Reports

COVID-19 and the fear of other unknowns: challenges and lessons learned from a digital contact tracing activity in the Rohingya camps in Cox's Bazar, Bangladesh

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Contact tracing can play an important role in controlling infectious disease outbreaks such as the COVID-19 pandemic. Containing the spread of COVID-19 is crucial in humanitarian settings such as in the Rohingya camps in Cox's Bazar, Bangladesh. This manuscript describes the COVID-19 contact tracing activities undertaken by a group of researchers and implementers in Cox's Bazar, Bangladesh. The paper details the design and development of the Commcare 'Contact tracing and case monitoring app', subsequent implementation of the contact tracing activity, challenges faced during the implementation process, and the strategies adopted by the research team to overcome these challenges. The research team leveraged the suite of template applications for COVID-19 response developed by Dimagi in response to the COVID-19 pandemic. Research partners organized a series of brainstorming meetings and workshops with relevant stakeholders to finalize the 'COVID- 19 contact tracing and case monitoring app' for final implementation. This app was implemented in 10 Rohingya camps from Ukhiya and Teknaf sub-districts of Cox's Bazar for 4.5 months from 1st January 2021 to 15th May 2021. Due to a restriction on internet availability in the Rohingya camps by the government of the host country, the research team had to adopt a manual approach to implement the contact tracing activity. During these 4.5 months, 249,452 individuals from 10 Rohingya camps were screened for COVID-19 case registration. Of all the screened individuals, 431 were identified as COVID suspected cases, and 77 were identified as confirmed cases. The research team experienced several implementation challenges such as inexperience of contact tracers with the nature of the work, convincing the community to register in a digital system, obtaining information around COVID-19 symptoms, and many cultural, linguistic, gender, and other social barriers. The team adopted challenge-specific mitigation strategies for the effective implementation of the activity. The modalities of operation adopted by the team engaged with this present intervention to overcome the difficulties experienced in its conduction can hopefully provide some guidance to future parties attempting to conduct similar activities in complex humanitarian settings.

Contact tracing is a basic tool of public health response and management of outbreaks of contagious diseases in human populations and has been used as part of the response strategy to contain and manage outbreaks of all major contagious diseases in the last two decades, including the Severe Acute Respiratory Syndrome Coronavirus (SARS) outbreak in 2002, the Middle East Respiratory Syndrome–Related Coronavirus (MERS) outbreak in 2012, the H1N1 Swine flu virus outbreak in 2009 as well as the COVID-19 outbreak. The World Health Organization (WHO) describes COVID-19 contact tracing as "the process of identifying, assessing, and managing people who have been exposed to someone who has been infected with the COVID-19 virus".[1]

The aims of a contact tracing endeavour remain the same across most contexts of its use. Based on the modalities of its actual execution, however, contact tracing as an activity can broadly be categorized into two types: manual and digital. Manual contact tracing involves human workers actively reaching out to potential or suspected cases, conducting an interview (either telephonically or in person with a specific checklist/ questionnaire and appropriate safety precautions), and thus identifying other individuals who may have come into contact with them. If potential symptoms of an infectious disease are identified in

an interviewed person, the initial interview is followed up with a period of case monitoring and counselling (to get tested, undertake self-isolation, etc., as appropriate) via periodic follow-ups, and the same procedure is carried out with their identified contacts as well. In that case, the initial interview is followed up with a period of case monitoring and counselling (to get tested, undertake self-isolation, etc., as appropriate) via periodic follow-ups, and the same procedure is carried out with their identified contacts as well. Digital contact tracing (most commonly) relies on installing purpose-built contact tracing apps on the smartphones of a given population. In-built proximity sensors on a contact tracing app detect the proximity of other individuals nearby, and in case of detection of infection in a particular individual, the app can instantly release details of all detected contacts, allowing for quick screening and further action.[2]

There are practical and ethical concerns associated with deploying either modality of a contact tracing activity. Manual contact tracing is likely to be expensive, for example, as significant manpower, infrastructure, and resources are likely to be needed to ensure its proper functioning. Digital contact tracing, while it might be advocated for as a quicker procedure, relies on varying, rather than uniform degrees of accuracy of digital proximity sensors, the basic presumption of smartphone ownership, and also voluntary installing of the contact tracing app onto one's cell phone. There have been multiple academic attempts to assess and compare the relative advantages and disadvantages of both approaches to determine a definitively more preferable approach. Globally, both measures are usually used in conjunction with each other, as part of a more complex and sophisticated overall outbreak response.[2] Regardless of the modality, given the mass collection of citizens' private information, implementers of contact tracing activities should be held to high standards of guaranteeing the security and privacy of data. The World Health Organization (WHO) in an Interim Guideline for Ethical Considerations to Guide the use of Digital Proximity Tracking Technologies for COVID-19 Contact Tracing, explicates a list of 17 principles that could be followed by both governments and private party contact tracing implementers to better ensure ethical collection, storage, and usage of contact tracing data.[1] The guideline highlights the need to ensure that mass surveillance measures such as contact tracing activities are time-bound in nature and to be ceased as soon as infections have been reduced to below epidemic levels locally, for example. Data collected under such activities should also not be retained indefinitely beyond the scope of the public health response efforts and should be erased or made anonymous (if used for research purposes) at the earliest. The guideline also stresses the need to be proportional and minimal in collecting data; to ensure the collection of only necessary information relevant to the particular public health crisis. The data collection, storage, and usage mechanisms must be tested, accurate, secure, and transparent. For contact tracing at the national level, the guideline also specifies requirements for independent

oversight and civil society engagement, ideally in a voluntary and participatory approach.[1]

Contact tracing activities play an important role in containing an outbreak of contagious diseases, especially in critical social contexts where the spread of a potential outbreak would prove particularly hazardous to human life. Since the 2017 influx of Rohingya asylum seekers into Bangladesh, over 880,000 Rohingyas have settled in 34 densely populated camps in Cox's Bazar, Bangladesh.[3] Studies modelling a potential outbreak in the camps have consistently found that an uncontained outbreak would pose numbers of infections and necessary hospitalizations that far exceed the capacity of the healthcare systems of the camps and of Cox's Bazar at large to cope with.[3,4] Cases of COVID-19 had already been detected in the camps by April 2020, and widespread misinformation (such as a belief that camp authorities would expel individuals identified to be infected with COVID-19) led to an unwillingness on the part of camp inhabitants to report symptoms, leading to significant challenges to early detection and management of an outbreak.[5] Moreover, restrictions by the Government of Bangladesh on internet access in the camps meant that the scope of employing fully digital methods of contact tracing was limited.

This paper describes the COVID-19 contact tracing activities undertaken by BRAC James P Grant School of Public Health (BRAC JPGSPH), BRAC University in collaboration with Dimagi and BRAC Humanitarian Crisis Management Programme (HCMP) between 1st January and 15th May 2021, in 10 Rohingya camps across Cox's Bazar, Bangladesh as part of a broader research programme. The paper is divided into three major parts. The first part describes the research team's design and development of the activity. The second part describes the experience of implementing the contact tracing activity, the challenges faced during implementation, and the strategies adopted by the research team to overcome these challenges. The third part focuses on lessons learned throughout the process of the deployment of the contact tracing activity. This paper is important as it provides some guidance for potential future implementers of a contact tracing activity during outbreaks, in a resource-constrained humanitarian context.

METHOD AND PROCEDURES OF THE COVID-19 CONTACT TRACING ACTIVITY

The COVID-19 contact tracing activity was implemented in 10 Rohingya camps from Ukhiya and Teknaf sub-districts of Cox's Bazar for 4.5 months from 1st January 2021 to 15th May 2021. Due to a restriction on internet availability in the Rohingya camps by the government of Bangladesh, the research team had to adopt a manual approach to implement the contact tracing activity. BRAC HCMP recruited Community Health Workers (CHWs) physically to enter the camps and went door-to-door to implement the contact tracing work. The actual collection of the data was done via a contact tracing app designed specifically for the research programme. The application for contact tracing was developed on CommCare, a widely used digital technology

for outbreak response in low-resource settings (https://www.dimagi.com/covid-19/).[6] The research team designed and developed the 'Contact tracing and case monitoring app' on the CommCare platform, through brainstorming meetings with partners and stakeholders to contextualize the app for use within the Rohingya camps. This app was then used to implement the contact tracing activity by BRAC HCMP recruited CHWs. Given the lack of internet in the camps, CHWs were able to store data collected on their CommCare application, which works offline, and were able to sync the data with the server once they moved into an area with connectivity. This section explains the process of app contextualization and its different features, capacity building of the CHWs implementing the Contact tracing app and the app implementation process.

DEVELOPMENT AND CONTEXTUALIZATION OF THE 'CONTACT TRACING AND CASE MONITORING APP'

Research partners organized a series of brainstorming meetings and workshops with relevant stakeholders. The group leveraged the suite of template applications for COVID-19 response that Dimagi developed in response to the COVID-19 pandemic. Hundreds of organizations in 40+ countries have used Dimagi's COVID-19 applications (Dimagi, 2021). Once a draft Commcare 'COVID-19 contact tracing and case monitoring app' was ready, research team members communicated with various key stakeholders working on the ground and shared app demonstrations with them.

Crucial feedback and suggestions were obtained from these stakeholders to gradually modify the app in terms of social and cultural context, focusing on appropriately incorporating local languages. Officials from the Civil Surgeon Office, Directorate General of Health Services (DGHS), Government of Bangladesh (GoB), World Health Organization (WHO), and Health Sector Actors from Cox's Bazar were reached for feedback. Once the CommCare app was ready to be piloted, the research team organized trainings for the CHWs. As soon as the app piloting concluded, qualitative interviews were conducted with CHWs and beneficiaries to understand the feasibility, acceptability, and scope of improvement of the app.

The research team observed that replacing the conventional paper-based working method with tablets allowed the CHWs to screen more beneficiaries in a single day; service delivery time was reduced drastically, and data reporting proved to be much easier than before. Utilization of the tabs also assisted the CHWs to have a quick view of the history of beneficiaries during follow-ups. After repeated discussion with the CHWs and beneficiary groups however, team members identified a few aspects that required changes before final app implementation; for example, technical changes in the app for the process of registration of the CHWs, unique identification number for the beneficiaries and CHWs, better visualization of the pictures and videos in the "community awareness" section of the app, incorporating local dialect in the "community education" feature, etc. After revising the CommCare app and incorporating feedback and suggestions from qualitative interviews, the final 'Contact tracing and case monitoring app' comprised of the following features:

1. COVID-19 case registration
2. Suspected COVID-19 case registration
3. Confirmed COVID-19 case registration
4. Education and information dissemination on COVID-19 and
5. Mental health and wellbeing

64 CHWs and six field supervisors were recruited based on previous experience of having worked in the sites of this study to adopt the new technological innovation. As the team finalized the app, project partners organized intensive training for the CHWs and field supervisors to ensure an efficient implementation process. Project partners developed a training module and training session outline after successive meetings and strategic planning. Team members identified language barriers between technological partners and CHWs as a crucial challenge to smoothly completing the training sessions. The majority of the CHWs were not fluent in English, whereas technological partners could not conduct the session in Bengali or its local Cox's Bazar dialect (which the CHWs were more comfortable with). In order to mitigate this situation, leveraging Dimagi's tiered training model, project partners from Dimagi and BRAC JPGSPH sat together in a series of internal meetings and team members from BRAC JPGSPH were trained first, to be able to train the CHWs. After getting acquainted with the training details, BRAC JPGSPH team members facilitated training sessions for the CHWs. CHWs were comprehensively trained on every feature and content of the app. While the trainers focused on theoretical aspects of COVID-19 (origin, preventive measures, mode of transmission and signs/symptoms) on the first day, hands-on training with Tab and app was undertaken on the second day. This training contributed to capacity building and also enabled the CHWs to respond immediately in an effective way to minimize the risk of disease transmission in highly vulnerable and crowded camp settings.

'CONTACT TRACING AND CASE MONITORING APP' IMPLEMENTATION PROCESS IN THE CAMPS

Implementation of the contextualized Contact tracing and case monitoring app continued for 4.5 months. Project partners adopted three major strategies for need-based and efficient implementation explained as follows:

THE INITIAL SCREENING AND CASE IDENTIFICATION THROUGH THE CONTACT TRACING APP

As a contact tracing strategy, CHWs visited every household in the designated camps and initially screened all individuals irrespective of their age and gender at the household level. In the *COVID-19 registration form,* two checklists shared by WHO officials were incorporated to screen individuals: a WHO COVID-19 case identification checklist and a checklist to identify high-risk individuals.[7] These generalized checklists were recommended by WHO and
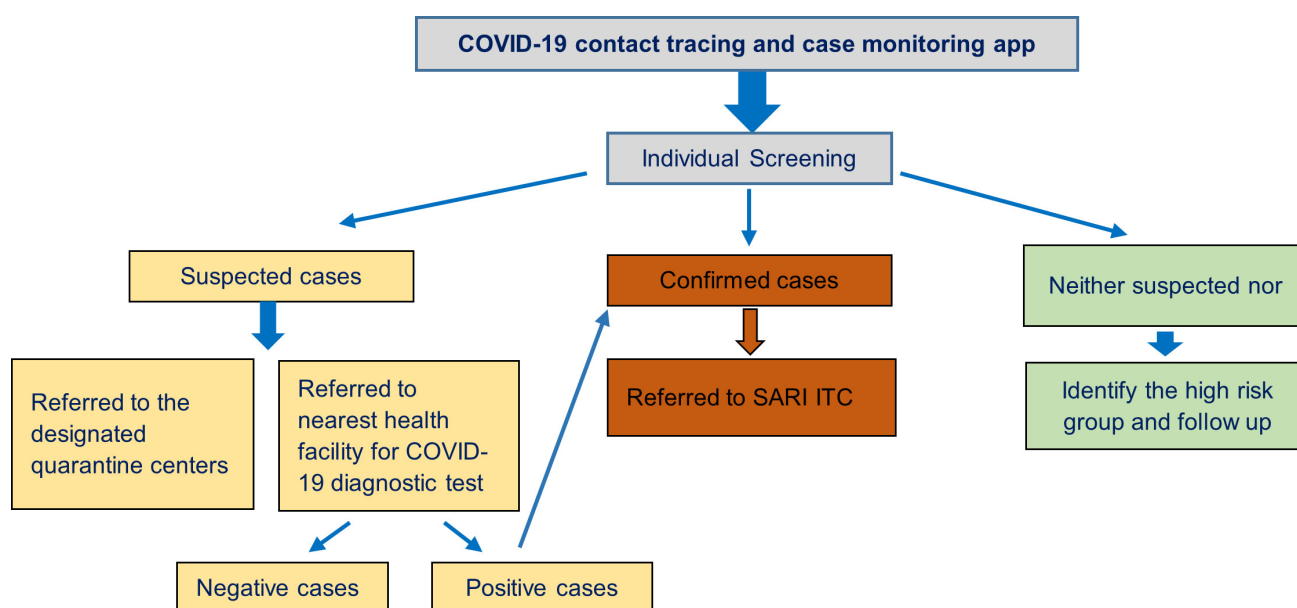
Figure 1. Diagrammatic representation of Commcare 'Contact tracing and case monitoring' app implementation process

Bangladesh government to be used during all interventions for contact tracing or COVID-19 activities.

Based on the beneficiary responses in COVID-19 case identification checklist (containing symptoms of COVID-19), the app categorized an individual into any of the three categories: i) Suspected COVID-19 case, ii) Confirmed case, and iii) Neither suspected nor conformed individual. A person with a few symptoms of COVID-19 and possible contact with a COVID-19 confirmed case was marked as a suspected case, whereas persons with a COVID-19 positive report were marked as confirmed cases. During the 4.5 months of the app implementation process, 249,452 individuals from 10 Rohingya camps were screened for COVID-19 case registration. Of all the screened individuals, 431 were identified as COVID suspected cases, and 77 were identified as confirmed cases. At the same time, utilizing the high-risk checklist, CHWs identified high-risk individuals (elderly people, individuals with comorbidities, and pregnant women) for further follow-up. The full implementation process of the app is shown in a flow chart given in Figure 1.

CASE MANAGEMENT, FOLLOW UP AND TIMELY REFERRAL

Based on the categorization into three groups, CHWs proceeded further with the case management and referral protocol. As soon as an individual was identified as a suspected case, a minimum case reporting form was filled for future references, and to identify the point of contact (if any). CHWs referred suspected individuals to the nearest designated quarantine center for facility quarantine for 14 days and COVID-19 diagnostic tests. They also explained the dos/don'ts of quarantine to suspected individuals. Hence, the earlier mentioned 431 suspected individuals were referred to health facilities for COVID-19 diagnostic tests and also for quarantine. Contact details of designated field supervisors were also shared with him/her for any further assistance or support. If the test report came out negative, they were free to go back home.

When a suspected individual became COVID-19 positive, this suspected case was then converted into a confirmed case in the app. A *minimum case reporting for COVID-19 confirmed case* and *laboratory test result form* were filled for the COVID-19 confirmed cases. The individual was further referred to the Severe Acute Respiratory Infection (SARI) Isolation and Treatment Centers (ITC) established by humanitarian agencies and health sector actors in Cox's Bazar. CHWs also notified WHO and other health sector actors as soon as they identified a suspected case becoming confirmed. Out of 431 suspected cases who went for the COVID-19 test, 19 became COVID-19 positive and were sent to SARI ITC. CHWs also notified WHO and other health sector actors as soon as they identified a suspected case becoming COVID-19 positive. Close contacts were then reached, and the close contact initial reporting form was then filled with relevant responses. CHWs followed up on COVID-19 suspected cases and close contacts every week to identify their prognosis and gave further advice based on his/ her physical condition. They also followed up high-risk groups every two weeks to enquire about their physical condition.

COMMUNITY AWARENESS TO ADDRESS MYTHS AND MISCONCEPTIONS

A critical feature of the app was the *education and information dissemination* section which contributed to developing community awareness by addressing the existing myths and misconceptions around COVID-19 infection and the vaccine. This was critical given the widespread misinformation and stigma surrounding COVID-19 and the inherent

distrust on the government. This app implementation supported the initiative of health sector actors in reducing the misconceptions around COVID-19 for improved case identification and containment of the chain of infection strategy. The research team ensured that CHWs disseminate information in two ways: i) direct counselling with the beneficiary groups and ii) disseminating pictures and videos relevant to COVID-19.

CHWs discussed relevant and important questions with the beneficiaries, including COVID-19/Coronavirus; the mode of transmission of the disease; main symptoms; preventive measures; and what to do when a person experiences symptoms of COVID-19. Pre-identified myths and misconceptions from the community were addressed by explaining relevant facts to them and showing them WHO-approved videos and pictures shared by other health sector actors. For example, a general perception in the Rohingya community about COVID-19 was that this the pandemic is a curse from the Almighty and can infect only sinners; wearing a mask or washing hands cannot prevent the disease and it can only be prevented by praying five times a day. Similarly, there was a generalized misconception about the contents of the vaccine, which were thought to have *'haram'* (forbidden) materials in it and the majority of the beneficiaries showed less interest to take the vaccine. CHWs, after building rapport with the beneficiaries, explained to them the facts and reality. Impact of pictures and videos remain with an audience longer than a conversation, hence these discussions with the community were supplemented with graphical materials. CHWs successfully disseminated accurate information to approximately 120,000 individuals utilizing the app.

Considering the burden of mental health among the Rohingya people post 2017 influx and due to the COVID-19 pandemic, research partners incorporated a feature for mental health assessment in the app. This mental health feature adopted a symptoms checklist developed by the National Technical Committee from the National Institute of Mental Health (NIMH), Bangladesh. Based on the responses following a mental health general symptom checklist, CHWs tried to identify individuals with mental health issues. If an individual was identified as suffering from anxiety, distress, confusion, boredom, or frustration, CHWs provided counselling on self-care whereas individuals with more severe symptoms were referred to the nearest health facility for better management.

IMPLEMENTATION CHALLENGES AND REMEDIAL STRATEGIES

The research team experienced several implementation challenges such as lack of capacity of the CHWs to implement a digital contact tracing app, convincing the community to register in a digital system, obtaining information around COVID-19 symptoms, and many cultural, linguistic, gender and other social barriers. This section briefly discusses the implementation challenges experienced by the team and the mitigation strategies adopted.

Insufficient expertise of the CHWs to implement digital initiatives: Even though the recruited CHWs had experience of working in the camps, none of them were used to delivering services utilizing a tablet or other types of digital devices. The newly implemented contact tracing app replaced the manual paper-based approach that CHWs used for their work for a long time in the camps. Initially therefore, they found it difficult to utilize the tablets and the 'Contact tracing and case monitoring app'. In order to mitigate this challenge, several training sessions were conducted regarding the concept of COVID-19, contact tracing app use, and how to collect and submit data efficiently with tablets. The research team also organized field pretesting to ensure hands-on training for CHWs. Once they achieved a working competency in using the contact tracing app through the tabs, they were sent to the field.

Challenges with screening, case identification, and registration in a digital system: In the beginning, CHWs experienced challenges in collecting data about symptoms of COVID-19 from the Rohingyas. Many Rohingya people (especially adult and elderly men) were hesitant to share the ID number provided to them as a resident of the camps. They were also hesitant to share details about travel history, age, health conditions, family members' health conditions, etc., especially because the information was being collected via tabs instead of on paper. These data, however, were important to categorize individuals into three groups, namely: suspected cases, confirmed cases, and neither suspected nor confirmed cases under the contact tracing activity. Widespread rumors and misinformation about COVID-19 in the camps were the main reasons behind the predisposition of the beneficiaries to hide symptoms of COVID-19 from the CHWs. The research team found a widely circulating rumour that any individual identified as being COVID-19 positive would be uprooted by Bangladesh military armed forces (who have a prominent presence around the camps) to break the chain of disease transmission. Consequently, the Rohingya people attempted to hide COVID-19 symptoms and were scared and reluctant to go to a health facility for further diagnosis. They were also hesitant to open up about their physical health conditions to the CHWs.

Besides the fear regarding registration due to the rumours, the research team also identified unfamiliarity with getting registered for any services through a tab, and a fear that getting registered would implicate individuals into something illegal. At the same time as the contact tracing activity, people from the camps were also being registered by the government of Bangladesh to be relocated to 'Bhasanchor' (an island territory of Bangladesh, developed to house the Rohingya people). Fear and mistrust of this relocation project, manifested as the Rohingya in the camps being especially guarded about the digital registration process, as they assumed that this new process of registration might be connected to the new relocation project.

Research team members mitigated this situation by leveraging the experience of CHWs who have worked in the area for a long time, and by taking assistance from Rohingya camp community leaders, known as 'Majhees'.

CHWs were asked to explain the process of the contact tracing activity in detail to show the beneficiaries that they can be trusted with personal information. 'Majhees' assisted the activity by encouraging beneficiaries to share needed information. Repeated visits by the CHWs and deliberate attempts to build rapport with the community proved to be beneficial in such cases, and after three/four visits and conversations, camp residents began slowly opening up to the CHWs.

Addressing myths and misconceptions: The Rohingyas were very commonly found to believe that COVID-19 is a curse from the Almighty, afflicting those that the Almighty wishes to curse with it, and as such, believed that maintaining any preventive measures is unnecessary. Given this metaphysical and moralistic understanding of the COVID-19 pandemic, praying five times a day, being honest and truthful, and helping others were seen as measures that could prevent COVID-19. Expelling individuals confirmed as being positive for COVID-19 and their families was a practice that was found to have occurred in a few cases due to a fear of the curse from the Almighty. Among the individuals who were aware of the availability of the COVID-19 vaccine, many were not eager to take it, believing it is made up of 'haram' ingredients. All these misconceptions and myths need to be addressed at the earliest for the disease containment strategies to work efficiently. CHWs utilized the 'education and information dissemination' feature of the app and tried to raise community awareness. This module was developed by the partner team members, keeping in mind specific myths about COVID-19 that were addressed through a combination of counselling messages and engaging infographics.

Many of the beneficiaries, however, preferred to hold on to their own perceptions regarding these issues, and were not convinced by the facts shared by the CHWs. The research team members strategized that engaging community and religious leaders in the information dissemination process could better address myths and misconceptions. Facts regarding COVID-19 transmission and prevention were shared with the community through mosques and in public areas by religious and community leaders in the presence of CHWs and field supervisors. After several days of following this strategy, beneficiaries began to trust the CHWs more and acceptance for their advised preventive measures grew.

Existing cultural barriers regarding COVID-19 precautionary measures: As the CHWs had to screen individuals through home visits, following precautionary preventive measures was mandatory according to BRAC JPGSPH's institutional, as well as local protocols. However, wearing masks/gloves/face shields were not considered to be "normal" by the camp residents. Outsiders seen with these precautionary measures were considered to be 'infected with COVID-19' and were avoided. In a few instances, it was also noted that when CHWs wore a mask, beneficiaries felt uneasy. To mitigate this unease, CHWs explained to community members why they are wearing masks and face shields during their visits, and why it was also necessary for the community members to wear the same (masks and preventive items were provided to beneficiaries by CHWs) while talking to them. Several beneficiaries explained to the research team that during the first wave of the pandemic, multiple organizations used to conduct drives to deliver masks and other preventive materials to the households of camp residents. However, this "fervour" (as the community members described) of organizations to supply the community with these safety materials died down after the first wave, and many households could not utilize their own resources to continue purchasing these materials anymore.

Societal barriers to accepting female CHWs: All the CHWs implementing the app-based intervention in the Rohingya camps were female, of different age groups, and qualifications. The research team documented CHWs experiencing difficulties persuading the male heads of households to obtain permission for initial screening. Male heads of households, and male beneficiaries were more hesitant to share information with the female CHWs. A pre-existing bias against women being in charge of their health and wellbeing was attributed by the CHWs to this attitudinal barrier to their work. Religious and cultural beliefs also compounded this perception and understanding, as women staying home and raising children is the accepted practice in the Rohingya community. Project team members were asked questions around the nature of the job, job responsibilities, and why these female CHWs "roaming around" the communities (which offended a few community members). Male field supervisors were engaged in mitigating the situation during such cases. In several cases, field supervisors had a conversation with the male household head to persuade them to permit the screening. The presence of a man resulted in a successful attempt to secure permission for collecting information in all such instances.

Challenges due to outbreaks of COVID-19: The contract tracing activity itself was undertaken during the COVID-19 pandemic. Whilst the rest of Bangladesh experienced peaks in new COVID-19 cases during March-April 2021, the Rohingya camps, because of their isolation from the rest of the country and strict restrictions on the movement of people to and from the camps, did not experience outbreaks in the same ways. During the contact tracing activity, there were sporadic outbreaks of COVID-19 in 4 of the 10 camps covered under the activity. Camp authorities enforced tight control over the movement of personnel to and from these camps, and contact tracing activities had to be halted for 2-3 weeks per camp before the movement was normalized.

DISCUSSION

Recruitment of field level contact tracers: The research team was aware that in order to successfully implement a health intervention in the Rohingya camps, field level workers need to know the local language of the Rohingya people, an understanding of the geographic and cultural landscape within the camps, and a certain degree of acceptance from the community. With these considerations in mind, the research team partnered with BRAC HCMP, to be able to benefit from the existing pool of CHWs that the agency already deploys within the camps. The CHWs pro-

vide basic healthcare services and consultation to Rohingya families through door-to-door visits. Therefore, they are a well-recognized and trusted group of workers within the camps, who also possess a good understanding of the social and material realities of the camps themselves. These considerations led the research team to pick contact tracers out of this group.

As the COVID-19 pandemic continued, however, the healthcare systems of both the camps and Cox's Bazar district began struggling to cope with the additional load of patients. The healthcare staff was redirected from regular patient services to selected emergency services and COVID-19 response. Many regular healthcare service centres within the camps shut down entirely, with staff being redirected to the SARI ITCs instead. Therefore, residents of the camps could not avail of most kinds of healthcare services at the healthcare centres. CHWs provide services (primarily to women and girls) on a door-to-door basis. CHWs having become engaged in the contact tracing activity meant that a number of them could no longer continue providing already scarce healthcare services to women and girls. Many CHWs also lost their jobs during the pandemic, as humanitarian organizations scaled down their sexual, reproductive, and maternal and child health services. The relative advantages and disadvantages of redirecting workers from an already diminished pool engaged in delivering services targeted towards vulnerable women and girls, to being engaged in contact tracing in order to quickly contain and prevent the spread of a potentially deadly contagious disease, are complex and perhaps present more moral, philosophical, economic, epidemiological and public health questions than can be answered.

On a purely pragmatic level, it was difficult initially to complete the immediate task of contact tracing via the CHWs as well, since many CHWs had no prior experience operating tablet devices or app-based interfaces. The team addressed this difficulty by arranging intensive training before the work started, and later through individual guidance given to the CHWs by their field supervisors. Uptake of the new technology by CHWs however, was initially slow. This slow uptake might contribute to slowing down the overall contact tracing activity, which would run contrary to the aims of the contact tracing to be able to quickly contain the spread of COVID-19. Both this difficult moral dilemma and the pragmatic concern of a slow uptake to technologies used for contact tracing, mean that despite the apparent advantages of employing an existing workforce of field level healthcare workers, it might be better for the purposes of quick and efficient containment measures, to recruit and train a workforce of individuals who are adept at using the technologies being employed for the contact tracing activity itself.

Working in conjunction with other health sector actors and stakeholders: Given the limited resources available for the overall containment effort in the camps, and the fact that a formal network of both government and non-government bodies working in the health sector within the camps already exists, the research team took care to avoid duplication of work and therefore unnecessary misuse of resources. Consultation meetings with government authorities from the Civil Surgeon Office, Directorate General of Health Services, with the WHO, and other key Health Sector actors and stakeholders ensured that the research team was fully aware of the scope and nature of similar activities of all other relevant stakeholders, and could plan to operate in areas of the camps where no other actors had planned to implement similar activities. At the same time, these consultations also allowed other stakeholders to be fully aware of the research team's plans and also meant that a professional network was built between the research team and important actors, which could be relied upon for crucial support during the course of the contact tracing activity.

Ensuring community buy-in and trust: Contact tracing for any infectious diseases within the context of a humanitarian crisis where refugees or asylum seekers are involved, presents some unique difficulties that must be overcome. These are populations for whom legal status and documentation might be complicated realities. The experiences of persecution that they attempt to flee from, potential experiences of exploitation on their way to the places where they seek asylum, might leave them wary of perceived authority figures attempting to collect their personal information.

The research team for the present study attempted to counter some of these challenges by employing field-level workers who already had working relationships with the communities inside the camps. The team also identified the importance of getting local community leaders or *Majhees* onboard with the planned contact tracing activity and broader research at large. Prior to the commencement of the study, consultation meetings were arranged by the research team with *Majhees* and local elders as potential gatekeepers or local leaders to the communities. The aims and objectives of the research project were clearly explained to the representatives of the communities, and plans to share the findings of the research with them, and their support for the research and its activities were received. Approval and cooperation from community leaders notwithstanding, it was also important to explain the aims and objectives of the study to every individual approached for the contact tracing as part of ethical aspects. It was of paramount importance that it be made explicit to the community, and especially the actual participants of the contact tracing activity, that their personal information will be stored in a secure way and can be accessed only to contain a potential COVID-19 outbreak. In densely populated and closely-knit asylum-seeking communities, it was very important that the trust of each household and individual be gained in order to be able to continue working within the same community.

Addressing misinformation within the community: Both the present study and studies prior to this have found widespread false rumors and misinformation within the camps about the COVID-19 pandemic itself, about the appropriate precautions from the same, and also about the measures being taken by camp authorities to contain and curb the spread of the disease.[5] With these severe misconceptions in the community, it would have been challeng-

ing to continue carrying out the contact tracing and other subsequent research activities within the camps. The communities were unwilling to share much information about experiencing symptoms of COVID-19 or any other personal details. Since for this research, a manual contact tracing approach was adopted where a worker would physically visit the house of an individual for contact tracing, the research team decided to leverage the same visit also to spread necessary and accurate information about COVID-19, its preventive measures, and what to do in case of a suspected infection. The CommCare app used by the CHWs had an option to display useful information on these themes, and CHWs received specific training to explain the information accurately to the community members. This process allowed for a necessary flow of vital and potentially life-saving information into the communities and alleviated unwarranted tensions and concerns about the COVID-19 situation and the perceived risks of participating in the study by providing personal information. If a contact tracing activity is conducted via a manual procedure, it would be advisable to leverage the fact that personal contact is being made with every person listed to also disseminate important public service announcements/information. This holds especially true in humanitarian contexts, where the internet or access to other forms of media might not be an option to disseminate information to individuals.

CONCLUSIONS

Conducting activities such as contact tracing, which involves recording and monitoring socialization and movement by community members who may have complicated and bitter personal histories with individuals they see as "authority figures", is challenging and complicated. This situation applies to the humanitarian crisis in Cox's Bazar, Bangladesh. However, this experience can reasonably be foreseen to apply to humanitarian crises in other locations, where refugees arriving in host countries experience persecution in their home countries and exploitation by various parties on their journeys to the host countries. The modalities of operation adopted by the team engaged with this present intervention to overcome the difficulties experienced in its conduction can hopefully provide some guidance to future parties attempting to conduct similar activities in complex humanitarian settings.

AUTHORSHIP CONTRIBUTIONS

MTH, AIA, and AK conceived the idea presented in the manuscript. AIA and AK developed the first draft and all authors provided constructive feedback to improve the content of the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests (includes financial and non-financial). The authors completed the Unified Competing Interest form at http://www.icmje.org/disclosure-of-interest/ (available upon request from the corresponding author) and declare no conflicts of interest

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