

The perception of COVID-19 pandemic response and factors associated with non-utilization of face masks in communities with previous exposure to Ebola virus outbreak, Liberia, 2020: A mixed-method study

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ABSTRACT

Introduction: The COVID-19 pandemic disrupted social life and the economy across the world. In communities with prior experience of Ebola virus disease (EVD) epidemics, this previous exposure was expected to influence the response to the COVID-19 pandemic. This study described communities' perceptions and responses to COVID-19 in Liberia and identified factors associated with the non-utilization of face masks. **Methods:** A cross-sectional study, using a qualitative and quantitative design, was conducted in Liberia six months into the COVID-19 outbreak. Forty-two communities were randomly selected from catchment communities around twenty-one main referral health facilities. In each community, a focus group discussion was conducted, ten community members were systematically selected for a face-to-face interview and a checklist was used to assess the community preparedness and response. **Results:** COVID-19 was reported in thirty-six of the forty-two communities (85.7%). Among the respondents, COVID-19 awareness was 96.2% (404/420), and 34.5% (145/420) reported using a face mask. Some communities initiated and implemented response strategies to COVID-19 without waiting for the government. Strong community leadership and collaboration strengthened community ownership and participation in the response. The non-involvement of the communities in response planning by the government and poor monitoring of adherence to COVID-19 preventive protocols were identified as gaps. Poor knowledge of COVID-19 preventive measures (aOR 5.3, 95% C.I., 3.3 – 8.6; $p < 0.01$), being a female (aOR 1.7, 95% C.I., 1.1 – 2.7; $p = 0.03$), and being in the 50 – 59 years age group (aOR 5.0, 95% C.I., 1.5 – 16.4; $p = 0.01$) compared to age < 20 years were significantly associated with the non-utilization of face masks. **Conclusion:** The high COVID-19 pandemic awareness did not translate into face mask utilization. Poor knowledge of COVID-19 preventive measures, being in the 50 – 59 years age group, and being female were associated with the non-utilization of face masks.

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Introduction

The first COVID-19 case in Liberia was imported from Europe on 15 March 2020 and the country declared the outbreak on 16 March 2020 [1,2]. As expected, COVID-19 caused fear and anxiety among the communities in Liberia, although they had prior significant exposure to the Ebola virus disease (EVD) outbreak. Upon declaration of the COVID-19 outbreak, the Ministry of Health and National Public Health Institute of Liberia which had already developed a COVID-19 strategic preparedness and response plan, activated the National Emergency Operation Center and instituted the Incidence Management System (IMS) or Team to coordinate the response. The IMS instituted measures to control the importation of cases at the ports of entry, established precautionary observation centres and treatment units, disseminated health education on COVID-19 non-pharmacological preventive measures, implemented movement restriction or lockdown, strengthened disease surveillance, and supported counties to respond to the outbreak.

A community is a group of people residing in the same geographical location, the feeling of fellowship with others, sharing common attitudes, interests, and goals, but facing a common risk[3] like exposure to infectious disease outbreaks. Community participation in controlling infectious disease outbreaks is a process of collective responsibility of individual community members for their own health and welfare regarding controlling the spread of disease e.g., COVID-19 [3]. Liberia communities significantly contributed and participated in the implementation of strategies to stop the transmission of the EVD outbreak in 2015 [4,5]. The importance of community involvement and participation in response to the control of epidemics was demonstrated when Liberia communities were incorporated into the EVD outbreak response in 2015.

In controlling the transmission of COVID-19, several non-pharmacological measures like the wearing of medical or non-medical face masks and frequent handwashing were found to be effective, if adequately used in the communities [6]. Therefore, to achieve the success required in controlling COVID-19 transmission in the community, factors such as the development of a community preparedness and response plan, availability of strong leadership to lead the planning and

implementation process, effective coordination, and collaboration among stakeholders in the community to drive community participation, implementation, and ownership of the culturally acceptable measures that control or prevent the epidemic need to be considered. These factors and individual perceptions of the disease could influence communities' behaviour, especially if they have prior experience with the same event threshold or any significant events.

The West Africa Ebola virus disease (EVD) outbreak in 2014 severely affected Liberia [1] which reported 10,678 cases and 4,810 deaths as of March 29, 2016, when the outbreak was declared over[7]. The outbreak left a diverse and significant experience for the individual and their communities. Generally, the EVD outbreaks affected the socioeconomic and psychological conditions[8], of families with cases and the survivors were stigmatized. This significant experience can either influence individual or community behaviour [9] in response to subsequent outbreaks like EVD [10].

According to social cognitive theory, the memories of a significant fatal event last long and can shape an individual's perception and practice regarding the object of the event [11]. Some of the factors that can influence behavioural response are the depth of individual exposure to the threat, the quality and perception of the information received, individual involvement in the implementation of response, and the strength of community collaboration with partnership among the stakeholders to control the epidemic using culturally acceptable local content [2,3]. This study describes the community's perception of the COVID-19 outbreak, the preparedness and outbreak response in comparison to the EVD outbreak. Also, the factors associated with the use of face masks in the community were examined.

Methods

Study setting

Liberia has an estimated population of 5.1 million distributed across 15 counties. One-third of the population is in Montserrado County which harbours the country's capital city and is divided into 7 districts which are equivalent to Counties administratively. Liberia suffered a prolonged civil

war that was followed by the EVD epidemic in 2014 [1] which caused 4,810 deaths [7]. All 15 counties in Liberia experienced Ebola in 2014-2015 [12] and have reported COVID-19.

Study design

This was a cross-sectional study that employed both quantitative and qualitative approaches.

Study population

The study population were the residents of the selected community from each of the 15 Counties in Liberia.

Sample Size Determination

For the quantitative study, we used the Cochran formula $n = z^2pq/d^2$ [13] to compute the sample size. We considered z at a 95% confidence interval as 1.96, the prevalence p for utilization of nose masks in the community, 50% [14], q (i.e., $1-p$) is 50%, and confidence limit d of $\pm 5\%$ as 0.05, and non-response rate of 10%. The minimum sample size was 420. Therefore, 10 persons were selected per community.

The qualitative study comprised one focus group in each of the 42 primary catchment communities that were selected for the quantitative study. In total, there were 42 focus group discussions (FGDs) were conducted. Six to ten community members were purposely selected among the community health team members (e.g., community chairman, chair lady, community elders, block chairman, youth representatives, women representatives, religious leaders, traditional or opinion leaders and community health volunteers) to participate in each FGD.

Technique

For the quantitative study, a multi-stage sampling technique was used. For stage 1, there are 15 counties divided into 21 administrative units in Liberia. All 21 administrative units were selected for the study. At each unit, the main referral or public secondary health facility or the most patronized non-public health facility with a high probability of managing infectious diseases like Ebola and COVID-19 were purposefully selected and their

primary catchment communities were listed as sampling frames. For stage 2, two primary catchment communities were randomly selected by balloting per health facility totalling 42 communities. At the selected catchment communities, a landmark like a market square, a religious centre, a public viewing centre, etc. was identified and a trained data collector systematically selected every tenth person that passed through this landmark until 10 participants were selected for a face-to-face interview in the 42 communities.

For the qualitative interview, six to ten persons among the community health team that comprises of community's traditional leaders, the elders, religious leaders, political or opinion leaders, youth leaders, women leaders, and community health volunteers or assistants were invited as a team to participate in the community Focus Group Discussion (FGD).

Data collection

A structured questionnaire and checklist were used to collect information from the communities on their knowledge and perception of COVID-19 disease and to observe if non-pharmacological preventive measures were used. The data collector visited the community leader to obtain his consent and approval to collect data before asking if COVID-19 had been reported in the community and interventions implemented to prevent it. Section A of the structured questionnaire was the checklist that asked if COVID-19 has been reported in the community. It also allowed data collectors to systematically select and observe if the selected 10 houses had handwashing sites, the presence of COVID-19 information, education, and communication materials in the community, and if social distancing was maintained at gatherings. Section B had four questions and was administered face-to-face to the ten participants systematically selected by the data collector while standing at a landmark in the selected community. It assessed the participant's knowledge and perception of COVID-19. The questions included "Have you heard or seen information on COVID-19 in the community?", "Do you think COVID-19 exists in Liberia?", "How can you protect yourself and your family from contacting COVID-19?", "Why are you wearing or not wearing a nose mask or face shield?" depending on whether the participant is wearing or not wearing a face masks. The questionnaire used for the

interview was designed in the Kobo Collect toolbox installed on an Android phone.

We conducted 42 community FGDs to discuss their preparedness and response to the COVID-19 outbreak with the background of their experience during the Ebola outbreak that occurred from 2014 to 2016 in Liberia. Using an FGD interview guide, we asked questions on the awareness of the COVID-19 outbreak, what the community did in preparation to prevent COVID-19 in the community, how community leaders sensitized the people, what the community members were doing to prevent the spread of COVID-19 disease, and whether community members accepted to implement the measures. We also enquired about perceived gaps and what could be done better. The interviewer booked an appointment for an FGD interview with each team member after obtaining their informed consent. The interviewer and a note-taker/timekeeper ensured that COVID-19 preventive measures such as wearing masks and social distancing were maintained during the interview. The interview was conducted in English language, audio recorded, and field notes were taken during the interview. Each FGD lasted 40 - 60 minutes. Data collectors were graduates and trainees of the Liberia Field Epidemiology Training Program (FETP) and were supervised by the FETP faculty members. The tools were piloted before use in the selected communities that were not part of the study.

Data analysis

Descriptive statistics such as mean and standard deviations for continuous variables and frequencies and percentages for categorical variables were used to summarize the variables. The proportion of houses in the community with handwashing sites (with soap and water) among the 10 houses observed was used to determine hand washing coverage. A community with at least seven handwashing sites was considered good coverage. Individual awareness, perception, and preventive practices were assessed and analysed using three items: the awareness of COVID-19, perception of COVID-19 as an infectious disease with epidemic potential, and ability to name 4 non-pharmacological preventive measures e.g., frequent hand washing with soap and water, use of hand sanitiser, cover mouth and nose with a mask, avoid close contact with anyone who has fever and cough and maintaining social

distancing. A correct response on these items was scored "1" and the percentage of the maximum obtainable scores that were correct responses was calculated. Thereafter, the percentage of the maximum obtainable score was categorized using a percentile score, i.e., < 50th percentile is poor, 50 - 74th percentile is average, and \geq 75th percentile is good. For bivariate analysis, < 75th percentile was categorized as poor. For the use of face masks, the proportion of participants who were observed to wear a face mask or shield at the time of recruitment into the study was calculated and the reasons for not using the face mask were reported. We analysed the factors associated with the use of masks.

The audio recordings from the FGD and corresponding field notes were transcribed into expanded notes by the interviewers and reviewed by the supervisor. All transcribed notes and audio recordings were verified by an independent reviewer who identified or corrected any inconsistencies before analysis. Each of the transcripts was uploaded into Computer Assisted Qualitative Data Analysis Software, ATLAS.ti for detailed reading and re-reading to identify significant keywords and phrases. Two analysts independently and then jointly evaluated the meanings of these words and phrases for consensus coding. A codebook was developed into themes identified while reading the transcripts based on the study objectives and COVID-19 thematic areas being evaluated. Initially, one analyst performed the analysis, but the final analysis was based on the review of two analysts. The themes and subthemes were synthesized, and interpretation was presented with excerpts or quotes from the data using a thematic approach.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to their containing information that could compromise the privacy of research participants but are available from the corresponding author on reasonable request with approval from national COVID-19 incident management.

Ethical considerations

The ethical clearance for this study was waived with reference letter no: 058 because the study was part of the outbreak response operation research in response

to the COVID-19 outbreak in Liberia. All methods were carried out per relevant guidelines and regulations as related to responsible research conduct. Before participation, consent was obtained from each participant and their confidentiality and privacy were assured.

Results

All the 42 communities participated in the study, 45.2% (19/42) of which were rural. COVID-19 has been reported in 85.7% (36/42) of communities. Of the 420 quantitative study participants sampled from the community, 51.4% (216/420) were male, the mean age was 36.4 ± 13.3 years, the commonest age groups were 20 - 29 years (26.4%, 111/420), and 30 - 39 years (25.7%, 108/420), urban community dwellers were 54.8% (230/420).

For the qualitative study, 291 community members participated in the 42 FGDs. The median age and inter-quarter range were 43.8 (33 - 53) years. The age group 25 - 44 years accounted for 49.5% (144/291) and males were 70.8% (206/291). In decreasing order, the youth leader, community chairman, women leader, traditional leader, opinion leader, religious leader, and community member were the commonest community roles of the participants ([Table 1](#)).

COVID-19 Community preparedness and outbreak response

The communities responded differently when the outbreak was declared on March 16, 2020. Some resorted to strategies used during the Ebola outbreak in 2014 by setting up handwashing sites, screening visitors, creating awareness, and reporting persons with fever and any deaths in the community. Others met with Ministry of Health officials before the implementation of the COVID-19 response ([Table 2](#)). Generally, the communities mobilized resources, created awareness, conducted active case searches, reported, and supported testing and case transfer to isolation units, and implemented non-pharmacological preventive measures as done during the EVD response.

The majority 78.6% (33/42) of the communities had handwashing sites with soap and water located in strategic locations in the community, 52.4% (22/42)

had COVID-19 posters, handbills or flyers displayed or seen in the community, 16.7% (7/42) had updated suspected case definition chart displayed, and 28.6% (12/42) enforced social distancing at community gatherings or entertainment centres. Among the 33 communities with handwashing sites with soap and water, 42.4% (14/33) had more than a third of households with handwashing sites at their entrances.

Community awareness, perception, and practice to prevent the COVID-19 pandemic

A month after the COVID-19 outbreak was declared on the 16th of March 2022 in Liberia, the community's perception of COVID-19 and its preventive measures was poor. The community believed that the COVID-19 outbreak was a scam by the government to make money through foreign donors ([Table 3](#)). Unlike the time of the EVD epidemic in Liberia, COVID-19 cases were not seen on television like in other countries where high COVID-19 transmission and mortality rates were reported in the media. However, with improved community awareness and more COVID-19 cases and deaths reported in Liberia, community perception also changed as said in one of the community focus groups *"At first most of the community members were not believing that the disease existed, but with the help of radio awareness and health education from the community health assistant (CHA), people began to believe that the virus was actually true."* D 34: Rivercess community ([Table 3](#)).

Most of the respondents, 74.5% (313/420) were aware of COVID-19 and had good knowledge of COVID-19 preventive measures 33.6% (141/420) ([Table 4](#)). The most common preventive practices known by the participants were frequent hand washing with soaps and water, 90.0% (378/420), the use of a face mask, 72.0% (302/420), and social distancing, 66.0% (277/420). Face mask utilization was 34.5% (145/420). More community members with good COVID-19 preventive knowledge, 62.4% (88/141) used face masks compared to 20.4% (57/279) among those with poor preventive knowledge. Poor COVID-19 preventive knowledge (aOR 5.3, 95%CI: 3.3 - 8.6; $p < 0.01$), age group 50 - 59 years (aOR 5.0, 95%CI: 1.5 - 16.4; $p = 0.01$) were more likely not to use face masks compared to age group < 20 years. Also, being a female (aOR 1.7, 95%CI: 1.1 - 2.7; $p = 0.03$) was significantly

associated with face mask non-utilization among the community members compared to being male ([Table 4](#)).

Gaps in community response to COVID-19 outbreak

Strong community leadership mobilized the people to respond to the COVID-19 outbreak as shown in [Table 2](#), where the community leaders-initiated context-purposeful measures to mitigate the COVID-19 transmission in the community. In [Table 5](#), the gaps in the COVID-19 community response show that the communities perceived the government leadership in the COVID-19 response as weak and that community ownership and involvement were poor. In addition, there was an inability to sustain COVID-19 preventive supplies, low awareness coverage, and no monitoring of the implementation of preventive measures.

Strengthening community response to the COVID-19 global health emergency

To strengthen community response, the participants recommend that the Ministry of Health should provide adequate leadership rather than allowing the politicians to lead the implementations. *“When it comes to health issues, I think the health Ministry is responsible so they should take ownership and not the politicians. What the government would have done was to take ownership and provide the community with the needed materials to implement preventive measures.”* D 18: Grand Cape Mount community. Also, the community structure should be involved in a task force instituted by the government to implement response measures and monitor adherence to COVID-19 preventive measures and identify cases in the community. *“The country was able to curtail the Ebola outbreak through the community base level structure and the government should have used the same structure.”* D 9: Central Monrovia community. *“The task force that government established should be tailored down to the community level and not stop at the National or County levels.”* D 18: Grand Cape Mount community. *“During the Ebola outbreak, there were people going around in the community to advise community members, so the government should get people again to continue checking on the community. The Town chief also buttressed this point that government should continue to have eyes or Community Health Volunteers in*

the community that will check on the community and report any case.” D 7: Caresburg community.

In addition, the collaboration among global health emergency stakeholders to respond by providing various technical, financial, human, and material supports to the communities is highly encouraged.

Discussion

This study describes the community's perception of and gaps in Liberia's COVID-19 preparedness compared to EVD epidemics in 2014 - 2016, and factors associated with the use of face masks. Previous experience with the EVD outbreak and response influenced the community preparedness and response to COVID-19. Liberia declared a COVID-19 outbreak on March 16, 2020, with mixed reactions among the communities. In Montserrado County, the community leaders were engaged by the Ministry of Health and County Health Team on preparedness and response to COVID-19 and in other communities where the outbreak had not been declared, the community leaders engaged their members to develop a context-purposeful preparedness plan to respond to the outbreak, using the experience gained in response to EVD epidemic in Liberia [[15](#)]. Generally, it was reported that Liberia had relatively rapid preparedness and response measures to COVID-19 compared with other countries partly due to the experience gained from the EVD outbreak [[16](#)]. The importance of early engagement of community leaders to proffer context-specific preparedness and response to COVID-19 as done in Liberia during the EVD epidemic response was expected to influence the response to COVID-19. In addition, providing community support will stimulate their involvement and participatory effort to appropriately respond to the epidemic [[15](#)] as well as enhance community intervention's effectiveness at controlling and managing the COVID-19 pandemic [[3](#)].

Being a novel disease that elicited anxiety, COVID-19 caused widespread misinformation in Liberia [[17](#)]. The study participants did not believe in the existence of COVID-19, they perceived government's intervention as a scam and means of making money. In this study, community awareness of the COVID-19 outbreak in Liberia 6 months into the outbreak was high like in other studies in Liberia

[17]. However, only one-third of community members had good preventive knowledge of COVID-19 and less than 40% were using a face mask to prevent COVID-19 infection compared to three out of four people in the study from Ethiopia [18]. The non-utilization of face masks was associated with poor COVID-19 preventive knowledge, younger age < 36 years and being female. These factors were reported by another study from Liberia [17] and aligned with other studies that reported having a formal education, being employed, living in an urban residence, having good preventive knowledge, positive attitude and right perception of COVID-19 severity and the impact of wearing a mask were found to be associated with face mask utilization [18, 19]. A study found an association between high COVID-19 awareness, male dominance, and willingness of people to implement appropriate preventive practices [17], similarly in this study male gender and having good preventive knowledge of COVID-19 were associated with the use of face masks. In a study in Liberia, it was found that trusted community leaders with strong community bonds effectively disseminate health information that influences community members' perception of the effectiveness and acceptance of preventive practices during epidemic response [5]. Where there is weak community leadership, misinformation thrives, and this exacerbates mistrust between the government and the communities [8]. A study from Sierra Leone demonstrated the importance of strong initiative by community leadership to curtail the EVD epidemic, but a devastating outbreak occurred in another community with weak leadership [20].

The gaps perceived by the communities in COVID-19 preparedness and response as compared to EVD were the lack of government leadership, poor monitoring of COVID-19 preventive measures implementation, and poor coverage of the sensitization and awareness campaign. Communities' response to epidemics requires strong leadership, collaboration, partnership, ownership, and sustainability of intervention to successfully stop the outbreak. This study demonstrated the importance of strong community leadership in preparedness and response to the epidemic as evidenced by the beneficial effect of leading community response when government leadership during the outbreak was perceived to be weak. This enabled the preparation of a context-purposeful

preparedness and response plan, a bottom-up approach to mobilising resources, creating effective awareness campaigns, and community collaboration with other stakeholders. Therefore, to strengthen community response to infectious disease epidemics, community involvement, stakeholders' collaboration [8], strong leadership, and effective community monitoring of the implementation of preventive measures were suggested [21]. Prior community experience with the EVD pandemic might have influenced the preparedness and response to COVID-19 health emergencies. Therefore, it is beneficial to strengthen the community system to prepare and respond to epidemics [15].

Comparing their COVID-19 experience with EVD community preparedness and response, the community felt that they were not involved and perceived government leadership in response to the outbreak as weak compared to the EVD epidemic. The gaps identified by the participants were poor government leadership and collaboration with community structure to implement COVID-19 preventive measures, inability to monitor adherence and utilization of non-pharmacological preventive measures, sustain community COVID-19 awareness and provision of soaps, chlorine, and face masks. Strong community bonds during health emergencies are a pointer that communities should be trusted to play a major role in preparedness and response to infection control of COVID-19 [20].

Conclusion

The high awareness of the COVID-19 pandemic among Liberia communities did not translate to face mask utilization. Poor COVID-19 preventive knowledge, being in the 50 – 59 years age group compared to those below 20 years age group, and females were associated with poor face mask utilization. In comparing the COVID-19 community preparedness and response to that during the EVD epidemic, the identified gaps were in government leadership, community involvement, strict monitoring of utilization of non-pharmacological preventive measures, and recognition of the community structure for effective response to COVID-19.

What is known about this topic

- COVID-19 pandemic disrupted international trade and social relationships with high community transmission.
- Myths and misconceptions about COVID-19 pandemic influenced community implementation of effective preparedness and response.
- Communities with prior exposure to infectious disease epidemics should have a coordinated and effective response to COVID-19 pandemic.

What this study adds

- Liberia had previous exposures to epidemics and severely affected with the West Africa Ebola virus disease (EVD) outbreak in 2014 – 2016.
- Not all communities with previous experience from EVD, initiated preparedness and response to COVID-19 prior to the engagement by the government.
- There were myths and misconception at initial phase of the outbreak
- Despite COVID-19 awareness being high facemask utilisation was low since only one third of the respondents used facemask as COVID-19 preventive measures.

Competing interest

The authors declare no competing interests.

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Authors' contribution

OJB and MAA conceived the study design, data collection, analysis, and interpretation, but OJB drafted the manuscript. HWS and PA made

substantial contributions to the conception, design, analysis, and interpretation of data, and all the authors revised the manuscript critically for important intellectual content. OJB performed the data analysis and interpretation was done by OJB, MAA, PA, HWS, LB, and FW. All authors read and approved the final manuscript.

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Tables

[Table 1](#): Characteristics of the survey participants, Liberia, 2020

[Table 2](#): COVID-19 preparedness and response plan development, Liberia, 2020

[Table 3](#): Community perception of COVID-19 existence in Liberia, 2020

[Table 4](#): Factors associated with non-use of face mask by the communities in Liberia, 2020

[Table 5](#): Gaps in COVID-19 community response to the outbreak, Liberia, 2020

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Tables 1: Characteristics of the survey participants, Liberia, 2020		
Characteristics	Frequency	Percentage (%)
For Focus Group Discussion Participants (n =291)		
Age group (years)		
15-24	8	2.8
25-34	76	26.1
35-44	68	23.4
45-54	79	27.1
55-64	33	11.3
65-74	18	6.2
75-84	6	2.1
Not stated/unknown	3	1.0
Sex		
Female	85	29.2
Male	206	70.8
Role in Community		
Youth Leader	48	16.5
Community Chairman	40	13.7
Community Chairlady/Women Leader	38	13.1
Traditional leader	33	11.3
Elder/Opinion Leader	31	10.7
Religious leader	28	9.6
Community Member	27	9.3
Community Health Volunteer/TTM/Mobiliser	21	7.2
Teacher	10	3.4
Disease Surveillance Officer	7	2.4
Farmer	5	1.7
Trader	3	1.0
For Quantitative Study (n = 420)		
Age group (years)		
< 20	36	8.6
20 – 29	111	26.4
30 – 39	108	25.7
40 – 49	93	22.1
50 – 59	46	11.0
>59	26	6.2
Sex		
Male	216	51.4
Female	204	48.6
Type of community		
Urban	230	54.8
Rural	190	45.2
Use face mask		
Yes	145	34.5
No	275	65.5

Table 2: COVID-19 preparedness and response plan development, Liberia, 2020

Theme	Description	
COVID-19 preparedness	Development of COVID-19 Community preparedness and response plan.	
Sub-theme	Description	Selected responses
Plan initiator	Who initiated the development of community preparedness and response plan for COVID-19?	<p><i>"...before the government's plan, the community has initiated its own awareness team for sensitization on risk of infection to the community." - D 5: Bushrod Community. "...when we heard about this coronavirus disease on radio, the Town Chief called the community leaders from the quarters to a meeting and told them to practice what the Ministry of Health has told them through the Nimba County Health Team." - D 29: Nimba Community.</i></p>
Activities in the plan	What activities did communities plan to carried out to prevent the transmission of COVID-19?	<p><i>"...the community developed a mass campaign that was headed by the Youth Association..., and this group distributed mask and sanitary materials throughout the community and its surroundings. We wrote letters to companies, enterprises, and others. There were hand washing buckets at every strategic entry point within the community, flyers were posted on the walls, and hand washing buckets were placed at every gathering." - D 5: Bushrod Community. "... the community leaders usually go around the community to create awareness and enquire if there is anyone sick in each household." - D 40: St. Paul community. "...we all agreed and went from house to house to collect USD\$5...to purchased hands washing buckets, buy tub, and nose masks that were distributed in our community to help reduce the spread...if someone died in the community, the community leader is informed and he will call the surveillance officer or report to the health facility, ... he will be the one to call 4455 emergency hotline to come and verify if the person died from the sickness or not"- D 11: Commonwealth Community. "..., observing the social distancing and demanded everyone to have handwashing buckets in front of their home ... with water and soap in it." - D 29: Nimba Community. "...the City Major established the community task force asking community dwellers to report any strangers and call 4455 hotlines whenever there is any sick persons in the community." - D 39: St Paul Community</i></p>

Table 3: Community perception of COVID-19 existence in Liberia, 2020		
Theme	Description	
COVID-19 perception	Community perception of COVID-19 existence	
Sub-theme	Description	Significant statements examples
Doubt the existence in Liberia.	Community did not believe that COVID-19 exist in the country	<i>"...the belief we had was that the government was just fooling the people of Liberia." - D 30: Nimba community. "Our people thought that it was money making thing." - D 23: Lofa community. "...some even said that the virus was man-made virus to get money." - D 34: Rivercess community. "COVID 19 is real in the world and killing many people but in Liberia it is not true." - D 15: Grand Bassa community.</i>
Not like Ebola time	COVID-19 existence is not true like Ebola time	<i>"...from the beginning of this disease, people doubted that this disease is not real like the Ebola time". - D 30: Nimba community. "During the course of Ebola, people used to watch the patients on television and is not the same this time around" - D 10: Central Monrovia community.</i>
COVID-19 is real	COVID-19 is real and kill people like the time of Ebola	<i>"I believe it is real in Sinoe County. I believe it strongly, very strongly, I travelled and saw what happen out there so I told my people that the virus is real and if we do not take precautions, we will die like we did during Ebola." - D 36: Sinoe community. "We have been informed by the media about the pronouncement of the first case in Sinoe county, it brought total silence to the county having experienced the deadly Ebola virus..." - D 35: Sinoe community. "...that after the COVID – 19 awareness in the community, they really never started taking steps until when one of their community dwellers died of this virus." - D 30: Nimba community.</i>
Awareness and perception	Community awareness and change in COVID-19 perception	<i>"...we ask if this was money making thing, then what about America and China? Who will give them money? It was through that they started believing that the virus is real and not about money making." - D 23: Lofa community. "At first most of the community members were not believing that the disease existed, but with the help of radio awareness and health education from the community health assistant (CHA), people began to believe that the virus was actually true." - D 34: Rivercess community.</i>

Table 4: Factors associated with non-use of face mask by the communities in Liberia, 2020						
Characteristics	Using Face Mask		Total (n=420)	OR (95% CI*)	aOR(95% CI*)	p value
	No (n=275)	Yes (n=145)				
Sex						
Female	149 (73.0)	55 (27.0)	204 (48.6)	1.9 (1.3 - 2.9)	1.7 (1.1 - 2.7)	0.03
Male	126 (58.3)	90 (41.7)	216 (51.4)	Ref	Ref	
Age group in years						
20 - 29	83 (74.8)	28 (25.2)	111 (75.5)	0.5 (0.2 - 1.3)	1.3 (0.4 - 3.9)	0.64
30 - 39	68 (63.0)	40 (37.0)	103 (74.1)	0.3 (0.1 - 0.7)	2.0 (0.7 - 6.0)	0.21
40 - 49	57 (61.3)	36 (38.7)	93 (72.1)	0.3 (0.1 - 0.7)	1.9 (0.6 - 5.9)	0.24
50 - 59	21 (45.7)	25 (54.4)	46 (56.1)	0.1 (0.0 - 0.4)	5.0 (1.5 - 16.4)	0.01
>59	15 (57.7)	11 (42.3)	26 (41.9)	0.2 (0.1 - 0.7)	2.3 (0.6 - 8.7)	0.24
< 20	31 (86.1)	5 (13.9)	36 (58.1)	Ref	Ref	
Type of Community						
Rural	130 (68.4)	60 (31.6)	190 (45.2)	1.3 (0.8 - 1.9)	1.2 (0.7 - 1.9)	0.48
Urban	145 (63.0)	85 (37.0)	230 (54.8)	Ref	Ref	
Awareness of COVID-19						
No	90 (84.1)	17 (15.9)	107 (25.5)	3.7 (2.1 - 6.4)	2.2 (1.2 - 4.0)	0.02
Yes	185 (59.1)	128 (40.9)	313 (74.5)	Ref	Ref	
COVID-19 preventive knowledge						
Poor	222 (79.6)	57 (20.4)	279 (66.4)	6.4 (4.1 - 10.1)	5.3 (3.3 - 8.6)	< 0.01
Good	53 (37.6)	88 (62.4)	141 (33.6)	Ref	Ref	

*Confidence Interval

Table 5: Gaps in COVID-19 community response to the outbreak, Liberia, 2020

Theme	Description	
Gaps in COVID-19 outbreak response	The role of leadership, collaboration, and community ownership of COVID-19 response	
Sub-theme	Description	Significant statements examples
Leadership by the government	Government leadership to drive COVID-19 response at community level	<i>“Government was not working with the community leadership structure to implement the policies and rules brought forward, did not strengthen the community and give them power to enforce these rules.” - D 9: Central Monrovia community. “Government did not come to the community at the beginning to help implement these activities, everything was left to the community.” - D 17: Grand Cape Mount Community. “... all the awareness was provided by us; government did not provide any information to us”. - D 37: Somalia Drive community</i>
Community ownership	The role of community ownership of the response and approval	<i>“Activities had not been well implemented in this community because awareness that were done by Red Cross team in the community did not involve community leadership.”- D 33: Rivercess Community. “... the community dwellers did not own the awareness.” - D 17: Grand Cape Mount Community.</i>
Monitoring the implementation	Implementation monitoring	<i>“...no one is checking to see if people are adhering to the preventive measures as it was done during Ebola.”- D 1: Bomi community.</i>
Response coverage	Community awareness coverage	<i>“We have tried to tell some inhabitants of the other community about coronavirus, but we felt it was not sufficient. We have a lot of other communities behind our town, and they all come here to interact, and they do not really know about the virus. Awareness didn’t reach them.” - D 39: St Paul community. “... but the awareness was only conducted on the main road; the team did not reach hard to reach communities.” - D 26: Margibi Community.</i>
Sustainability	Adequacy of supplies	<i>“Yes, there are no supplies....” - D 39: St Paul community. “The community put up buckets for hand washing but no support to continue buying soap for hand washing.” - D 7: Caresburg community.</i>
		<i>“...community does not have enough buckets for hand washing and nose mask for everyone.” - D 2: Bomi community. “...we don’t have money to buy the hand washing buckets, mask, soap, and many things.” - D 21: Grand Kru community.</i>