



# The need for a holistic approach toward pandemic control: lessons from a cross-sectional study on COVID-19 in Meghalaya, India

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## Abstract

We conducted a community-based cross-sectional survey of 416 participants from Meghalaya, India to assess knowledge, perceptions, and practices toward recommended COVID-19 preventive measures, and to explore health-seeking behavior and stigma during early phase of the pandemic. Most participants had knowledge of the signs and symptoms of COVID-19 (94%) and its spread (96%), and reported positive behavior change such as handwashing  $\geq 6$  times/day (41% pre-COVID-19 vs. 81% during COVID-19,  $P < 0.001$ ), sneezing or coughing into sleeves (65% pre-COVID-19 vs. 89% during COVID-19,  $P < 0.001$ ) and staying home if having flu-like symptoms (44% pre-COVID-19 vs. 94% during COVID-19,  $P < 0.001$ ). We found delayed healthcare seeking for non-COVID-19 illnesses (16%). Fear of losing life was reported by 26% participants, as was discrimination toward migrant returnees, with 35% blaming returnees for the spread of COVID-19. We highlight the need for a holistic approach toward pandemic control, including social and mental health interventions, in public health strategies.

**Keywords** COVID-19 · India · Social stigma · Fear · Health-seeking behavior · Respiratory etiquette · Hand hygiene

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## Key messages

- High levels of awareness of COVID-19 symptoms, modes of transmission, and preventive measures among the general population were noted early on in the pandemic.
- The pandemic resulted in delayed healthcare seeking for routine illnesses in approximately one-sixth of the respondents or their family members.
- Nervousness and anxiety about COVID-19 were reported by almost half of the participants; fear of losing life from the virus was reported by one-fourth.
- A holistic approach toward pandemic control should be considered to effectively mitigate the overall impact of the pandemic.

## Background

The 2019 novel coronavirus, called ‘SARS-CoV-2,’ referred to as ‘COVID-19,’ is a new strain of coronavirus, first reported from Wuhan, a city in China, in December 2019 [1]. COVID-19 spreads by human-to-human transmission through respiratory droplets of an infected person [2]. Public health experts have recommended hand hygiene practices, use of masks, respiratory etiquette, and physical-distancing as key measures for controlling the spread of COVID-19 [3]. The pandemic has affected all aspects of people’s lives, caused financial and social hardships, and impacted health and quality of life [4]. Changes in lifestyle due to prolonged lockdowns have resulted in increased stress, weight gain, reduced physical activity, and decrease in sleep quantity and quality [5]. It has disrupted the global economy [6], affecting the marginalized and pushing them to extreme poverty [7]. The pandemic has also generated a lot of media attention, both print and electronic. An adverse effect of this ‘infodemic’ has been the widespread circulation of misinformation, especially in the social media [8, 9]. In a systematic review of COVID-19-related publications in social media during the first phase of the pandemic, up to 29% of the social media posts related to COVID-19 were classified as misinformation [10].

During infectious disease outbreaks, misinformation can cause fear, stigma, and panic among the public [8, 11]. From the severe acute respiratory syndrome (SARS) experience, it was learnt that public health education and communication helps in mitigating fear and stigma of the disease [11]. Those with better knowledge are less anxious, less likely to stigmatize others and, therefore, positively impact the ability to control disease spread. Understanding knowledge, perceptions, and practices of individuals and communities can help in developing targeted information, education, and communication (IEC) campaigns and other non-pharmacological control efforts.

This community-based cross-sectional study aimed to assess the knowledge, perceptions, and practice toward hand hygiene, respiratory etiquette, and



community quarantine among rural and urban households of Meghalaya during the early phase of the COVID-19 pandemic, at the time of total lockdown in India. Additionally, it assessed the health-seeking behavior, stigma, fear, and discrimination related to COVID-19 among the residents. Although studies exploring awareness [12–23], health-seeking behavior [24–26], and stigma related to COVID-19 [27, 28] have been reported from different parts of India, to the best of our knowledge, this is the first community-based study to have been conducted in the northeast region (NER) of India, which has distinct cultural beliefs and practices. Moreover, the previously reported studies were either conducted online [12–20, 23, 25–28] or telephonically [21, 24], or within specific population subgroups [13, 17, 20, 22, 24–28], which may result in biased inferences due to lack of generalizability [29, 30]. A comprehensive understanding of the community perception and health-seeking behavior can enable policy makers to plan mitigation and control measures to effectively tackle future pandemics.

## Methods

### Study area and population

Meghalaya is a hilly state in the NER of India, with a population of around 3 million; about 75% are literate [31]. The population is largely indigenous (86%), with majority belonging to three main tribes: Khasi, Jaintia, and Garo [32]. Meghalaya shares international boundaries with Bangladesh in the south and west and is bordered by Assam in the north and east [33].

To minimize the impact of COVID-19, the Government of Meghalaya adopted a combination of containment and mitigation measures such as imposing travel restrictions, curbing commercial activities, registering and testing entrants, and undertaking extensive IEC activities encouraging people to adopt hand hygiene, respiratory etiquette, social distancing, and home/institutional quarantine (for entrants). The IEC materials in English as well as in the local language (Khasi, Pnar, Garo) were disseminated through conventional and social media, and daily announcements were carried out by the *Dorbar Shnongs* (traditional governing body) to emphasize the collective responsibility of communities in preventing spread of COVID-19.

We conducted a community-based cross-sectional survey in 14 localities of three districts in Meghalaya: East Khasi Hills (EKH), West Jaintia Hills (WJH), and Ri-Bhoi. Within large urban villages, localities have several smaller agglomerations known as “*Dongs*.” Between May and June 2020, the research team approached the permanent residents of these *Dongs* for participation. Respondents were adult members aged 18–60 years. Households with one or more members under quarantine were excluded.

### Sampling technique

We employed a multi-stage sampling technique and randomly selected 30 *Dongs* using computer generated random numbers from 14 localities. To ensure a



representative sample, we sub-divided each large *Dong* (with  $\geq 65$  households) into three sections, with the number of sampled households divided equally. The participating households were selected using a systematic random sampling technique, wherein we randomly selected the first household from among the houses in the left-most corner of the area; thereafter every fifth household toward the right was approached, until the targeted sample size was achieved. In the event of a household refusing to participate or a household member being under quarantine/isolation, we approached the adjacent household for participation.

We recruited only one eligible participant per household for the study. To obtain equal representation of male and female participants, we attempted to select alternate female and male respondents, i.e., if a female participant was recruited from a household, a male participant from the next household was approached for participation; if the participant refused or was not available, we recruited another eligible participant (either gender) from that household.

### Data collection procedure

We developed a semi-structured questionnaire to capture demographic data of the survey participants, knowledge of clinical symptoms, transmission and prevention of COVID-19, healthcare-seeking behavior during the pandemic, changes in hand hygiene and respiratory etiquette, and perceived anxiety, fear, and discrimination related to COVID-19. We adapted the following instruments: (a) World Health Organization (WHO) “Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 *Preparedness* and Response” [34]; (b) “Can We Measure HIV/AIDS-Related Stigma and Discrimination-Current Knowledge About Quantifying Stigma in Developing Countries?” [35]; (c) “HIV/AIDS Stigma and Discrimination in Developing Countries” [36] (for questions related to perceived stigma and discrimination); and (d) “Fear of COVID-19 Scale” [37] (for questions on COVID-19 related anxiety).

We first developed the survey questionnaire in English and then translated to the local language (Khasi). It was piloted among family members of the data collectors for language and comprehension; the households included in the pilot survey were excluded from the main study. We standardized the data collection process through multiple virtual (online) training sessions for data collectors using video conferencing facilities. We conducted role plays during these sessions to ensure that the data collectors were well-versed with the questionnaire, the consent process, and followed the pandemic protocol. We also conducted after-event reflections after the second and fifth day of data collection, during which the challenges faced during data collection were addressed.

### Statistical analysis

We analyzed the data using Stata 15 for Windows (StataCorp, College Station, Texas) statistical software. For descriptive statistics, we used mean and standard deviation (SD) or median and interquartile range (IQR) for continuous variables, and



frequency counts and marginal percentages for categorical variables. We calculated the 95% confidence intervals (CIs) using the Taylor linearized method that accounts for the clustered data structure [38], with *Dongs* assigned as the primary sampling units. To assess statistically significant differences between practices before and during COVID-19, we used the McNemar's test [39] to evaluate imbalance in discordant pairs for nominal data; a  $P$  value  $< 0.05$  was suggestive of significant difference in the marginal proportions.

## Ethical consideration

We obtained ethical clearance for conducting the study from the University Research Ethics Committee, Martin Luther Christian University, Meghalaya; we also obtained permission from the Department of Health and Family Welfare, Government of Meghalaya. We consulted the headman of each locality, and obtained permission from him prior to the survey. The data collectors obtained verbal consent from all participants to ensure their voluntary participation. Interviews were conducted by the data collectors at the participant's home, and an identity code assigned to each participant to maintain confidentiality.

## Results

### Demographics

A total of 416 participants responded to the survey. Majority (60%, 95% CI 55–65%) of the participants were females, belonging to Khasi (65%, 95% CI 43–82%) or Jaintia (23%, 95% CI 8–51%) tribes; around three-fourth (76%, 95% CI 61–87%) were Christians. Almost half of the participants (46%, 95% CI 39–54%) had graduate-level education. The demographic details of participants are presented in Table 1.

### Knowledge on COVID-19, preventive measures, factors of transmission

Most of the participants were aware of the important signs and symptoms of COVID-19 such as fever (91%, 95% CI 85–94%), difficulty in breathing (93%, 95% CI 89–96%), and coughing (94%, 95% CI 91–96%). Almost all participants could correctly identify the modes of transmission of SARS-CoV-2. For instance, 95% (95% CI 92–97%) and 96% (95% CI 93–98%) participants, respectively, attributed shaking hands with an infected person and infected droplets as potential modes of transmission. Participants were also aware of the best practices for preventing the spread of SARS-CoV-2 such as washing hands with soap and water (93%, 95% CI 88–96%) for at least 20 s, wearing a face mask (94%, 95% CI 90–96%), and avoiding contact with sick people (93%, 95% CI 90–96%, Table 2).



**Table 1** Demographic characteristics of the study participants ( $N=416$ )

Characteristics	<i>n</i>	% (95% CI)
Gender		
Female	251	60.3 (54.9–64.5)
Male	165	39.7 (34.5–45.1)
Ethnicity		
Garo	3	0.7 (0.2–3.3)
Jaintia	95	22.8 (7.7–51.3)
Khasi	271	65.1 (42.8–82.4)
Others	47	11.3 (4.5–25.7)
Religion		
Christian	318	76.4 (61.4–86.9)
Hindu	38	9.1 (3.3–23.0)
Tribal religions <sup>#</sup>	57	13.7 (5.3–30.9)
Other religions	3	0.8 (0.2–3.2)
Age groups		
18–29 years	133	32.0 (25.8–38.9)
30–44 years	189	45.4 (41.4–49.5)
45 years and above	94	22.6 (17.7–28.3)
Permanent resident of Meghalaya	406	97.6 (91.8–99.3)
District		
East Khasi Hills	312	75.0 (46.5–91.2)
Ri Bhoi	26	6.3 (1.4–23.7)
West Jaintia Hills	78	18.8 (4.8–51.6)
Highest level of education		
No schooling/up to primary	50	12.0 (8.5–16.8)
Middle/secondary/higher secondary	173	41.6 (35.3–48.2)
Graduate and above	193	46.4 (39.3–53.7)
Monthly income (in rupees)		
≤ 19,758	171	41.1 (33.6–49.0)
19,759 and above	245	58.9 (51.0–66.4)
Currently employed		
No	197	47.4 (39.4–55.4)
Yes	219	52.6 (44.6–60.6)
Duration of unemployment ( $n=197$ )		
< 1 year	47	23.9 (17.4–31.8)
1–2 years	10	5.1 (2.9–8.7)
> 2 years	89	45.2 (33.3–57.7)
Not applicable	51	25.9 (18.0–35.7)

<sup>#</sup>Tribal indigenous religions in Meghalaya—Niam Khasi and Niamtre



**Table 2** Knowledge regarding measures for preventing the spread of COVID-19 (N=416)

The following can prevent the spread of COVID-19	n Not at All % (95% CI)	n Very Well % (95% CI)	n Don't Know % (95% CI)
Washing hands with soap and water for at least 20 s	28 6.7 (3.7–12.1)	388 93.3 (87.9–96.4)	0 0
Wearing a face mask	26 6.3 (3.9–10.0)	389 93.5 (89.9–95.9)	1 0.2 (0.0–1.9)
Avoiding physical contact with sick people	24 5.8 (3.7–9.0)	388 93.3 (89.7–95.7)	4 1.0 (0.4–2.3)
Staying at home while having flu-like symptoms	31 7.5 (5.0–11.0)	373 89.7 (85.2–92.9)	12 2.9 (1.1–7.1)
Avoiding spitting in public places	11 2.6 (1.2–5.9)	399 95.9 (88.5–98.6)	6 1.4 (0.2–8.8)
Avoiding crowded places	11 2.6 (1.2–5.9)	405 97.4 (94.1–98.8)	–
Avoiding shaking hands with others having flu-like symptoms	21 5.0 (3.0–8.5)	390 93.8 (89.7–96.3)	5 1.2 (0.5–2.9)
Not touching eyes, nose, mouth with unwashed hands	24 5.8 (3.0–10.7)	384 92.3 (87.5–95.4)	8 1.9 (0.7–5.1)
Covering nose and mouth while sneezing or coughing	6 1.4 (0.7–2.9)	404 97.1 (93.8–98.7)	6 1.4 (0.4–5.4)
Stopping the consumption of non-vegetarian food	230 55.3 (46.6–63.7)	123 29.6 (23.1–36.9)	63 15.1 (9.1–24.1)
Drinking hot water	65 15.6 (9.7–24.2)	327 78.6 (69.6–85.5)	24 5.8 (3.1–10.5)
Keeping family members with flu-like symptoms, in a separate room	33 7.9 (4.3–14.2)	373 89.7 (83.7–93.6)	10 2.4 (1.0–5.8)
Disinfecting surfaces like doorknobs, tables, desk, and handrails	34 8.2 (4.0–16.0)	377 90.6 (82.9–95.1)	5 1.2 (0.5–2.9)
Avoiding sharing towels and other personal care items	11 2.6 (1.4–4.9)	398 95.7 (93.3–97.2)	7 1.7 (0.8–3.6)



## Changes in the practice and perceptions before and during COVID-19

Participants reported significant increase in hygienic practices such as sneezing/coughing into sleeves (65% [95% CI 55–74%] pre-COVID-19 vs. 89% [95% CI 82–94%] during COVID-19,  $P < 0.001$ ), staying at home while having flu-like symptoms (44% [95% CI 34–55%] pre-COVID-19 vs. 94% [95% CI 90–96%] during COVID-19,  $P < 0.001$ ). A slight decline in unhygienic practices such as spitting on the ground after eating *kwai* (areca nut, betel leaf, and slaked lime, culturally used as a mouth freshener in Meghalaya) (4% [95% CI 2–10%] pre-COVID-19 vs. 3% during COVID-19 [95% CI 1–8%],  $P = 0.083$ ) was reported by the participants. Moreover, participants reported a significant increase in frequency of hand washing during COVID-19, compared to earlier: 41% (95% CI 32–50%) of them reported frequent handwashing (> 6 times/day) before COVID-19, which increased to 81% (95% CI 72–87%) during the pandemic ( $P < 0.001$ ).

## Health-seeking behavior, stigma, perceived discrimination, and fear/anxiety related to COVID-19

Approximately, 16% (95% CI 10–25%) of participants reported delaying a hospital visit for treatment of routine illnesses in them or their family members during the COVID-19 pandemic. Close to one-tenth (95% CI 6–15%) of the 148 the participants requiring medication reported inability to procure their routine medicines during the pandemic.

Almost all participants (99%, 95% CI 97–100) agreed that people should inform the health authorities, should someone develop COVID-19 symptoms. More than one-third (35%, 95% CI 24–48%) blamed people traveling from outside of the state for spreading SARS-CoV-2 (Table 3).

More than one-fourth (26%, 95% CI 20–33%) of participants expressed fear of losing their life from contracting the virus; 17% (95% CI 12–22%) mentioned that they were unable to sleep at night due to worry about contracting COVID-19. Close to half (46%, 95% CI 38–54%) expressed anguish and nervousness while watching news and stories about COVID-19 on conventional and social media.

## Discussion

In this study, participants had adequate understanding of the virus (SARS-CoV-2) and the disease (COVID-19), including knowledge about the common signs and symptoms, mode of transmission, and measures of prevention during the early phase of the pandemic. We also noted a positive behavior change among the participants. Most participants reported preventive measures, illustrated by an increased frequency of handwashing, avoiding of crowded places, and avoiding spitting in public places during the pandemic. Importantly, we also noted that participants reported fear of the disease, resulting loss of sleep and nervousness,





**Table 3** Social stigma and perceived discrimination related to COVID-19 (N=416)

Questions	Agree		Disagree		Don't Know	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Families of COVID-19 patients should not be ashamed	398	95.7 (91.9–97.7)	14	3.4 (1.5–7.5)	4	1.0 (0.4–2.3)
It is reasonable for a landlord to ask a tenant who is suspected of COVID-19 to vacate	28	6.7 (2.8–15.3)	378	90.9 (80.8–95.9)	10	2.4 (1.1–5.3)
Health workers must be treated with respect	414	99.5 (98.0–99.9)	1	0.2 (0.0–1.9)	1	0.2 (0.0–1.9)
In case one develops the signs or symptoms of COVID-19, it is better not to hide so you can get support from the health authorities	411	98.8 (96.6–99.6)	5	1.2 (0.4–3.4)	0	0
COVID-19 patients face rejection from their local neighborhood	192	46.2 (37.7–54.9)	186	44.7 (35.7–54.1)	38	9.1 (5.5–14.9)
People suspected with COVID-19 lose respect in the community	122	29.3 (19.8–41.1)	258	62.0 (49.9–72.8)	36	8.7 (5.1–14.4)
Suspected COVID-19 contacts in this community face physical abuse	64	15.4 (9.2–24.5)	318	76.4 (64.6–85.2)	34	8.2 (4.2–15.4)
Traveler from outside the state should be blamed for spreading COVID-19	146	35.1 (24.3–47.6)	243	58.4 (46.3–69.6)	27	6.5 (4.2–9.8)



and perceived discrimination and stigma toward travelers and COVID-19 positive individuals.

The findings of this study are consistent with observations in other settings, where participants were found to be aware about the clinical symptoms of COVID-19, its transmission and prevention, the high-risk groups, and the need for quarantine [22, 40–42]. This demonstrates a high level of awareness about the pandemic in the general population, even during the initial phase of the pandemic, possibly due to the extensive IEC efforts by different governmental and non-governmental agencies. The importance of having correct knowledge to enable individuals to make informed decisions about change in behavior to ensure better compliance with preventive measures has been emphasized repeatedly [43].

Despite adequate knowledge about COVID-19, some participants reported delay in healthcare seeking for routine illnesses during the pandemic. The delay in healthcare seeking [44–47], including the use of emergency services [48, 49], and an increase in self-medication [50] during the pandemic have been reported earlier. This may have resulted in an increase in mortality from non-COVID-19 illnesses such as cardiovascular diseases and neoplasms [51]. A major reason for this is the fear of contracting COVID-19 at healthcare facilities [45, 46]. Taken together, the findings highlight the importance of allaying public fear and perception and encouraging people to avail routine healthcare services, irrespective of the COVID-19 status of the patient. Per the WHO, efforts to address delay in healthcare seeking for non-COVID-19 illnesses must also be part of the COVID-19 response [52].

Public health behavior change is challenging [53, 54] and requires integration of insights from several psychological and sociological theories [54]. The aim of disseminating information is to translate it into practice, resulting in a positive behavior change. In this study, we noted a significant change in behavior during the pandemic. A large proportion of participants reported practicing several hygienic practices such as frequent handwashing or coughing/sneezing into the sleeves, which were not commonly carried out before the pandemic. An increase in compliance to the preventive measures during the pandemic has been reported by participants from other studies [40, 41, 55, 56], although how long such positive behaviors are maintained and the possible techniques for reinforcement remains uncertain. Future studies may consider evaluating long-term behavior change resulting from pandemics such as COVID-19 to identify cues for motivating participants to maintain positive behaviors [57].

In this study, we noted that some participants perceived discrimination toward individuals with COVID-19, with the feeling that COVID-19 patients faced rejection and loss of respect in the community. Additionally, some participants stigmatized returnees from other states for spreading the disease. Incidents of social stigmatization have been reported from other parts of India, wherein suspected or infected individuals, their family members, deceased individuals, migrant workers or even healthcare providers were victimized [58, 59]. Such issues of stigmatization and discrimination should be tackled with equal importance as the prevention and treatment of COVID-19 [60]. The WHO has suggested that leaders should publicly condemn any act of stigmatization or discrimination and



encourage those who follow the public health measures recommended from time to time; furthermore, IEC activities that reduce discrimination and stigma should be promoted [61].

We also noted that there is a marked fear toward COVID-19, with some participants reporting loss of sleep at night, and almost half reporting nervousness and anxiety from media reports on COVID-19. Common mental health issues reported among Indians during the pandemic include stress, anxiety, depression, insomnia, denial, anger, and fear that oneself or a family member may get infected [62]. Sleep difficulties, paranoia, and distress from COVID-19-related information in social media have also been reported [23]. Taken together, this highlights an increase in mental health issues during this pandemic. The impact of the pandemic on mental health of people may last beyond the pandemic itself and, hence, should be addressed urgently [63].

This study has several limitations. Firstly, we cannot rule out a “social desirability bias” in some responses, especially those related to change in handwashing and respiratory hygiene practices before and during COVID-19. Secondly, majority of the participants were from the urban areas, which has a higher literacy rate than the rural areas (91% vs. 70%) [31]. Literate individuals are more likely to be better informed about COVID-19, thereby restricting the generalizability of the findings to urban settings and more educated population of Meghalaya.

## Conclusion

This study provides important insights on the knowledge, perceptions, handwashing and respiratory hygiene practices, healthcare-seeking behavior, stigma, fear, and discrimination related to COVID-19 in a northeastern state of India, during the early phase of the pandemic. Despite better knowledge about COVID-19 and its prevention, a sizeable proportion of the participants reported fear, stigma, and discrimination toward COVID-19 patients. This highlights the need for a holistic approach that includes the social and mental health interventions, in addition to the clinical and public health measures to effectively mitigate the overall impact of the pandemic.

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## Declarations

**Conflict of interest** The authors declare no conflict of interest.



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