Estimation of SARS-CoV-2 infections and deaths among Rohingya refugees, Kutupalong-Balukhali camps, Bangladesh

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Introduction

Since the emergence of the COVID-19 pandemic, concerns have arisen regarding the potential impact of outbreaks affecting Rohingya refugees living in the Kutupalong-Balukhali refugee camps in Bangladesh. Early modeling work projected substantial outbreaks of SARS-CoV-2 virus were likely within the camps. However only 435 laboratory-confirmed cases and 10 deaths were reported from 14 May 2020 through 19 March 2021. While these official numbers imply spread of SARS-CoV-2 has been controlled, other data are contradictory, highlighting a population unwilling to seek care or be tested. Surveys from slums in India and Bangladesh suggest seroprevalence rates of 45% and 75%. Here we use multiple data sources to evaluate whether SARS-CoV-2 outbreaks may in fact have been larger than previously thought among Rohingya refugees in the Kutupalong-Balukhali camps.

Methods

We used a mixed-methods approach to analyze SARS-CoV-2 transmission in the Kutupalong-Balukhali refugee camps using multiple datasets. We developed a probabilistic inference framework to assess support for three hypotheses of how variability in care seeking and testing might alter the interpretation of official case and testing data. We estimated weekly numbers of infections among the Rohingya refugees using official reported case and testing data, data on acute respiratory infections (ARI) from WHO's Emergency Warning and Response System, probability of SARS-CoV-2 PCR test among ARI cases at MSF health centres, and data from a serological survey conducted in Dhaka. Separately, we assessed compatibility with suspected COVID-19 among deaths identified through an International Organization for Migration (IOM) mortality survey among the Rohingya during April–July 2020. We compare these deaths to the inference model results to identify consistency between sources and methods.

Ethics

This study fulfilled the exemption criteria set by the MSF Ethics Review Board (ERB) for a posteriori analyses of routinely collected clinical data and thus did not require MSF ERB review. It was conducted with permission from Dr Kiran Jobanputra, Operational Centre Amsterdam, MSF.

Results

Under our probability framework, each hypothesis suggests a substantial outbreak occurred, though size and timing vary substantially. Under hypotheses accounting for declines in willingness to seek care, the data suggest a large outbreak occurred in spring 2020, with up to 400,000 infections, or 47% of the population, and 390 deaths occurring during April-December 2020. These findings were consistent in both timing and magnitude of the outbreak estimated separately from deaths identified by the IOM survey, including 47 unreported deaths consistent with suspected COVID-19 and up to 370 suspected COVID-19 deaths after adjusting for sampling. These deaths coincided temporally with spikes in reported cases and test-positivity rates during June 2020 and with increased contact during Ramadan.

Conclusions

Despite the low numbers of reported cases and deaths, we suggest an early large-scale outbreak is consistent with the reported data, with the outbreak remaining unobserved because of reduced care-seeking behavior and low infection severity among this population. Current data do not permit precise estimation of incidence, but results do suggest substantial unrecognized transmission of SARS-CoV-2 within the camps. However, confirmation will await more conclusive evidence from serological testing.

Conflicts of interest

None declared.

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Shaun Truelove is an Assistant Scientist at the Johns Hopkins Bloomberg School of Public Health, in the Departments of International Health and Epidemiology. Dr. Truelove's work mainly focuses on the impact of vaccination and understanding the potential for outbreaks in various settings. His research specifically focuses on SARS-CoV-2, measles, rubella, and diphtheria and involves infectious disease dynamics, modeling, and methods development. His work is done as part of the Johns Hopkins University International Vaccine Access Center, Infectious Disease Dynamics group, and Center for Humanitarian Health. A large part of his work focuses on understanding infectious disease risk in vulnerable populations, including refugees and displaced populations. During the COVID-19 pandemic he has been engaged with the United Nations High Commissioner for Refugees, United Nations Office for the Coordination of Humanitarian Affairs, and MSF, to better understand pandemic risk in various camp settings. He holds a PhD in epidemiology from the Johns Hopkins Bloomberg School of Public Health.