Title Page

**Public Health Implications of an Unfolding Infectious Disease Crisis among Rohingya in Bangladesh**

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Abstract

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**Abstract**

Complex cultural, political, and socioeconomic factors remain major obstacles to solving the infectious disease crisis of the Rohingya refugees in Bangladesh. Using Cox’s Bazar and makeshift settlement camps as context, this essay presents evidence from published literature that establishes the key historical events that produced the current policies in effect, thereby leading to an exponential increase in infectious disease prevalence and a high degree of public health significance in Bangladesh. Epidemiological studies of infectious diseases in this region have traced the cause to ineffective resource management. Available evidence reveals several possible solutions to rectify current policies that govern water and sanitation, food and nutrition, shelter and non-food items, access to health services, and medical education. However, traditional solutions such as identification cards, food rations, repatriation for refugees, and resettlement have not produced beneficial outcomes for any of the parties involved, as local economic opportunity and freedom of movement are not granted to the Rohingya for fear of resource depletion. The inefficient supply chain management of these resources must be addressed in order to produce long-term relief from infectious diseases for refugees. By including local leaders of the community in policy meetings, the Government of Bangladesh and the United Nations can develop a viable public health strategy to combat the spread of infectious diseases among Rohingya in Bangladesh.

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# Introduction

## Problem Statement

This essay will address the epidemiological impact of the Rohingya on the Bangladeshi community and potential public health and policy implications crucial to managing the growing infectious disease crisis. Underlying socioeconomic and environmental factors must be resolved by programs and policies that consider effective disease monitoring and preventative medicine-based measures. The United Nations (UN), Government of Bangladesh (GoB), and other supporting non-governmental organizations (NGO) must produce a solution to the issues of repatriation and resettlement process. Modest solutions can be enacted to rectify the water supply and medical education of the refugee population without disturbing local Bangladeshi communities. Diseases investigated include sexually transmitted infections (STIs) such as Human Immunodeficiency Virus (HIV) and Urinary Tract Infections (UTI), water-borne diseases such as cholera and hepatitis E, airborne diseases such as respiratory infections and tuberculosis (TB), and vector-borne diseases such as malaria and leptospirosis.

## Geography

Cox’s Bazar District is located in the eastern and southernmost portion of Chittagong Division, comprising 2,491 kilometers squared of mainly low-lying coastal land with large tracts of mixed agricultural areas and rugged forested hills further inland. It is centrally situated on the west coast facing the Bay of Bengal where the climate and environment are influenced by its location in the tropical monsoon zone, which produces heavy rainfall, high temperatures, and distinct wet and dry seasons. The tropical, coastal situation of Cox’s Bazar deals with natural disasters, such as floods, tropical cyclones, tornadoes, and tidal bores, which combine with the effects of climate change, deforestation, soil degradation, and erosion. On a personal anecdote, I took repeated trips to Bangladesh to visit my family’s village as a child, where walking trails visible in the springtime would vanish underwater from the July monsoon. No individual or organization had prepared some of the modern advances we take for granted – levees, strategic evacuation plans, or any relief of any sort. Witnessing an entire family in my father’s village lose their home to a flood showed how any people, especially people who are fleeing persecution while huddled together in a camp, can be at the mercy of Mother Nature.

Myanmar is a country located in South-East Asia and is bordered by Bangladesh and India to the west, China to the northeast, Laos to the east and Thailand to the southeast. The country’s largest city and former capital Yangon is situated in southern Myanmar while to the north is the new capital, Naypyidaw. Approximately 51 million people live in Myanmar with nearly 30% of the population living in urban areas. The majority ethnic group is the Bamar, who constitute about two thirds of the population. Other ethnic minorities residing in that state include, Chin, Kachin, Karen, Kayah, Mon, Rakhine, and Shan. The largest ethnic groups in Rakhine State are the Buddhist Rakhine and the Muslim Rohingya while the smaller Muslim group in Rakhine State are the Kaman, who are recognized as citizens by the government.31

## Geopolitical History

Ethnocentric violence in the Rakhine State of Myanmar has forced almost 1 million Rohingya refugees to neighboring Bangladesh, specifically Cox’s Bazar.1 The Rohingya in Myanmar have consistently been persecuted and only occasionally removed by force since 1982. 1 The largest Muslim group within Rakhine State self-identify under the term “Rohingya,” a designation that is not accepted or recognized by the Government of Myanmar as an official nationality within the country. In order to preserve neutrality on the issue, the International Organization of Migration (IOM) and Myanmar alternatively refers to this group as “Muslim minority of Rakhine State.” In accordance with the National Strategy of the GoB, Bangladesh refers to unregistered members of this minority group as “Undocumented Myanmar Nationals”.2

Historically, the Myanmar Government contends that the Rohingya people are originally from Bangladesh and as a result, Rohingya refugees have been fleeing Myanmar in large numbers to nearby countries with similar cultures, such as Bangladesh, Malaysia and Thailand.3 The major influxes occurred in 1977–78, when the GoB sheltered the Rohingya refugees, in 1992, when the GoB actively fought the migration, and again in 2016–17, when violence in Myanmar increased the amount of undocumented refugees.3 Official registered refugees live in the United Nations High Commissioner for Refugees (UNHCR) camps and unregistered refugees reside in makeshift camps. Both of these groups have been refused basic healthcare, employment opportunities, and education.3 Those residing in the makeshift sites are living in emergency-like conditions, while UNHCR has not been able to account for the 200,000 unregistered Rohingya, classifying them as “persons of concern” in 2010.2

Bangladesh also has the burden of poverty and natural disasters, such as, tornadoes, cyclones, floods, and tidal bores while still permitting massive influxes of Rohingya due to shared social, ethnic, linguistic and religious aspects, mostly stemming from Islam.2 The GoB asserts that international efforts must solve the problem in Myanmar and assist in repatriation, while the public have done little to create additional protection space for the Rohingya.2 The Rohingya in Bangladesh have faced the same restrictions on movement, secondary education, and marriage that they faced in Myanmar.2

Myanmar’s treatment of the Rohingya includes periodic killings, rapes, and scorched earth tactics, as well as a refusal to provide legal identities, birth certificates, or childhood vaccinations.4 Poverty rates in Rakhine reflect this, as they are nearly twice that of the national average. Due to these restrictions, the Rohingya can work only in the informal sector, where they are still regarded as illegal migrants by the government. Potential solutions may include resettlement elsewhere in Bangladesh or further migration to a country that is not Bangladesh or Myanmar.4

The implications of these traumatic experiences resulting in post-traumatic stress, physical stress, and resource stress affect the Rohingya well-being beyond what statistics demonstrate. The social determinants of health (neighborhood and built environment, economic stability, health and health care, social and community context, education, neighbors) are all negatively affected by the crisis and limited efforts have been made to alleviate this stress compounded by the lack of clean water, food, and medicine. According to the Office of Disease Prevention and Health Promotion, “Health starts in our homes, schools, workplaces, neighborhoods, and communities.'' We know that taking care of ourselves by eating well and staying active, not smoking, getting the recommended immunizations and screening tests, and seeing a health care provider when ill all influence our health. However, our health is also determined in part by access to social and economic opportunities; the resources and supports available in our homes, neighborhoods, and communities; the quality of our schooling; the safety of our workplaces; the cleanliness of our water, food, and air; and the nature of our social interactions and relationships. 43

## Infectious Disease History

Currently, most infectious diseases in Bangladesh can be categorized as sexually transmitted, water borne, air borne, and vector borne. Prevalent STIs include HIV and some Hepatitis B although there is no reliable epidemiological data on this disease.26 Bangladesh reportedly has low prevalence of HIV infection with an estimated 9,600 individuals living with HIV.26 Other STIs include UTIs mostly caused by Klebsiella, Pseudomonas, Enterococcus, and E. coli.26

Cholera, E.coli-related diarrhea, typhoid, dysentery, Hepatitis E, and leptospirosis are the main water borne diseases with high incidence rates in the region. A range of studies conducted by Noor showed significant Vibrio spp. found in meat, fish, vegetables, fruits, street food, bakery shop foods, fast food, sweets, and dairy products. The prevalence of bacteria other than Vibrio cholerae causing diarrhea in children were 2% for Yersinia spp., Aeromonas spp., and Plesiomonas spp., 6% for Vibrio spp., 10% for Salmonella spp. and Shigella spp., and 14% for Campylobacter spp.34

The airborne diseases that have been detected and quantified in laboratory studies are tuberculosis (TB), pneumonia, and acute respiratory illnesses. In Cox's Bazaar refugee camps, Bangladesh Rural Advancement Committee (BRAC), an NGO based in Bangladesh, reported testing 11,370 people for TB. Detected cases of Multi-Drug Resistant (MDR) - TB increased from 505 cases in 2012 to 880 cases in 2015. According to the World Health Organization (WHO), 6.8% of smear positive TB cases in the Rakhine state of Myanmar were reported in 2010.32

Vector borne diseases, such as malaria caused by Plasmodium falciparum, have been prevalent in Bangladesh for decades. 28 Within developing countries such as Bangladesh, Leptospirosis is a widespread zoonotic disease that is increasingly being recognized in urban settings where human infection results from exposure to pathogenic spirochetes of the genus Leptospira, often by skin contact with contaminated water, soil, or rat urine. 28 Epidemiological data on these diseases is limited due to lack of supporting scientific infrastructure.28

## Rohingya Refugee Landscape

Rohingya technically refers to Sunni Muslims of Arakan, an isolated region of the Myanmar border which has been referred to as the “Rakhine State” since 1989.12 Rohingya are thought to be of mixed ancestry, tracing their origins both to outsiders (Arabs, Moors, Turks, Persians, Moguls and Pathans) and to local Bengali and Rakhine. They speak a version of Chittagonian, a regional dialect of Bengali which is also used extensively throughout south-eastern Bangladesh.12 This similarity in language is one of the few factors making Bangladesh a more sought after destination for the Rohingya than surrounding areas such as Thailand, Pakistan, or Malaysia. There are estimated to be up to 400,000 in Bangladesh, 200,000 in Pakistan, 20,000 in Thailand and 15,000 in Malaysia.4 Bangladesh fought its own independence war over their language and therefore attaches much significance to this – perhaps this cultural overlap is the reason the refugee influx has at least partially worked in Cox’s Bazar camps.

The northern portion of the state contains three townships of Maungdaw, Buthidaung and Rathedaung, where locals are reportedly unwelcoming to the refugee population due to ethnolinguistic barriers and therefore were not formally recognized as one of the country’s official national groups when the country gained independence.4 UNHCR estimates some 750,000 Rohingya remain in northern Rakhine state and other parts of Myanmar.4

Aside from having no access to healthcare or education, Rohingya in Rakhine are confronted with forced labor, extortion, restriction on freedom of movement, inequitable marriage regulations and land or business confiscation.4 Of the Rohingya currently living in Bangladesh, subgroups have emerged and congregated. One particular type has families with Bangladeshi citizenship who do not require immediate assistance and another group of approximately 30,000 recognized refugees spread among the Kutupalong and Nayapara camps are from families who did not repatriate during the large-scale returns of the 1970s and 1990s. Another population of 5,473 refugees are not granted rights by the government to pursue food assistance or any type of aid through resettlement, even with the majority of this group being Bangladeshi natives.10

Unrecognized refugees total more than 20,000 and have formed makeshift camps bordering main camps seeking safety from floods resulting from monsoon season.10 There are also approximately 200,000 undocumented Rohingya who participate in the labor force through host communities near Cox’s Bazar.10 Many of them reside in the Bandarban district, known to be a part of Chittagong hill tracks.10 Unlike those in the official camps, those residing in makeshift camps have typically lost registered refugee status during repatriation attempts which was not re-granted.10

The UNHCR also operates in connection with the Refugee, Relief and Repatriation Commission (RRRC) which manages Cox’s Bazar but is based in the Ministry of Food and Disaster Management (MFDM).10 The MFDM provides mission allowances to MFDM personnel seconded to the RRRC office in Cox’s Bazar and additional salaries for local personnel.10 The MFDM and Ministry of Health staff works with the UNHCR.10 (The Ministry of Foreign Affairs and the Ministry of Finance’s Economic Relations Division control political influence and must legally authorize all refugee operations.)10 The MFDM hires senior civil servants to be the Camp in Charges (CiC) to refugee camps. They serve for short durations – sometimes lasting a year or less.10

## Organizational Influences

According to a report published in Health System in Transition, “The provision of basic health services in Bangladesh is a constitutional obligation of the Government (IGS, 2012). Article 15 of the Constitution stipulates that it shall be a fundamental responsibility of the State to secure for its citizens the provision of basic necessities of life, including food, clothing, shelter, education and medical care. In addition, Article 18 of the Constitution asserts that the State shall raise the level of nutrition of its population and improve public health as some of its primary duties.” 35 This law has been interpreted to make Bangladesh's health system “pluralistic”, referring to the fact that the Government of Bangladesh has made it the responsibility of others to provide healthcare.35 The structure and functioning of the broader health system are defined by four key actors: the government, the private sector, NGOs and donor agencies. Government, the private sector and NGOs are involved in providing services, financing and employing health personnel; donors play a key role in funding and planning health programs.35

Bangladesh has approximately 3.05 physicians per 10,000 population and 1.07 nurses per 10,000 population according to the Ministry of Health and Family Welfare (MoHFW).40 There is a notable gap between sanctioned and filled health worker roles: 36% vacancy in approved health worker positions and only 32% of installations have 75% or more of the approved facilities required.40 Alternative medicine (Ayurveda, Unani and Homeopathy) accounted for 28% of the therapy given in public health centers. Although 70% of the population lives in rural regions, health employees are focused in urban secondary and tertiary clinics.40 Major difficulties include: an overly centralized health care approach, weak governance structure and regulatory framework, weak management and organizational capability in the MoHFW , fragmented government service delivery, inefficient government resource allocation, and the fact that only 58% of all doctors are employed in the private sector.40

When this healthcare system must now manage the additional burden of refugees, the broadly stated laws in Article 15 are not clear. The language in Article 15 does not touch on refugees and unrestricted refugees, which makes it difficult for the GoB to use it for guidance. 10 Bangladesh’s two major parties, the Awami League and the Bangladesh National Party (BNP), have repeatedly opposed the local integration of refugees and attempted to implement a plan for repatriation or resettlement.10 Echoing this sentiment are members of the Bangladeshi society who seemingly hold resentment of refugees due to assumptions that these individuals drain jobs and resources from the local market.10 Indeed, access to firewood and clean running water has caused documented incidents of tension and violence between Rohingya refugees and Bengali citizens. Numerous conservative movements across the world within democratic and autocratic governments eventually start to view refugees entering their country as a problem of resource reduction rather than a larger geopolitical problem that needs to be resolved with diplomacy and collaboration with international organizations.

UNHCR has had a relationship with Bangladesh since 1978. In 1994, the UNHCR committed to repatriation that the organization now admits was not safe and resulted in harm.10 From 2002 onward, the UNHCR unsuccessfully tried to start education programs (including primary schools within the camps), computer-training, and work-training revolving around farming and tree-planting for the refugees as part of self-reliance programs.10 In 2010, the GoB and UNHCR provided identification documents to all registered refugees over the age of five, a total of 21,784 persons.10

This approach to refugee documentation provided the refugees with access to education, protection, and outreach conducted by the UNHCR. However, tensions between the UNHCR and local authorities escalated over disagreement on resettlement starting January 2011 and continuing to present day, the government formally declined any help through the UNJI due to the long-perceived notion that the UN does not understand how the Rohingya hurt the local Bangladeshi environment. Specifically, the authorities felt left out of the decision-making process during the UNJI efforts, which were not in keeping with the local culture. Therefore, efforts to address and resolve a protracted refugee situation, however well-intended, may ultimately be constrained by political considerations that lie well beyond the control of UNHCR.11

Real-time efforts to improve livelihood in the camps include an installation of solar lighting around latrines and washing blocks and a response protection system to record incidents of wife beating and/or rape.10 A Boy Scouts initiative has attempted to prevent truancy and unemployment but has faced restrictions while a Girl Scout troop was formed and participated in the International Coastal Clean-up held in Cox’s Bazar.10 By continuing to partner with local organizations, the UNHCR can work towards peace-keeping and violence reduction. Food that is distributed is often shared with other children who are undocumented and makes a full assessment of the situation virtually impossible.10

After detaining offenders, the UNHCR developed a system of detention centers that monitor and collect data on how offenders are treated in order to better train the local law enforcement to observe the rights of refugees. Non-Governmental Organizations and pro bono lawyers are still needed to provide representation for these offenders and other refugees. The identification cards do not prevent refugee detainment outside the camps and even birth certificates are not recognized by local authorities. United Nations High Commissioner for Refugees keeps track of such children by entering their data into ProGres, but cannot handle unregistered refugees.10

Refugees obtain food through documentation known as the ‘family book’. These record all forms of assistance; including food, non-food items and vaccinations, as well as all family members and their relationships.10 Several UNHCR-World Food Program Joint Assessment Missions (JAM) have tried to digitize this system which has been tampered with in the past.10 Such tampering instances included situations where people living in different households are sometimes recorded in the same family book, or when family members who are not entitled to rations are included in the books, which themselves can be forge, bought, and sold.10 In addition, some 5,800 people who are currently residing in the camps do not receive food because they are unregistered.10

The family book system is problematic due to its history of past abuses. Inaccuracy is the primary concern, where heads of households with several wives will not recognize them as heads of single households. 11 Authorities have also arbitrarily removed names from family books as a means of extortion and/or punishment while refugees have used naming rights on family books as a commodity for local bartering. On this point, the UNHCR and the GoB have agreed on working together to resolve this problem in a sustainable manner and to combine this identification with ration cards inside family books.11

With regards to ration cards specifically for women, this does not occur as typically ration cards will be issued to the refugee male head of family (for himself) and for the female head of family (for herself and her family). If this practice were adopted, ration cards could even grant the power to vote to card holders.11

A UNHCR report in 2007 details the contemporary outcomes of the Rohingya healthcare system. It is centered on the Office of the Civil Surgeon with whom UNHCR has no agreement, causing several issues such as delays in the release of funds, supplies, and wages. However, some programs have been successful. The United Nations International Children's Emergency Fund (UNICEF) sponsors the government’s national vaccination program which works with children under the age of 5 yet still requires negotiation with the GoB to expand its role. Camps have a labor room, laboratory, pharmacy and emergency service to service antenatal and postnatal care, immunizations, family planning, and therapeutic feeding. 11

## Health Implications

The Rohingya’s current struggles with STIs, and specifically HIV, are compounded by gender-based violence and exploitation as a result of poor living conditions. 26 Current epidemiology of HIV has improved in recent years, though testing is not routine and data may still be underrepresented for certain groups that are difficult to reach. Bangladesh, based on the available data reported, appears to have a low numbers of people with HIV. It is estimated that there are 9,600 individuals are living with HIV.26 Given the limited resources for other public health initiatives in the country, accurate surveillance of HIV is questionable. Community-based organizations are involved in intervention programs such as condom distribution but testing and STI services are not widely accessible for this population. Non-Governmental Organizations are increasingly seeing that resources are decreasing in terms of prevention, testing and STI services.26

Patients with a CD4 T-cell count below 500 cells/mm3 are initiated on ART, with a new threshold of CD4 T-cell count above 500 cells/mm3 to be implemented. Eight centers exist for CD4 T-cell measurements but the majority of them are affected by a chronic lack of resources and cannot sustain regular testing. 26 Currently only 3,900 of 12,000 people living with HIV are aware of their status, with only 1,800 people receiving proper antiretrovirals. 5

An estimated 77% of HIV patients found intestinal parasitic pathogens including: Cryptosporidium spp., Blastocystis hominis, Entoeba histolytica, Hymenolepis nana, Giardia lamblia, Ascaris lumbricoids and Trichuris trichiura. Spp. Cryptosporidium.34 Common opportunistic HIV-related infections include diarrhea, pulmonary TB, gland TB, skin lesions and fever. Other HIV-related issues include respiratory and gastrointestinal complications, bronchitis, UTIs, diseases of sexual transmission, weight loss, pharyngitis, prostatitis, skin rashes, and oral ulceration.34

The National Strategic Plan (NSP) for HIV/AIDS in Bangladesh has assumed the job of extending program coverage to include case detection, enhanced access to therapy, care and support facilities for individuals living with HIV in Bangladesh. The NSP has made drug stocks accessible, but in June 2018 some second-line drugs will expire. By December 2017, the NSP estimated an antiretroviral treatment (ART) of > 100 recognized Rohingya patients.39 The total amount of Rohingya people residing with HIV has been estimated at approximately 5,000. The WHO estimates that approximately 500 patients were on ART in three northern Rakhine state cities from which the Rohingya population has escaped since August 25th, 2017.39

Antenatal care (ANC) facilities are crowded; often there is no availability of even minimal inquiries. Preventing mother-to-child transmission (PMTCT) facilities is only accessible in Chittagong, which is nearly 200 kilometers away, and traveling that distance may be hard for pregnant females. Among migrants, there are an estimated 20,000 pregnant females, although only two were discovered to be HIV-positive.39 Due to some movement restrictions beyond the camp fields, adherence and access to drugs stay hard among refugees. It also remains a challenge to introduce screening and the ability for laboratory diagnosis.39

Other infections prevalent in the refugee community include urinary tract infections (UTI). As a part of these epidemiological studies, 462 urine samples were collected from UTI patients, with 100 being culture-positive with predominantly E. coli, with lower levels of Klebsiella and Enterococcus and minor amounts of Pseudomonas.34 With the sexual and gender based violence mentioned previously, UTIs are a primary public health concern among women.

The prevalence of airborne diseases, such as Tuberculosis, are a major issue in Bangladesh and in the camps as well. Nearly 364,000 cases of TB were reported overall in 2017 with approximately 60,000 deaths related to TB.38 In the camps specifically, it was reported by the WHO that the TB notification rate in the state of Rakhine in 2016 was 231/100,000 compared to the general level in Myanmar of 217/100,000. Among TB instances, HIV is 3% (domestic average of 9.6%).39 These rates may actually be higher than reported, due to the fact mentioned earlier that the Rohingya were barred from childhood vaccinations during the period of time in which they lived in the Rakhine State. In Myanmar, the incidence rate of TB is 365/100,000 (greater than 225 in Bangladesh).39 Extrapolating this rate and using a prevalence rate of 500/100,000, it can be expected that some 4,000 TB patients will now be in camps among the displaced as of 2018.39

The TB reaction initiated by the Bangladesh NSP for TB together with Bangladesh Rural Advancement Committee (BRAC), the lead non-governmental organization (NGO) partner, has created a comprehensive referral approach with partner assistance, but its operationalization remains a challenge. TB screening is performed at health and community level hospitals.39 Additional laboratories for microscopy, camp-based sputum smear sites and GeneXpert were developed at strategic health complexes for upazila (UHCs) and Sadar Hospital, where the NSP maintains the supply of laboratory consumables and drugs.39

Patients usually contract TB when an infected person coughs, sneezes, talks, etc. and the air droplets containing the bacteria infiltrate the respiratory system and eventually almost all parts of the body in latent and active disease.31 The emergence of drug-resistant forms can develop without proper treatment and diagnosis, leading to severe symptomatology and an increased burden on this vulnerable population.33

With regard to water borne diseases, lack of hygiene, water, and sanitation under refugee conditions are directly linked to the refugees' poor health outcomes.33 Water shortages and adequate sanitation have also led to disease outbreaks such as diphtheria, cholera, hepatitis E, and diarrheal diseases.31 Diphtheria had affected over 3,500 people as of 2018.36 Approximately 63,750 acute watery diarrhea cases were diagnosed at primary care centers in Cox's Bazar from August to December 2017.36 A September 2017 cholera risk evaluation discovered a high danger of a pending epidemic.36 The main risk variables are population density, access to secure water, sanitation and hygiene (WASH), topography of soil and insufficient planning of sites, as well as the rainy season and possible landslides and floods.36 The worst-case scenario predicts 35,000 instances of cholera according to the Preparedness and Response Plan of 2017.36 The environmental landscape touched on earlier speaks to the susceptibility of water-borne diseases emerging in these camps.

Vector-borne infectious diseases are a major concern in Bangladesh, where Plasmodium falciparum causes approximately 90% of malaria. Neglected tropical conditions (NTDs) are known to cover a wide range of infections affecting most of the poorest and vulnerable individuals, which requires a greater effort from researchers and future studies.34 These include lymphatic filariasis, trachoma, helminths, leprosy, guinea worms and visceral leishmaniasis in Bangladesh.34

## Methodology

This methodology includes the review of secondary data collected from peer-reviewed journal articles, books, international, government, and non-government organization reports, as well as articles published in electronic news media. For this essay, a literature search was conducted, after which the reference lists gathered were audited and their full-texts were reviewed. Inclusion criteria was based on a mention of “infectious” or “Rohingya” through a MeSH (medical subject headings)-based database search.

# Infectious Diseases Overview

## Sexually Transmitted Infections

The prevalence of gender-based violence in and near camps has resulted in unsafe sexual practices and increased HIV prevalence among refugees. Overall, STIs remain a major concern, as nearly 4,000 cases of HIV infection are currently known in the Rohingya population, with evidence that many more remain undiagnosed. 26

Currently there is no standing HIV testing policy for Rohingya refugees or structured HIV prevention program in place for this population. It is estimated that around 5,000 – 10,000 men who have sex with men (MSM) live in Rohingya camps. 26 They are technically covered by the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) but only an estimated 35% of those will be tested for HIV. Fifty percent of MSM are married to female partners and no interventions or testing programs are in place for their spouses due to the stigmatization of HIV, possibly caused by cultural issues.26

People who inject drugs (PWIDs) and men who have sex with men (MSM), have prevalence at 5% and 1%, respectively. 26 Currently the National AIDS/STD Program (NASP) offers voluntary counselling and testing through 12 drop-in-centers while NGO and community-based organizations offer HIV testing to Rohingya populations in Bangladesh with the support from GFATM.26

With regards to HIV, treatment in Bangladesh has been successful but still requires solutions to improve gaps in coverage. User-friendly services should be offered to increase testing while sustained funding is needed for NGOs to maintain their present success. Interventions are needed in terms of testing/diagnosis, treatment, its monitoring and patient follow-up as well as healthcare training. HIV couples counselling and testing should be offered to all patients with TB, STI attendees and spouses of HIV-infected patients after initial counselling.

HIV viral load for treatment monitoring should also be made available and implemented with the necessary resources as well as sustainable linkage and follow-up models. Currently only 3,900 of 12,000 people living with HIV are aware of their status, with only 1,800 people receiving proper antiretrovirals.5 Isoniazid preventive therapy is not implemented for co-infections. Commonly accepted antiretroviral regimens (ARVs) Tenofovir, emtricitabine and efavirenz (TDF/FTC/EFV) have been used as first-line treatment since 2012.26 Zidovudine, lamivudine and nevirapine (ZDV/3TC/NVP) were used previously and Rohingya patients are continuing on this regimen. Ritonavir-boosted lopinavir (LPV/r) and atazanavir (ATV/r) are available as second-line treatment.26

## Airborne Infectious Diseases

The Early Warning, Alert and Response System (EWARS) is a web-based system and mobile application for outbreak detection and response which investigated outbreaks of measles among >700,000 Rohingya refugees.6 Measles, a childhood killer disease which can be particularly dangerous among unimmunized and malnourished children, is one of the major health risks among the over 611,000 people who have crossed over to Bangladesh from Myanmar since late August and are now living in cramped and unsanitary conditions in Cox’s Bazar district.7 Approximately 625,000 Rohingya arrived in Bangladesh from Myanmar in the second half of 2017. They settled in Cox’s Bazar where a diphtheria outbreak generated 440 reported cases in November 2017 and has continued to rise since. 9

Between September 6th, 2017 and November 18, 2017, a total of 1,270 suspected cases of measles including two related deaths were reported from Forcibly Displaced Myanmar National (FDMN) settlements in Cox’s Bazar, with the under-5 age group representing 82% of total cases.15 Seventy-three percent of these samples collected for laboratory confirmation were positive for measles-specific IgM, triggering a 14-day-long mass measles vaccination campaign in Cox’s Bazar that targeted 122,580 children <15 years old. Vaccination efforts afterward were intensified in children 6 months to 15 years as massive “catch-up” vaccination campaigns were recommended by the WHO. Measles, rubella, and other vaccination attempts have not demonstrated any incidence of adverse events; however, no substantial monitoring system was established to track such data.15

With the risk of measles being high during such health emergencies, Ministry of Health and Family Welfare (MoHFW), with support of WHO, UNICEF and other local partners, was quick to roll out a measles and rubella (MR) vaccination campaign and also gave bivalent oral polio vaccine to 70,000 children. In total, 43 fixed health facility sites, 56 outreach vaccination teams and vaccination teams were set up to administer vaccines, with over 70 trained vaccinators participating.7

A good example of these immunization efforts include the GoB and UN’s partnership, which led to immunizing approximately 360,000 infants and children in Cox’s Bazar with measles and rubella vaccines, specifically targeting entry points. As reported in November, one death and 412 suspected cases of measles have been observed, with only 11 of those reports emanating from the Cox’s Bazar hospital and the majority of them stemming from the Ukhia and Teknaf sub-districts. As expected, a significant portion of these cases are from new arrivals and more than 80% of cases are associated with children under the age of 5. 7

Other than measles, TB is a primary airborne disease affecting Bangladesh and Cox’s Bazar. Tuberculosis is a major public health concern among the population of Rohingya primarily due to the high risk of transmission, rapid progression of the disease, and the burden of poor living conditions.33 Overcrowding, indoor cooking practices, poorly constructed shelters, and poor indoor air quality leads to the proliferation of infectious diseases such as acute respiratory illness, measles, and TB within the camps.14 Chronic communicable diseases such as TB should be of concern, as Myanmar, from where the recent refugees have come, was ranked as one of the top 30 countries for TB in 2016.14 A lack of resources, technical capacity gaps in implementation (e.g., contact tracing), and a lack of directly-observed-therapy (DOT) regimens remain key dilemmas when offering TB management for the refugee population in suboptimal camps or unorganized residential settings.14

Etiological studies are based on either insensitive or non-specific indirect methods such as blood culture, serology and microbiologic assessments of the upper airway. Based on these studies, about one fourth to one half of childhood pneumonia cases in Rohingya camps appear to have a primarily viral etiologic agent, including human respiratory syncytial virus (RSV), parainfluenza and influenza viruses.29

A large number of Rohingya entering Bangladesh are also increasingly susceptible to TB due to a weakened immune state suffering from diseases like hepatitis B, hepatitis C, and polio.33 The prevalence of HIV in and out of the camps is a significant comorbidity of TB, increasing susceptibility of the individual and leading to rapid progression of the disease.31

Forty-three percent of all cases are undiagnosed, according to the WHO, and a survey in 2015 showed that most cases were detected at advanced stages of the disease. In addition, diagnosis and management of TB in children is difficult due to rapid progression in severe forms of TB development.33 According to BRAC, between 2014 - 2015, the proportion of children with TB had risen to 4 %, indicating that although infant TB cases are below the international average, many of the cases go undiagnosed.33

Only two of Bangladesh's eight divisions have used electronic reporting systems to document TB, according to BRAC.33 Moreover, hospitals and facilities in the camps are not required to mandatorily report TB. Monitoring of TB testing, diagnostics, and treatment is also increasingly difficult due to loss of follow-up because of frequent displacement of the Rohingya population.33 Tuberculosis testing is performed only in the case of MDR-TB, extra pulmonary TB, and treatment failure and for contacts of TB patients. Isoniazid preventive therapy is not implemented; however, Genexpert testing is available. 26

A broader subcategory of airborne infections is known as Acute Respiratory Infections (ARIs). These may be classified into upper (AURI) and lower (ALRI) acute respiratory infections, depending on the main organs affected (nose, sinuses, middle ear, larynx and pharynx versus trachea, bronchi and lungs). Acute Upper Respiratory Infections are generally mild in nature and most often caused by viruses, sometimes with a bacterial component as in some cases of sinusitis and otitis media. The overwhelming majority of ARI deaths and severe illness episodes are due to ALRIs, consisting mainly of pneumonia.29 The rain, and potential associated flooding in Rohingya camps, are likely responsible for the increased risk of transmission seen with respiratory viruses and bacteria, particularly when access to health care is delayed.29

## Waterborne Diseases

Waterborne diseases affecting the Rohingya camps include diphtheria, cholera, hepatitis, and diarrheal diseases. Hepatitis E virus (HEV) is known to cause significant disease in endemic countries and is the leading cause of enterically transmitted viral hepatitis illness throughout the world.26 Studies suggest that HEV causes 10%–95% of admitted cases of hepatitis across Bangladesh.26 Children under 15 years of age demonstrate an unusual low rate of seroconversion while the high mortality rate of 20% in pregnant women is also lacking in biochemical rationale.26 Little data is available on pathogenesis and protection after infection.26

Between 2015 and 2017, a study calculated HEV infection rates by following a randomly selected cohort of 1,134 age-representative subjects in endemic southern rural Bangladesh. Two follow-up time points were set based on rainy monsoon seasons as a potential factor.26 During the first 12 month period, incidence was 60.3 per 1,000 person-years, with 50 years being the peak and childhood rates among the lowest.26 From >12 to 18 months (during the monsoon season), it was 72.4 per 1,000 person-years, with similar demographic distribution and few of the subjects reporting symptoms indicative of hepatitis-like illness. Anti-HEV antibody incidence demonstrated no significant associations with demographic or socioeconomic factors.26 Hepatitis E infection has not yet been reported in the Rohingya camps but acute jaundice syndrome and its presence in settlements coupled with the lack of a reliable food source is a potentially emergent situation. 26

With minimal baseline health information of the Rohingya refugees, there have been several attempts to diagnose infectious diseases among this population with stagnant water supplies and a lack of healthcare. Over 90% of the water tested in the camps was contaminated with Escherichia coli according to the WHO.5 Acute watery diarrhea (AWD) was found to account for 7–9% of morbidity in the refugee camps, with prevalence around 22%.5 Water-borne disease outbreaks in the camps have included cholera, bloody diarrhea, typhoid, and hepatitis A. In camps with predominantly young women, hepatitis E infection is a major concern as the death rate from hepatitis E infection in pregnant women can increase to 20–25% if they are in the third trimester.18

Poor sanitation, flash flooding, and overcrowding may facilitate transmission of the disease but because cases often present as a nonspecific febrile illness and because no reliable, rapid, and readily available diagnostic test (serum polymerase chain reaction or blood culture) exists, many cases have gone undiagnosed.

Data on the epidemiology of leptospirosis in Rohingya camps are limited. 28 However, a study assessing etiologies of fever in rural and semi-urban areas of Bandarban district, an area approximately 100 kilometers from Cox’s Bazar, where Rohingya camps have set up shop, showed high proportions (44%) of seropositivity for leptospirosis in cases misdiagnosed as malaria. 28

# Literature Review

## Infectious Disease Obstacles

The obstacles relevant to the treatment and prevention of airborne disease such as measles, diphtheria, and tuberculosis present a range of obstacles separate from the issues of STIs and water-borne infections. Similar to waterborne infections, airborne diseases necessitate the proliferation of space as a barrier to the spreading of contagions. Often waterborne and airborne infections are caused by the issue of overcrowded areas with overused water supplies and forced close contact making the spread of respiratory infections predominant. HIV, other STIs, and vector borne diseases such as leptospirosis and malaria have less treatment obstacles than other diseases but are still lacking in appropriate monitoring for future incidence.

### Airborne Diseases

Current and future interventions for TB and other airborne diseases on a macro level include the following policies, for which there has been insufficient political support in Bangladesh: Meeting the United Nations diagnosis and treatment targets for drug sensitive TB, multi-drug resistant TB, children with TB, as well as providing funding for catastrophic health expenditures, ART access for those co-infected with HIV, tobacco taxation, and air pollution.41 Issues of air pollution have become severe as many in the area smoke cigarettes and fires are a common site. These issues are not specific to the Rohingya, but because of the overcrowding, many are forced to breathe air that has been subject to pollution, with few government regulations in place to curb it.

Studies on measles, rubella, and diphtheria have provided a clearer evaluation of disease prevalence in the Rohingya community as compared to other types of diseases. Diphtheria is a widespread severe infectious disease that has the potential for epidemics and depends on three measures for control; prevention of disease by ensuring high population immunization rates; secondary prevention of spread by the rapid investigation of close contacts to ensure their treatment; and tertiary prevention of complications and deaths by early diagnosis and management.15 The Early Warning, Alert and Response System was able to generate a reporting form, contact tracing form, treatment center bed counts, and diphtheria antitoxin use form during daily monitoring of a diphtheria outbreak. Pre-EWARS forms were usually inconsistent, but with the real-time records system of EWARS, names, data, and assessments of outcomes were more accurate and enabled a transfer from paper record systems. 6

However, a key limitation of the application was the lack of availability of mobile networks in areas within the settlements, making it difficult to update monitoring information for diphtheria. Offline EWARS retains functionality but does not enable updates to be made without network access. A fully offline version of the EWARS application with the capability for installation and use on computers without any Internet connection must be set up with a centralized server allowing for comprehensive disease monitoring updates.

### Sexually Transmitted Infections

The spectrum of STIs affects the lifespan and quality of living among the infected individuals and their families. More importantly, they serve as potential sources of infections within their intimate partners and children.5 The economic burden of STIs is enormous, and it is becoming more severe in this time of statelessness.5 To prevent the above-mentioned crises, extensive behavioral change education programs should be launched to make Rohingya population aware about the STIs and associated preventive measures, such as provision of social protection to vulnerable women and children, promotion of barrier methods of contraception among sexually active women, and strengthening of legal measures against drug abuse and forced prostitution in Cox's Bazar district.5

The situation demands attention to sexually transmitted infections (STIs) for several reasons. STIs are highly prevalent among the background population of Myanmar.5 Gender-based violence is frequently reported by Rohingya girls and women, which increases the risk of STIs.5 A lack of basic living facilities during complex humanitarian crises makes girls and women vulnerable to exploitation and exposure to STIs, which is evident by recent reports of increased prostitution among the Rohingya population.5 The prevalence of HIV is 1.1% among the injection drug users in Bangladesh, which is much higher than among the commercial sex workers.5 As Cox's Bazar is well known for drug-trafficking, both the general and refugee population are at higher risk of HIV and other STIs.5

### Waterborne Diseases

Water-borne diseases in particular are a direct result of the current infrastructure of the Rohingya camps which are densely populated and extremely vulnerable to weather conditions, rain, and fire, with only one latrine per thirty seven people.33 This has led to open defecation causing cross-contamination of water streams used for drinking and bathing.33 Crowded conditions, lack of sludge management facilities, low electrification rates, and lack of an air quality system correlate directly with increased morbidity and stress and need to be evaluated when addressing health care infrastructure.31

The high density population, lack of awareness of personal hygiene, inadequate microbiological processing of food and pharmaceuticals, defective water distribution systems saturated with sewage pipelines and the ineffectiveness of antimicrobial agents were known to account for the onset of these water-borne diseases while the outcomes of treatment are complicated by hospital-acquired infections and drug-resistant pathogens.34 The Centers for Disease Control (CDC) in Bangladesh has been working with the International Center for Diarrheal Disease Research in Bangladesh (ICDDRB) to identify etiological agents and accurate remedies.34

As of February 2018, the UNHCR has reported the presence of 19,585 total latrines in the camps, with 12% of the latrines being full and 35 persons per functioning latrine. 15% of the latrines are closer than 10 meters to a hand pump, resulting in water contamination, verified by water samples, over 42% of which were contaminated with Escherichia coli.36

As of June 21st, 2018, two-thirds of Rohingya refugees have access to safe water and functional latrines that fulfill the norms agreed upon in Cox's Bazar by the Inter Sector Coordination Group (ISCG).37 Community Partners International (CPI) works with Society for People's Action in Change and Equity (SPACE) as a local partner to close the gap and guarantee that all refugees have access to these fundamental requirements.37

CPI and SPACE focus the original water, sanitation and hygiene (WASH) operations at Kutupalong Camp 17— Balukhali Expansion Sites in Cox's Bazar.37 CPI and SPACE performed a feasibility study and evaluation of requirements as a first phase.37 The results have been used to prioritize WASH facilities services and places. Building operations started in April 2018.37

Since then, with the assistance of CPI, SPACE has built eight profound tube wells to provide nearby homes with access to secure water. These profound tube wells fulfill minimum ISCG standards-depth of 280 meters or more and are located at least 30 meters uphill and/or away from latrines.37 Each of these tube wells can provide up to 500 individuals per day with an appropriate supply of safe water.37

The building of three latrines was also finished by SPACE, with two under construction and another three scheduled for building. The latrines fulfill ISCG norms, are at least 5 feet deep and have a concrete ring of 30 inches or more in diameter and are located at least 30 meters away from groundwater sources and downhill.37

Each latrine unit offers a distinct enclosed cubicle for men and women with a door lock and a soap-equipped hand-washing station. Building women-friendly hygiene equipment is another concern.37 SPACE has constructed three attached women's and girls' bathing stations, including menstrual hygiene management equipment, with two under development and two additional development scheduled.37

These stations provide privacy and specific equipment for females and girls to help with their requirements for hygiene. Community-based laborers recruited to work on these projects find it difficult to maneuver dirt roads, and can quickly turn to deep mud when it rains.37 Many cannot support heavy vehicles needed to build tube wells, and sites are often some way from the roads and located in hilly terrain.37

SPACE is also working with communities in Rohingya camps to promote and teach them to keep excellent practices in water management, sanitation and hygiene. This involves monthly meetings with members of the society to discuss problems and concerns, as well as practical sessions where they learn about excellent hygiene and sanitation procedures such as frequent soap washing. SPACE also organizes private meetings with adolescent women to provide menstrual and personal hygiene management information and solve their questions or issues.37

In vitro microbiological studies in Bangladesh involving the use of traditional differential, selective culture media, morphology tests, biochemical identification confirmatory tests, antibiogram tests as well as ESBL tests and carbapenemase production have found that a large number of bacterial pathogens are proliferating.34 Specifically, enteric diseases (e.g. cholera, diarrhea and dysentery) have occurred here as a result of food and water contaminated by microbiology and non-hygiene.34

Poor water and sanitation conditions resulting in faulty hygiene has also been a point of emphasis as 92,090 refugees were given 3.2 million water purification tablets and a total of 18,418 hygiene kits.7 A randomized survey of 802 households conducted in March 2018 took place in Cox’s Bazar and included statistics on water and healthcare. It was found that the majority of households in both the Rohingya community (88.6%) and host communities (79.3%) used tube wells as a sourcing method for drinking, cooking, and bathing water while the remaining Rohingya households obtained drinking water from wells (4.9%), rivers (0.5%), and other unspecified sources (5.7%).8 Among those households that did not source water from tube wells, only 35.6% of Rohingya households purified their water. Those who did purify utilized boiling, filtering iodine tablets, or ultraviolet machines to do so.4

It should be noted that it is not practical to solely engage in “handouts.” General education is always required in cases such as this where the population is not accustomed to extra resources and must first be educated on how to maximize these kits and tablets, as well as the significance of water purification. More importantly, there must be consensus and understanding. If the community as individuals can be convinced to actually use these resources and agree to use them in a strategic manner so as to conserve while still maintaining proper health and hygiene,  then handing out kits and tablets will have a sustained effect.

Factors influencing the development of these programs include the congested living conditions and large amounts of safe water required. The Rohingya refugees need nine million liters of safe water daily, and water, sanitation and hygiene (WASH) services are currently only servicing about 30% of the people. This combined with little or no access to working toilets necessitates the use of muddy streams for water supply and excretion purposes.8 Successes and failures of these programs are linked to unforeseen practical obstacles.

## General Obstacles

Obstacles preventing treatment and the implementation of preventative measures for these infectious diseases have been researched by several groups seeking to analyze the social and legal stigmas and ramifications behind inequities in Bangladesh’s healthcare infrastructure, vaccination implementation and supplies and healthcare in general, as well as the requirement for the healthcare workforce to maintain adequate gender diversity when handling issues of STIs related to sex based gender violence.

### Health Workforce

According to Bangladesh national law, the public sector is mandated not only to establish policies and regulations, but also to provide comprehensive health services to manage health staff's financing and employment.35 Through various acts and legislation, the government regulates the functions of public, private and NGO providers.35 By employing doctors, dentists, nurses, pharmacists and a huge number of auxiliary health workers, it provides services through its nationwide infrastructure.35

Public sector care includes curative, preventive, promotional and rehabilitative services, while the private sector provides curative and non-profit services to a limited extent at the national and sub-national level, mostly for profit. On the other hand, NGOs mainly provide preventive and basic care. Although the Ministry is the leading institution-based health care delivery agency at the national and rural levels, under the Ministry of Local Government, Rural Development and Cooperatives, primary health care in urban areas is the responsibility of local government institutions (municipalities and municipal corporations). However, the infrastructure of the private sector is limited to medical schools, hospitals, clinics of different natures and qualities, pharmacies, and untrained healers as private sector service coverage is wider than public sector coverage. 35

This Bangladesh-wide policy has only seldom applied to Cox’s Bazar. The Rohingya camps have sufficiently staffed and stocked clinics providing free health care; however, an evaluation mission found a delay that caused a shortage of medication and medical supplies due to lack of ratification of a sub-agreement between partners of the UNHCR.**10** This is highlighted by reluctance of doctors and female health workers to join the effort as a result of not having received incentive payments.**10**

The Ministry of Health visits the camps weekly and staffs them with a doctor, one medical assistant, eight nurses, and up to 16 community health workers. Written and practical training includes topics such as HIV/AIDS, personal hygiene, immunization and nutrition.11 Personnel-wise, the camps do not have sufficient help.11 Doctors see on average 200 patients a day, referrals average between 150-200 patients per month with the average bed occupancy rate of 92% and average length of stay of four days. 11 The availability of these resources tend to be variable based on waves of funding that stem from external actors that play a hand in Bangladesh’s healthcare system (i.e.: NGOs, donors, private sector) .35

In particular, female staff are discriminated against during the hiring process, resulting in a lack of female applicants, and eventually causing significant difficulty in addressing health-related needs of refugee women. According to the UNHCR’s report on gaps in Rohingya refugee coverage, male staff often harass female refugees and fellow female employees.11 The doctors on staff are also over-prescribing painkillers and cannot handle the diseases seen regularly, such as respiratory problems, skin infections, diarrhea, dysentery and malaria.11 They also reflect a need to focus more health activities on prevention. Dental care has been lacking, which organizations attempted to fix with an organized team of dentists and discussed adding ophthalmologists.11

### Vaccination

Cholera, pneumonia, rubella, and polio vaccination attempts have also begun as a response to reports of these diseases in children. 7 The diseases included were ARI, measles/rubella, suspected meningitis, suspected hemorrhagic fever, neonatal tetanus, adult tetanus, malaria, and unexplained fever.7

With the support of UNICEF and the WHO, the Ministry of Health and Family Welfare of Bangladesh launched a measles and rubella vaccination campaign that has yet to achieve the >95% coverage required for herd immunity, the vaccination campaign must be strengthened and embellished upon by the local community.14

Another massive vaccination drive is being set up for 900,000 doses of oral cholera vaccine (OCV) to these populations as two phases. Phase 1 includes approximately 700,000 people aged one year and above. Phase 2 contains a dose of OCV to almost 200,000 children under 5. 7

All children should receive nine doses of injectable vaccines and four doses of oral vaccines by the age of two according to the recommended schedule; however, 61.7% of Rohingya aged two and younger had received no doses of injectable vaccines in Myanmar, and only 2.4% had received five or more doses in Myanmar.4 Fifty-seven percent of children aged two and younger had received no doses oral vaccine doses in Myanmar.4 Inability of the governments to synchronize efforts while handling their own pre-existing lack of resources as well as a lack of response to humanitarian efforts has led to the outbreak of these infectious diseases.

## Social Issues

The Rohingya society and its attitude towards women create barriers to addressing the STIs present in the community. The Government of Bangladesh’s refusal to grant rights to the Rohingya prevent them from joining the workforce and receiving fair treatment.32 Women, especially, are not allowed to seek employment beyond the camp, though some of them have developed several stalls on roadside, mostly throughout the camps.32 Voluntarily and involuntarily, many young Rohingya females resorted to working in the sex trade for income, which affect their mental well-being and the level of STIs in the community.32 The conservative Muslim faith of the Rohingya limit women’s roles in the workplace, though 36% of households are headed by females.32

These attitudes towards women’s roles act as a barrier to vaccinations as well. A research project conducted an assessment of nine focus group discussions and 15 key informant interviews.23 This included mothers and fathers with under five-year-old children, community volunteers, majhis (camp leaders), Islamic religious leaders, traditional and spiritual healers, and teachers.22 Varying beliefs about vaccination causing people to become Christian, concerns about multiple vaccines being received daily, concerns related to side effects, and, lack of sensitivity to cultural norms at the vaccination sites were deemed hurdles.21

The majority of these vaccination barriers can be categorized as one of the following by WHO’s Strategic Advisory Group of Experts on Immunization; contextual influences, individual and group influences, and vaccine and vaccination-specific issues.24 Contextual influences that may have contributed to vaccine hesitancy among Rohingya included initial resistance by religious leaders to accept any vaccines and gender norms discouraging women and adolescent girls from attending vaccination campaigns.24

Furthermore, negative experiences during previous vaccination campaigns, knowledge gaps about vaccination benefits, and suspicions about the intentions of health and humanitarian workers to convert Rohingya from Islam to Christianity were also factors, as well as fear of not knowing the substances contained in any of the vaccines, receiving multiple vaccines on the same day and how that increases adverse events, and delivery of vaccines in non-private spaces that had no religious or privacy consideration for women and girls.13

# Solutions

## Infectious Diseases

Solutions to solving the infectious disease crisis are both specific to the water-borne, airborne, sexually transmitted, and vector-borne diseases themselves and a referendum on general legislative issues preventing the Rohingya from obtaining enough space and clean water. These include potential for the repatriation of the Rohingya or the granting of more rights to them that would include clean water, TB treatment, and assistance from local female health workers for STIs as well as increased monitoring of sex based gender violence.

### Airborne Diseases

The WHO End TB Strategy aims to reduce TB-related deaths globally by 95% and to reduce incidence by 90% by 2035 compared to 2015 rates.33 The strategy's first pillar is aimed at expanding TB management services and early diagnosis services.33 This pillar includes additional services of outreach to underserved and vulnerable populations in Bangladesh. The End TB Strategy aims to uphold universal human rights by implementing both preventive measures and TB in Rohingya medical care needed to decrease TB morbidity and mortality.33 The goal of no family being affected by the devastating costs of TB lies within the second pillar.33 This can only happen by minimizing direct medical costs, including consultations, hospitalizations, testing, and medication. It is also necessary to take into account non-medical costs such as transportation.33

Measures to improve access to safe water and sanitation facilities and hygiene promotion, with an emphasis on handwashing, combined with humanitarian action focused on strengthening the World Health Organization’s Expanded Program on Immunization for all Rohingya refugees would help reduce the incidence of ARI and diarrheal disease.12 In addition, promotion of established health care facilities by community outreach programs can help to ensure safe and appropriate treatment.12 Historically, handwashing and other hygienic practices are not common in these parts of the world given the already limited water and soap and clean linens. As these resources need to be conserved, often when they are available people are not accustomed to using them for anything beyond drinking or cooking. Similar to the issue of medication adherence, the principles of resource allocation are complicated by the refugee’s inability to consistently utilize resources they need for survival.

One viable solution for the transmission of airborne diseases could be the simple repurposing of surgical facemasks provided to the health workers. According to the WHO, their Operation Support and Logistics (OSL) unit has received over 100,000 surgical face masks intended for health workers. Evidence shows that utilizing these masks for the developed world may prove effective at guarding against general pollution and airborne disease.42

Incoming Rohingya who report symptoms of respiratory disease and current refugees in camps who are situated in the most congested regions and have reported comparable symptoms should be supplied with facial masks at secure points. As with the allocation of any funds, medical education should be given alongside the facemasks to tackle why it operates and how to wear it properly.

### Waterborne Diseases

A mortality and morbidity weekly bulletin in Bangladesh observed high levels of fecal contamination surfacing in local household, suggesting this as a cause of water borne diseases in the area such as cholera, bloody diarrhea, typhoid and hepatitis E. E coli is usually utilized as a gateway indicator that suggests Cryptosporidium, Giardia, Shigella, and norovirus may be prevalent as well.15

Tube-wells in Cox’s Bazar district need chlorination as the WHO water quality monitoring revealed that most of the drinking-water at household level is contaminated. Using deep tube wells over shallow tube wells is the preferred option as it is least susceptible to microbiological contamination. Already contaminated water sources and associated pit latrines should be decommissioned or relocated.15

Conducting a hygiene awareness campaign would act as a platform for proper demonstration of how to treat water, identify safe water resources, and prevent a perpetuation of the fecal-oral route of disease transmission.16

A chlorination plan for households has been developed that is based on data showing that a higher level of water contamination at household compared to source level indicates poor hygiene practices. Household chlorination should therefore work in tandem with hygiene promotion until positive outcomes in both categories are seen. Water purification tablets should provide 0.5 mg/l of residual chlorine after 30 minutes time.1

Based on serologic testing, it was found that leptospirosis accounted for a sizeable portion of outpatient fever episodes. These results suggest that health care providers in Bangladesh should consider leptospirosis as a cause of acute febrile illness in outpatients and initiate appropriate antibiotic therapy when indicated.28

It may be possible to develop a leptospirosis probability scoring system to guide diagnostic testing or empiric therapy in Bangladesh. The concentration of leptospirosis cases in the early, dry part of the year differs from patterns observed elsewhere, but may be attributable to the year-round persistence of wet conditions in low-lying areas in Dhaka and stagnation of standing water during the dry season. Once secure shelter can be procured for the Rohingya and more polymerase chain reaction machines are available to local labs, better treatment (with penicillin) and diagnosis can start to take effect.28

### Sexually Transmitted Infections

To reduce new HIV infections, scaling up of both prevention and ART coverage among PLHIV by using strategic approaches must be done. Addressing HIV-TB co-infection with a focus on migrants while implementing integrated interventions for clients of sex workers is crucial to gather data on risk populations. A cost-effectiveness analysis of the frequency of HIV testing in migrants should also be carried out.27

As not all patients are initiated on ART as recommended, the current WHO Treatment Guidelines are not implemented locally. However, due to the small number of people diagnosed, the implementation of WHO guidelines is expected to be cost-effective for the country in the long run. HIV viral load for treatment monitoring should also be made available and implemented with the necessary resources. Sustainable linkage and follow-up models are needed to prevent onward HIV transmission and the emergence of a drug-resistant virus.

Resources for diagnosing opportunistic infections in all hospitals are inadequate and should be allocated to prevent morbidity and mortality in a sustainable manner. In this population, care for non-communicable diseases (NCD) should be strengthened. In addition, in order to keep up with medical developments, doctors in charge of HIV patients should require ongoing training programs. On a personal note, my family friend currently attending medical school in Bangladesh has constantly remarked on the insufficient nature of the curriculum there. According to literature, Bangladeshi medical school curricula suffer from a lack of clinical training, ineffective instructional methods, the absence of community-based training, little to no resources for staff and teachers, and no national curriculum body.42 This leaves Bangladeshi patients poorly equipped with doctors who are inadequately trained to handle the HIV and infectious diseases rampant throughout the country.

Researchers believe that investing in prevention will yield significant savings on treatment costs and make the long-term HIV program affordable. If ART is scaled up without significant population coverage expanding and optimizing, new infections will continue to rise, treatment costs will spiral upward, and the program will become financially unsustainable. An explanation for this could revolve around issues of adherence and shady drug pricing. A cost effectiveness analysis (CEA) would need to be conducted to determine if awareness is more impactful than distribution. (Cost effectiveness analyses compare interventions as ratios of the cost of the intervention to the outcomes produced by the intervention). In this case, the intervention would be a pro-adherence awareness campaign, its expenditure and life-years saved, compared to an increase in drug distribution efforts and the associated cost and outcomes from that project. Long held myths that simply handing out more drugs in an intermittent basis would provide sustainable healthcare for these populations need to be tested and published in future literature.

There is also a need for separate consultation between NASP and the International Migration Organization to develop an effective and robust migrant HIV policy. All migrants, which amount to approximately 5 million people per year, should be offered educational programs and systematic voluntary counseling and testing. A cost-effectiveness analysis should also be performed on the frequency of HIV testing in migrants.

## General Health

Vaccination strategy based on the advice of community leaders can both reduce stigma and religious concerns of this practice while pro-Rohingya legislation sponsored by the UNHCR and the GoB and EWARS-level tracking of disease statuses can create synergistic effects towards overcoming disease obstacles. Vaccination schedules need to be enforced by the UNHCR and the GoB as a collaborative effort and tracking of vaccination attempts and outcomes together with existing data on disease prevalence will prevent future epidemics. Working with community and religious leaders can help with vaccination awareness and with political machinations behind securing legislation to provide the Rohingya with rights. Without a path towards repatriation or sustainable living in the camps, more exploratory programs must be launched to handle the influx and the current healthcare status as well as future influxes of refugees to the camps and beyond Bangladesh.

### Legislative Approaches

Legislative efforts, while problematic, have been underscored by growing anti-Rohingyan sentiment from Bangladeshi authorities and the Rohingyan’ s own unwillingness to return to Myanmar.10 In the case of repatriation, the Rohingya could vacate their substandard living conditions, temporarily reducing the overcrowding leading to cleaner water supplies and less chance of contagion by airborne pathogens.

Authorities favor repatriation over integration, creating a situation rife with conflict as the UNHCR must help the Rohingya without a concrete plan for repatriation. These policies are a response to Rohingya responding negatively to “premature or coercive repatriation”, which has taken place in the past.10 The current prospects for the voluntary repatriation, local integration or resettlement of the refugees give very little indication of any improvement in the situation in Northern Rakhine State, and the Rohingya receive virtually no support from the Burmese opposition, led by Nobel Prize laureate Aung San SuuKyi.10

It should be noted that Bangladesh is not party to the 1951 Refugee Convention or its 1967 Protocol, nor is it party to the 1954 and 1961 Statelessness Conventions.7 It is bound to human rights conventions such as the Convention on the Rights of Migrant Workers and Their Families.7 Ideally, the jus soli provisions of the 1951 Citizenship Act should apply, but the Government does not allow dual citizenship.7 This leaves the issue to the UNHCR, who can operate in Bangladesh through a 1993 Memorandum of Understanding that argues for repatriation.7 This coupled with the lack of support from Myanmar has severely limited the UNHCR’s operations and continues to do so at this point in time.

Past resettlement solutions (as an alternative to repatriation) have been sparse, specifically in the 2006 – 2008 time period, with only half of the refugee resettlement cases being accepted by the UNHCR. Refugees responded with shock and confusion as the program was closed. Authorities stopped individual resettlement cases in 2010. Any direct alternative to voluntary repatriation would be a policy towards resettlement, a point currently in contention between The Ministry of Foreign Affairs and the UNHCR. However, resettlement would allow for the burden to be distributed more evenly and would only apply to formalized refugees.10

To mobilize support for the UNHCR’s efforts in Bangladesh, action should be taken to reestablish the now defunct Eminent Persons’ Group on Refugee and Migratory Movements in South Asia (EPG), which utilized prominent former ministers, jurists, diplomats, academics and other opinion-makers to promote sustainable solutions for refugees in the region, and in 2004 issued a ‘model national refugee law’.10 In addition, the Dhaka Steering Group (DSG), an informal grouping of a dozen ambassadors and UN agencies, has credence with the international community and should include China and India, as well South-East Asian states receiving Rohingya, such as Malaysia and Indonesia, to help ameliorate Bangladeshi concerns.10

To ascertain how many people would be willing to relocate, it would be advisable for the government, IOM and UNHCR to conduct a survey on the needs and profile of those Rohingya living in local villages and makeshift locations and to examine their interaction with both the local population and camp-based refugees. However, this might not be an easy task. The mission was warned that the Rohingya are unlikely to want to participate in any identification or registration exercise unless it promises to provide them with a status and entitlements. Otherwise they may prefer to continue to live this way.10

Recommended adjustments for improving the situation of working Rohingya include the need for international law and UN resolutions to grant the right to work to the Rohingya, outreach programs by humanitarian workers to educate workers and train them on necessary skills for raising livestock and construction, and an ending of the polygamous relationships that have plagued females looking to work through a reinforcement of Bangladeshi law, which outlaws polygamy. Formal documentation for Rohingya, with the inclusion of family books as a baseline for identification could help provide an expansion of labor rights to the Rohingya and enable them to join the poultry farming and construction industries nearby in Bangladesh.

To those subpopulations that cannot benefit from these traditional legislative solutions, a plan must be constructed to allow for self-reliance. Refugees should be provided all macro and microeconomic opportunities of the local markets to leave the camps and enjoy the right to work in fishing and construction industries nearby. The Rohingya are not able to access credit at local institutions and have no right to work yet are a vital source of potential labor.10 Recent UNHCR reports are dedicated to policy changes that will allow for economic opportunity and eliminate any dependency syndrome in these subpopulations.10 The most crucial component of GoB-UNHCR efforts must be to maintain food registries and utilize ration cards for refugees. Gender specialists are required to enforce safety laws within camps and secure authorized movement outside the camps for all refugees. Physical passes for students and formalized refugees should be addressed by data harmonization to avoid errors and abuse.11 Speaking from the perspective of a student, this would be a good legislative bargain because granting passes for everyone would be met with political friction. The quid pro quo nature of this arrangement limits opportunities for those who would potentially cause trouble to the system and rewards those who observe the principles of data harmonization and abuse prevention.

### Social Approaches

Culturally sanctioned norms and practices about gender roles and structural gender inequality within a traditionally patriarchal society remain a challenge in providing counseling services for gender based violence. Matching genders of humanitarian workers and their clients should be prioritized or workers should discuss with the woman how she feels most comfortable prior to initiating services. Psychosocial service providers should be specifically trained around the risk of reinforcing discriminatory and oppressive structures in formalized services. Interventions addressing social norms show promise in Malaysia, where a manual and poster campaign to raise awareness around intimate partner abuse has been developed specifically for Rohingya community members.31

Most treatment interventions require a coordinated effort from individuals, communities, and policy makers to show effectiveness. First, community leaders need to be engaged at the personal level and establish sustained, ongoing community engagement platforms consisting of these influential leaders, particularly faith-based leaders. Before treatment attempts can reach acceptable levels, several issues must be solved.

Reporting data shows a lack of identification efforts regarding affected age groups that would be prime targets for treatment campaigns. Better documentation of the Rohingya and their families will facilitate this targeting and help the UNHCR and EWARS programs to properly monitor outcomes of past diseases as well as areas of future need.

Second, faith-based messages should be used in tandem with promoting treatment among Rohingya, as leaders can help to identify appropriate passages from the Qu’ran and Hadith to support treatment messages and campaigns in mosques during Friday prayer. Model Mothers organizations and female hafiz can also assist in solving the gender discrimination issue and bringing women’s rights to the forefront of the discussion. Specifically, private areas should be set up for women and adolescent girls by those familiar with Islam and Rohingya customs and dialects. Targeted approaches in future treatment campaigns will highlight these improvements and allow for easier follow-up from caregivers.

Studies evaluating treatment barriers demonstrate potential for bias as quantitative or qualitative results are never sufficient to represent an entire population.13 These studies only review large scale trends and local reports which are susceptible to reporting bias and small sample size errors.13 More data is required, including audiovisual elements to aid in assessing true causes of current Rohingya suffering. Even incomplete interpretations and loss of records are issues that need to be addressed before socioeconomic or sociocultural ones.13

Therefore, an optimal strategy to boost treatment statistics would have to include engaging influential Rohingya leaders in the early stages of planned community treatment events, while utilizing various forms of communication channels to facilitate increased training of caregivers to improve interpersonal interactions with children and communication with caregivers who can help cross cultural hurdles.13

### Epidemiology Tracking

Better characterization of the epidemiology and etiology of ARI and particularly pneumonia in crisis-affected settings is critical to rationalize disease priorities, gauge the potential impact of improved diagnostics and treatment, optimize treatment algorithms, and make the best use of available and new vaccines against Hib, pneumococcus, measles and pertussis while considering risk factors such as overcrowding or acute malnutrition.29

The EWARS program that was successful at monitoring disease prevalence was flawed in its reliance on a centralized online system.6 It is therefore recommended that the lack of availability of mobile networks in areas within the settlements be addressed first. Offline EWARS retains functionality but does not enable updates to be made without network access.6 A fully offline version of the EWARS application with the capability for installation and use on computers without any Internet connection must be set up with a centralized server allowing for comprehensive disease monitoring updates.6

# Summary

This essay aimed to elucidate the current public health challenges within the refugee population in Bangladesh. The findings suggest that there is a need for increased public health education of the refugee population to prevent the acquisition of infectious diseases and prompt treatment once infection occurs. Across STIs, airborne diseases, and vector borne diseases, there is a lack of education in the community regarding what should be done in acute cases of these diseases. Furthermore, the healthcare system within Bangladesh presently has significant gaps in the physician and nurse workforce, community and hospital facilities, and community approaches to infectious disease prevention and control that must be rectified.  Due to the fragmentation of the health care system, the situation with the Rohingya is amplified and great public health threats remain at large. For most infections, the limited space in Rohingya camps contribute to the spread of infectious diseases. For example, in the case of TB, inhaling air droplets; for waterborne diseases, drinking contaminated water; and for malaria, proliferation of mosquitoes.

Unfortunately, current efforts to control sexually transmitted diseases including HIV is exacerbated by gender-based violence and exploitation.  There needs to be increased efforts by community-based organizations to work with the local groups to increase STI and HIV testing, increase contraception usage, as well as promoting advocacy for increased resources and services. To control further transmission and outbreaks, extensive behavioral change education programs should be launched to increase awareness of STIs.  It is also critical to increase the provision of social protections for vulnerable women and children, and strengthening of legal measures against forced prostitution in Cox's Bazar district.

Structural changes can be implemented within local communities in Bangladesh to improve the quality of the water supply. Efforts need to be made to secure clean water and increase sanitation and hygiene. Already poor water hygiene education has led to a higher percentage of organisms detected in the water at refugee homes than at the source of water. Efforts of organizations such as WASH have had some effect by building and labeling tube wells. A more cost effective intervention includes education programs to address proper handwashing, recommended bathing and showering, home water chlorination procedures, building of proper latrines specific to reproductive hygiene issues for women. Due to the topography of soil and the results of the rainy season that include landslides and floods, building tube wells is a less sustainable method of rectifying an unsanitary water supply not only because of the costs to build a single tube well but because water sanitation educational efforts are more likely to impact the community if spearheaded by community and religious leaders.

In the case of airborne infections caused by overcrowding, the congestive nature of the camps can be overcome by large-scale infrastructure-related efforts but also by immediate public health strategies to prevent the spread of infection and co-infections. Facemasks should be provided at safe points to incoming Rohingya who report symptoms of respiratory illness and to existing refugees in the camps who are in the most congested areas and have reported similar symptoms. As with the distribution of any resources, public health education should also be provided to address the rationale and procedures for proper use.

To improve monitoring and tracking of disease states, acquisition of improved mobile networks in areas within the settlements are needed as a solution for consideration. The establishment of a measure or proposal co-signed by the GoB and the UNHCR to allow for the construction of boosted mobile networks anchored by large broadband coverage throughout the camps in Dhaka could be a significant improvement for disease surveillance. There is a need for case-based records to be regularly edited through a fully offline version of the EWARS application, with the capability for installation and use on laptop computers without any Internet connection, before being synchronized with a central server when connection allows. This would provide a functional and simple digital surveillance system that can be easily deployed and rapidly implemented in an emergency setting for timely detection of and response to new outbreaks.

The United Nations (UN), the Bangladesh Government (GoB) and any other supporting NGOs need to develop solutions that can address repatriation and resettlement issues.  Repatriation in the past has resulted in refugees having to return to Bangladesh after suffering from the same violence that caused the migration initially. Resettlement could work in the future if the new camps are located near a community as culturally similar to that of the Rohingya, in the way that the communities surrounding Cox’s Bazar have maintained at least some type of relationship, aided by similarities in language. However, resettlement in the past was only allowed for formalized refugees through the UN. Future resettlement plans should include both formalized and unregistered refugees. In addition, there is a need for advocacy through a general parliamentary referendum to assure that the Rohingya have adequate space and clean water. Additional resources are needed to provide them with improved public health services including access to prevention and treatment for infectious diseases, support services, reduction of stigma, and effort to reduce gender-based violence.

From a policy perspective, it is also important to increase organizational collaboration particularly among international stakeholders, such as the WHO, UNICEF, and GoB.  For example, these organizations worked together for the cholera vaccination campaign which was successful in vaccinating 900,000 children under the age of five in both host communities and new arrivals. Synergistic efforts among international and national agencies and programs have been shown to reach the communities and the demographics that need assistance. If future efforts are characterized by cooperation and increased public health approaches and resources, positive changes in the health and well-being of all official and unofficial members of the country can be achieved.

# Conclusion

The UNHCR has encountered several issues during its attempts to treat and prevent infectious diseases among the Rohingya camps. Emerging obstacles include poor sanitation, limited access to clean water, over-crowding, limited infectious disease surveillance, lack of health care workforce diversity, inadequate training and limited numbers within the healthcare workforce, limited public education regarding infectious disease prevention, and an unstable supply chain for medications and medical supplies. In addition, there are the social issues impacting those living in poverty and without resources which leads to poor health outcomes and may result in behaviors that increase risk for infectious diseases.

There is a tremendous need for local community leaders in collaboration with the UNHCR to advocate for the government to provide funding to increase services and programs to alleviate these issues and improve the public health of the Rohingya in Bangladesh. Based upon the WHO’s Social Determinants of Health, three types of interventions can combat the stresses of social exclusion, unemployment, and lack of social support that lead to negative health outcomes. 43 First, is to increase the quantity and quality of publicly available educational resources, which in the case of Rohingya should be focused on prevention and control of infectious diseases. Secondly, is by creating a system of “health-related cash transfers” to reduce expenses related to healthcare such as, transportation for to clinical sites. Finally, the most significant undertaking is to improve housing conditions through infrastructure improvements. 43 Changes made to the civil infrastructure of the area could improve the viability of a Rohingyan state in Bangladesh and may help to ease political gridlock leading to a stronger healthcare system, improved management of infectious diseases, and public health for the Rohingya and Bengali in Bangladesh.

Appendix Figures

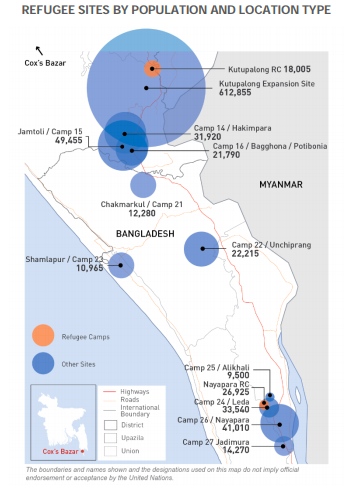


Figure 1. Refugee Sites by Population and Location Type

**Source: Intersector Coordination Group at** [**https://data.humdata.org/event/rohingya-displacement**](https://data.humdata.org/event/rohingya-displacement)

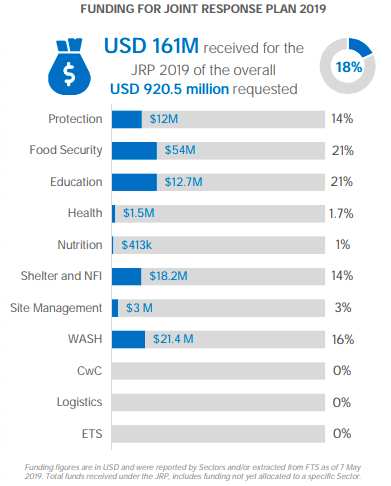


Figure 2. United Nations Joint REsponse Plan Funding Breakdown

**Source: Intersector Coordination Group at** [**https://data.humdata.org/event/rohingya-displacement**](https://data.humdata.org/event/rohingya-displacement)

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