 2.91)	0.156
Print media	3.29 (1.55 to 6.99)	0.002	3.52 (1.57 to 7.90)	0.003
Traditional leaders	3.21 (0.91 to 11.30)	0.068	3.33 (0.87 to 12.71)	0.077
MoHS	2.70 (1.27 to 5.76)	0.011	2.88 (1.28 to 6.47)	0.011

*Adjusted for risk perception, region, sex, age, education and religion.
MoHS, Ministry of Health and Sanitation.

that older age groups (70 years and older) are most at risk of experiencing a severe form of COVID-19 and of dying from the disease.[23] While in many European countries the share of those aged 70 and older is between 15% and 20%,[24] in Sierra Leone only 2.4% of the population is older than 70.[25] Exact age-specific mortality rates of COVID-19 are to date not confirmed but are significantly lower than Ebola.[26 27]

Radio has throughout the Ebola outbreak been an important source of information.[14 28] In our study, radio is similarly the most cited source of information. Community sources such as religious and traditional leaders were mentioned by only 10% of the sample, which is low compared with the Ebola outbreak when 60% heard messages through community leaders.[28] This can be explained by the timing of our survey; sensitisation and community engagement efforts were just starting. Community leaders remain trusted sources of information in Sierra Leone and should be mobilised for community engagement.[29]

Social media, on the other hand, was also a relatively frequently mentioned source in our study. WhatsApp is an especially widespread social media platform in many African countries.[30] In our study, social media was strongly associated with increased knowledge and with avoiding crowds. Whereas it can clearly be a source of relevant information, there is also reportedly widespread misinformation circulating quickly on WhatsApp.[31] We have not studied misconceptions and risk behaviour further, which are likely to be associated with social media. Monitoring and frequent updates on social media should be a priority in any communication strategy.[32] Radio and social media provide platforms that could be leveraged to disseminate important information.[33]

While a little more than half of the respondents indicated that they had already taken actions to avoid

COVID-19 infection, the feasibility of (long-term) preventive practices in low-income settings should be taken into account.[34] Physical distancing in overcrowded communities can be very challenging. Most deprived communities lack running water, toilet facilities, soap and basic food items. It is not uncommon to find a family of four to five people cramped in a single bedroom with poor lighting and ventilation.[35] Promoting physical distancing should be aligned with the on-the-ground reality. Increasing public education, especially on the use of face masks and the provision of water and soap, might be the most realistic measure to take.

Strengths and limitations

Major strengths of this study are the nationwide sample and high response rate. This study shows that rapid data collection can be done in preparation for a health emergency and can form the basis of evidence-based decision-making. This is a cross-sectional survey, so associations can also be interpreted in the opposite direction. The sampling strategy (using PHUs as the sampling frame) caused oversampling of some regions compared with population size, which was adjusted for by applying sampling weights. Still, the data may not have been representative of the population. Social desirability might have influenced the answers of respondents. Respondents might have highlighted preventive practices that they were familiar with from the Ebola outbreak—which might make the implementation of public health measures quicker. Despite extensive practice of the translations of the English questionnaire to local languages, the translations in practice might not have been fully consistent. Lastly, self-reported practices might be different from actual practices.

CONCLUSION

In Sierra Leone, where a devastating Ebola outbreak ended over 4 years ago, we found that while awareness and risk perception of COVID-19 was high, the majority does not know that one can survive COVID-19. While knowledge does not automatically translate into practices, this study shows that in the context of COVID-19 in Sierra Leone, there is a strong association between knowledge and practices. Although we cannot rule out reverse causality, this points to the importance of community engagement and risk communication. Because the knowledge gap differs between genders, regions, educational levels and age, it is important that messages are specifically targeted to these core audiences. Information platforms with a wide reach, such as radio and social media, should be leveraged to disseminate messages by trusted leaders.

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