

Article

Climate Risks and Truncated Opportunities: How Do Environmental Challenges Intersect with Economic and Social Disadvantages for Rohingya Adolescents in Bangladesh?

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Abstract: Integration of environmental, economic, and social approaches to development is crucial to achieve the United Nations Sustainable Development Goals. Global evidence reflects that this integration is often imbalanced, with development policies and programs in many low- and middle-income countries placing greater emphasis on economic needs than environmental vulnerabilities. Drawing on qualitative research undertaken in mid-2021, this article explores how limited integration of environmental, economic, and social aspects has affected the development of Rohingya refugee adolescents who were forcibly displaced from Myanmar to the Cox's Bazar district of Bangladesh. Cox's Bazar is one of the most climate-vulnerable areas in Bangladesh and is subject to extreme rainfall, landslides, and flash floods. The article highlights the ways in which Rohingya adolescents are highly vulnerable to both the direct and indirect consequences of these environmental conditions due to poverty, and inadequate housing infrastructure and water, sanitation, and hygiene facilities. It discusses the ways in which these environmental challenges intersect with socioeconomic disadvantage, especially limited education, skills development, and livelihood opportunities for young people, which are in turn compounded by limited voice and agency, and a dearth of security and protection measures. For some Rohingya adolescent girls and boys, the findings suggests that these multi-dimensional vulnerabilities place them at risk of exploitation by traffickers, smugglers, extremist groups, and criminals. The article concludes by highlighting the importance of explicitly integrating environmental aspects into policy and programs that support Rohingya adolescents to develop their full capabilities, and encouraging their meaningful participation in policy dialogues and accountability processes.

Keywords: Rohingya; refugee adolescents; Bangladesh; environmental risks; climate change; Cox's Bazar; adolescent capabilities



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1. Introduction

Bangladesh is extremely vulnerable to climate change and has been rated as the seventh most affected country from extreme weather events globally [1]. Its Cox's Bazar district is home to the largest refugee camp in the world. The addition of around 1 million Rohingya refugees, who fled persecution in their home country of Myanmar, has put tremendous pressure on the region's already fragile local ecosystems [2,3]. Many of the camps in Cox's Bazar are built on steep slopes and huge amounts of forest have been cut to build sheds and provide people living there with firewood [4]. These activities have made the ground unstable and during heavy rainfall, landslides can occur [5,6]. In 2021, 2500 huts were destroyed by floods and landslides after heavy monsoon rainfall hit the camps in Cox's Bazar and at least six people lost their life [7]. There is also a lack of proper hygiene

conditions, people suffer from mental health issues and poor nutrition, and physical/sexual abuse is endemic in the camps [8–10]. To date, however, there has been limited discussion of the intersecting effects of such precarity on the lives of adolescents and youth within these communities.

In an effort to address this research gap, this article explores the interconnected challenges facing Rohingya adolescents in Bangladesh, using primary qualitative research to interrogate both the environmental challenges they face, and how these vulnerabilities are exacerbated by socioeconomic disadvantage. The article starts by outlining Bangladesh's vulnerability to climate change, and the related risks facing Rohingya adolescents in Cox's Bazar. Next, we present the framing of our article by combining theories of climate justice and the capability approach. We then discuss the results, first through examining the environmental risks adolescents face and then situating these risks in their socioeconomic contexts. Finally, we discuss the policy and programming implications of these results, identifying the types of support that are needed to ensure sustainable environmental and socioeconomic futures for young people from the Rohingya refugee community.

2. Context

2.1. Bangladesh and Climate Change

The challenges threatening the Rohingya camps in Cox's Bazar must be viewed in the wider context of Bangladesh, which is on the front line of climate change. It is well recognized that Bangladesh is one of the most vulnerable countries to climate change [11,12]. Bangladesh has a low-lying coastline (most of the land is below 10 m) and is situated on the floodplains of three major river systems: the Ganges, the Brahmaputra, and the Meghna. The country is extremely vulnerable to rising sea levels and heavy rainfall (recurrent during the monsoon season). Flooding, erosion, and landslides are a perpetual risk in Bangladesh, which will most likely worsen over time [11–13]. The rising sea temperature increases the chances of tropical storms in the region and disappearing glaciers could lead to a water shortage downstream [12,14,15].

The impacts of climate change have already been seen in Bangladesh, with more frequent tropical storms in the past decade, and saltwater creeping into the mainland, contaminating drinking water and damaging agriculture [16]. Nearly 12 million people living in the coastal areas are living in poverty and are particularly vulnerable to changes in their livelihood. Especially in the south-west region (including Cox's Bazar), with its fragile mangrove forests, climate change will have a devastating impact [17,18].

Climate change is threatening the livelihoods of Bangladeshi people, especially those engaged in agriculture. Agriculture becomes more difficult due to salinization, algal blooms, low dissolved oxygen, and augmentations of toxins in (seafood) organisms [13]. Especially farmers in marginalized areas are vulnerable; a study in Kurigram shows that farmers already witness the effects of climate change. Due to flooding and erosion, they lose valuable arable land, crops are damaged, and livestock perish. In addition, communities become more prone to water-borne diseases [19]. As a consequence, some farmers switch to different kinds of economic activities or sell their land to rich aquaculture farmers, increasing the inequality in land ownership [20]. In the future, it is estimated that the loss of agricultural production could lead to a decrease of 17% of calorie intake and aggravate inequitable food distribution [21].

Women and girls are especially vulnerable to the effects of climate change. It was estimated that 90% of the victims of Cyclone Gorky in 1991 were women or children [22]. Post-disaster, women often suffer from larger economic losses, increased workload, and are at greater risk of sexual or domestic abuse [23,24]. Children and adolescents are at risk of poverty, and face consequences indirectly, through the impacts of disasters on services and systems central to their wellbeing, such as schools and healthcare facilities [25]. However, there is only limited research on the experiences of children in emergencies in the context of Bangladesh.

2.2. The Rohingya Camp: A Space of Violence, Exclusion, and Climate Risks

When the Rohingya arrived in Bangladesh, many were already traumatized by their experiences of physical and sexual violence, loss of homes, and expulsion from their home country [26]. In the camps in Bangladesh, however, many of these risks remain. Rohingya adolescents live in extremely challenging conditions in makeshift camps. The displaced Rohingya were settled in the camps situated in the hilly site in Cox's Bazar. After the mass influx of Rohingya in 2017, the refugees needed to be settled quickly; hence, the camps were set up as part of the emergency response. The houses are not of a durable structure, and the living conditions inside the shelters are very poor [27]. The temporary makeshift shelters are also at risk from fires, which can have devastating effects [28], and they give only limited protection against the unpredictable Bangladeshi climate. The shelters are not able to withstand extreme temperatures, storms, or heavy rainfall [29]. Housing close to 1 million refugees on an area of around 5800 acres also puts tremendous pressure on water and energy sources. The lack of access to clean water sources, combined with unsafe water, sanitation, and hygiene (WASH) practices, poses a significant health risk [30].

People with disabilities are often more vulnerable during emergencies. In Cox's Bazar, the camps are by no means equipped to deal with mobility issues faced by people with disabilities. Relief distributions are not always accessible; infrastructure and distance are cited as the biggest obstacles for people with disabilities to reach these vital locations [31].

Deforestation is an ongoing disaster in Cox's Bazar as a result of the huge demand for wood to build sheds, cook meals, and keep families warm [4,32,33]. As already stated, most of the camps are built in areas vulnerable to landslides. This, combined with deforestation and increased rainfall, creates life-threatening situations, as in June 2017, when heavy rainfall triggered several landslides, killing 162 people [2,5,34]. The presence of the Rohingya has upset local ecosystems, and this has caused tensions with host communities who also rely on the local forests for survival [2,32].

The Rohingya are not officially recognized as refugees by the Bangladesh government; instead, they are termed 'forcibly displaced Myanmar nationals' (FDMN). Although Bangladesh has allowed refugees to settle and has provided humanitarian support, Rohingya refugees in Bangladesh lack any form of protection by the state and are effectively placed outside the legal framework of both Bangladesh and Myanmar [35]. Refugees are kept in the camps in the hope of repatriation, even though the camps lack basic infrastructure and are overcrowded [35,36]. Bangladesh is only willing to provide refugees with essential humanitarian services such as water, medical care, and sanitation facilities [35,37].

More than half (55%) of the population in the camps of Cox's Bazar is children aged under 18 years [38]. Adolescent capabilities are extremely limited in the camps and have to be seen through an intersectional lens. They lack access to education, formal work opportunities, legal protection, mobility, clean water, sanitation services, sexual and reproductive health (SRH) awareness, and a nutritious diet [8,38,39].

Due to their lack of legal status, Rohingya are not able to participate in the formal economy of Bangladesh. They mostly rely on the informal sector (often inside the local economy of the camp itself), and this makes them vulnerable to exploitation [35]. Child labor is endemic in Cox's Bazar; around a third (32%) of adolescent boys from host communities work. The rate of child labor among the Rohingya is unclear, but due to their lack of legal status, children in the informal economy are at risk of bonded labor, involvement in the sex trade, peer violence, and trafficking or kidnapping [40,41].

Education is a major challenge for Rohingya children and youth. Out of fear that this might endanger the repatriation of these children, the government barred international organizations from providing formal education in the camps. In 2020, this decision was reversed [41,42]; however, restrictions put in place due to COVID-19 led to the closure of all learning facilities and limited the access of staff from United Nations agencies and non-governmental organizations (NGOs) to people receiving support in the camp [43]. The current education system prevents Rohingya children from integrating into Bangladesh society, and with the ongoing security situation in Myanmar, their future prospects are stark.

UNICEF has set up informal learning centers for children aged 4–14 years. However, older adolescents and youth in the refugee camps are not catered for, and it is estimated that 83% of those aged 15–24 years lack access to education or skills development activities [44]. For girls in the camps, the chances of going to school are even worse—only 2% of girls aged 15–18 years access informal learning centers in the camps, compared to 13% of boys of the same age. Cultural practices and the segregation between boys and girls were the most frequently cited reasons for keeping girls out of school [45].

Adolescent girls are at high risk of sexual or physical violence in the camps. Among older female adolescents in Cox’s Bazar (both in host communities and the Rohingya camps), 12% report having witnessed rape or sexual violence, and 17% of married women had experienced some form of gender-based violence in the past 12 months. The fear of this kind of violence (among parents and adolescents alike) severely limits girls’ movement, especially at night: girls are 65% less likely to leave their camp blocks compared to adolescent boys [46]. Out of fear of social stigma, girls rarely report the gender-based violence they experience.

Child marriage is a deep-rooted cultural practice among the Rohingya. However, Myanmar state laws and military surveillance made marriage before the age of 18 difficult, with high fines for non-compliance. In Bangladesh, the situation is different. Although the law forbids marriage before the age of 18 years (21 years for males), it is still a common practice. In one study, more than half of all women in their mid-twenties reported having married as a child, with 18% having married before the age of 15 [47]. Among the Rohingya, these numbers are lower—10% of women aged 20–24 years reported having married before the age of 18 [48]—but the relaxed enforcement of the minimum age for marriage in Bangladesh makes children in the camps more vulnerable to child marriage [46,49,50]. Insecurity can also play a role in the preference for child marriage. Given the fragile context of the camps and the constant threat of natural disasters, marriage can be a means to lessen the financial burden on families, although data on this are limited [49].

3. Conceptual Framing

Scholars have increasingly framed climate justice in terms of capabilities, building on Amartya Sen’s (1984, 2004) argument that human development is best conceptualized in terms of a broad range of capabilities needed for individuals to be able to ‘do and be’ in ways that give them value [51,52]. Schlosberg (2012) takes this approach—and also that of Kabeer (2003), who called for a recognition of collective capabilities focusing less on the individual and more on supporting communities towards empowerment, describing that *“climate justice would therefore recognize and seek to encompass the reality of our immersion in, and dependence on, the functioning of the natural world”* [53,54]. In short, climate justice can be described in terms of how climate change makes human lives more vulnerable in specific ways, which in turn hinders access to capabilities. However, historically the capabilities approach has paid insufficient attention to the effects of environmental degradation and climate change in influencing human capabilities. While Nussbaum (2011) expanded on Sen’s capabilities approach to outline ten central capabilities, including *‘other species: being able to live with the full range of creatures and plants that inhabit the world around us. To be able to enjoy nature and appreciate its beauty’* [55], Holland (2008) argues that this approach does not accurately address the question of environmental justice, and instead recognizes the inherent dependence of all individual capabilities on our natural environment. She consequentially defines environmental conditions as a ‘meta-capability’ that allows populations to access their capabilities in the contexts of appropriate ecological conditions [56].

Climate change will be experienced uniquely by different individuals and social groups, and at varying intensity in different places. Understanding these different vulnerabilities can help us to understand the expected impacts. In Figure 1, we outline the conceptual framework which will guide the analysis of the research. As described above, Rohingya adolescents in Cox’s Bazar are situated between significant environmental challenges and compounding socioeconomic vulnerabilities. We highlight that Rohingya

adolescents face compounding inequalities based on these vulnerabilities. Both Rohingya adolescents' immediate living environment and the surrounding environment of the camps in Cox's Bazar leave them at risk from the impacts of extreme weather events, with climate changes acting as a risk amplifier to these challenges [3,5,34]. Socio-economic disadvantage through exclusion of Rohingya refugees from job markets and formal education, coupled with gender norms which restrict girls' mobility and favor child marriage, interact with these environmental risks [46]. This article aims to explore these factors as they shape the extent to which Rohingya adolescents face inequitable outcomes, particularly looking at this in the context of climate change.

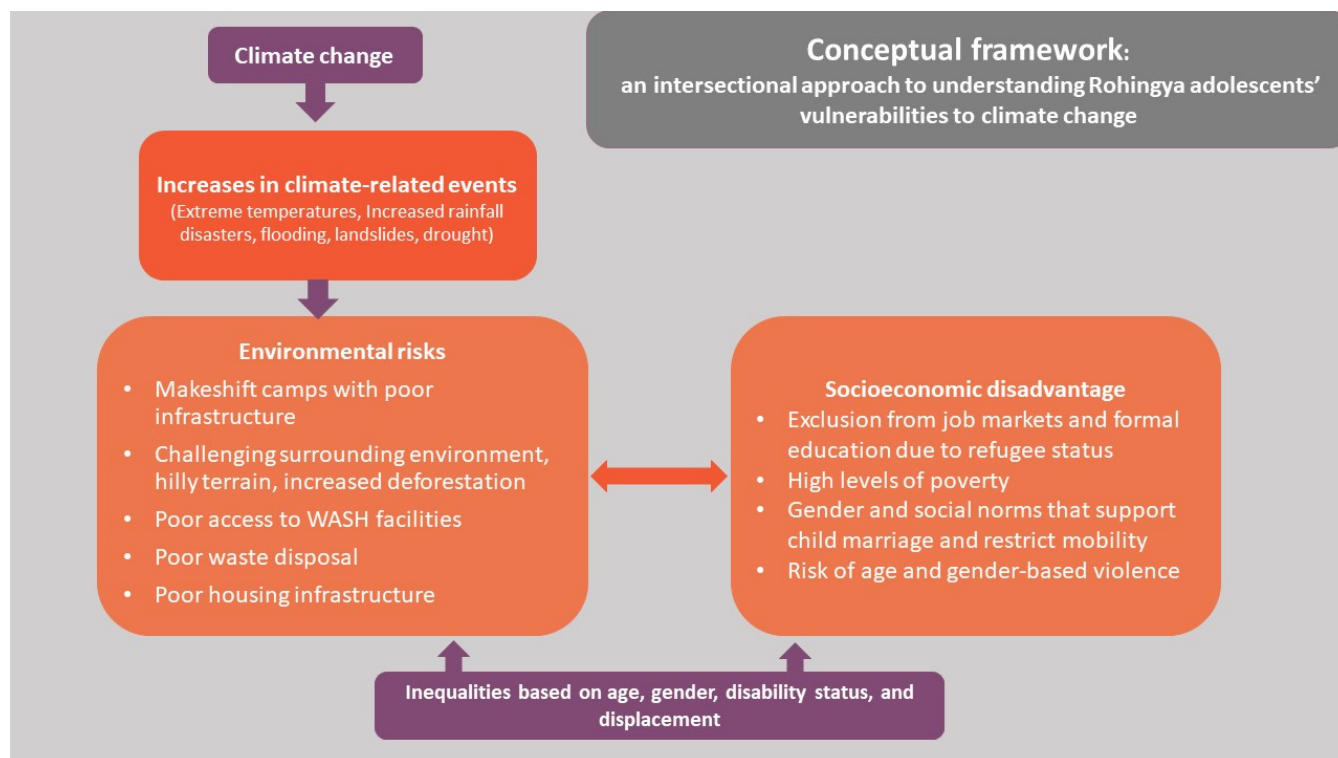


Figure 1. Conceptual framework.

4. Methods

This paper is based on qualitative data collected in Ukhia and Teknaf Upazillas (sub-districts) in Cox's Bazar, Bangladesh. The research aimed to understand the perspectives of young people aged 15–19 years from Rohingya communities in Cox's Bazar in terms of environmental protection and the impacts it has on their day-to-day lives. This study is part of the Gender and Adolescence: Global Evidence (GAGE) longitudinal research program, which explores what works to support the development of adolescents' capabilities [57]. In Cox's Bazar, GAGE is partnering with Yale University, the World Bank, and Innovations for Poverty Action (IPA) Bangladesh to implement the Cox's Bazar Panel Survey (CBPS) [58,59], of which the GAGE component surveyed 2280 adolescent girls and boys and their caregivers. For this study, qualitative data were collected from a purposefully selected sub-sample of older adolescents (aged 15–19 years), with the aim of ensuring gender balance and diversity in terms of household composition, as well as marital status and (dis)ability status in line with the 2030 Agenda for Sustainable Development and its commitment to leave no one behind. (See Table 1 for further details on the sample).

Table 1. Overview of sample.

Tool	Site		Gender		Marital		Disability Status		Total
	Site 1	Site 2	Male	Female	Married	Unmarried	Disability	No Disability	
In-depth interviews (aged 15–19)	12	12	12	12	3	21	4	20	24
FGD (community mapping)	2	2	2	2	-	-	-	-	4 groups (33 participants)
Key informant interviews	3	3	-	-	-	-	-	-	6

The study was conducted in two camps in Ukhia and Teknaf, selected based on the character of their terrains and permanence. Site 1 is located in a hilly area and was built after the mass influx of Rohingya refugees into Bangladesh in 2017; site 2 is located in a plains (comparatively less hilly) area and is built around the older makeshift camps where many Rohingya were already living, having fled during previous waves of forced displacement. To protect the privacy of study participants, the camp names are anonymized in the article and the locations are referred to as “site 1” and “site 2” (see, Figure 2).

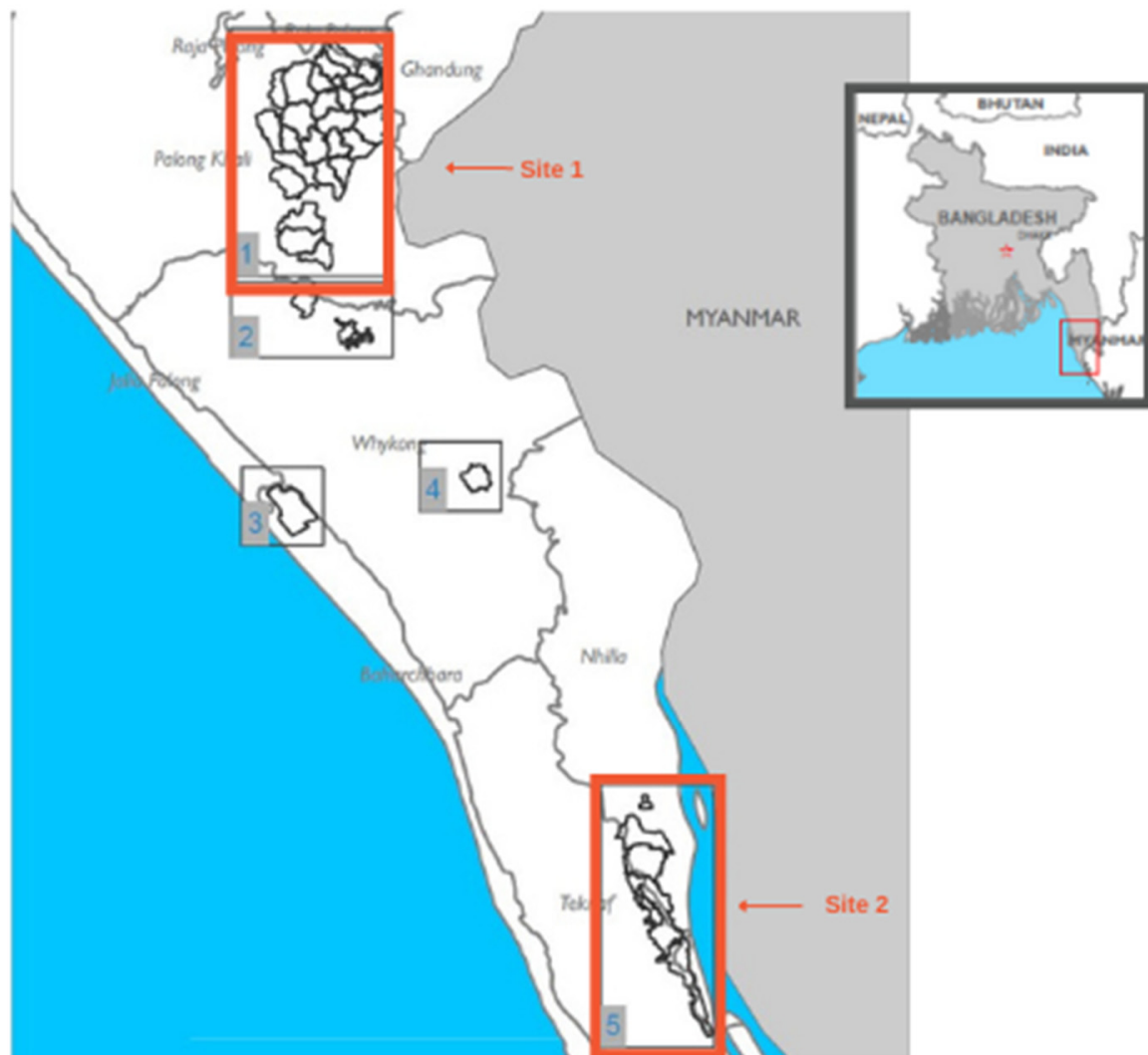


Figure 2. Map of the Rohingya Camps located in Ukhia and Teknaf Upazillas in Cox's Bazar, Bangladesh (Adapted from: [60] (edited version to include research sites)).

A total of 57 adolescent girls and boys aged 15–19 were interviewed using in-depth interviews (IDIs) and focus group discussions (FGDs). A total of 24 adolescents (12 girls and 12 boys) were purposively selected from the GAGE quantitative sample. Four FGDs were conducted (two with boys and two with girls) using an interactive community mapping tool, where 16 girls and 17 boys participated from the same communities. In the community mapping exercise, adolescents were asked to draw their communities in a group, and then responded to a series of probing questions about the economic, environmental, and social spaces in which they live, including those in which they feel safe or unsafe, and the reasons why.

We also conducted in-depth semi-structured interviews with six key informants who are community leaders and service providers in the selected camps.

Verbal consent and assent were obtained for all participants in adherence with the ethical guidelines of the GAGE program. Parental consent was obtained for adolescents under the age of 17 years, and assent was obtained from adolescents and for those aged 18 or above, consent was obtained directly from the participant themselves. All the interviews and focus groups took place at camp locations that were suitable for participants. The field researchers made sure that the adolescents had privacy during the interviews so that they could express their views freely. Interviews and focus groups were conducted in the Rohingya language and were tape-recorded. Transcripts of those recordings were translated from Rohingya into Bangla and subsequently into English. To analyze the qualitative data, transcripts were coded following a thematic codebook shaped around the GAGE conceptual framework and the research tools. Thematic codes were also developed from detailed debriefing sessions with the data collection team. The interviews were analyzed thematically, exploring the challenges adolescents face in their socioeconomic and environmental contexts and the impacts on their multidimensional capabilities.

5. Results

The analyses of the qualitative data yielded the complex and interconnected environmental and socioeconomic challenges facing Rohingya adolescents. The results show how uncertainty, caused by protracted displacement, poor living conditions, and environmental hazards, is compounded with socioeconomic disadvantages, leading to adverse impacts on adolescents' capabilities that constrain the possibilities for sustainable development.

5.1. Environmental Vulnerabilities Experienced by Rohingya Refugees

5.1.1. The Living Environment and Infrastructure

Most adolescents reported that their shelters are very small. A 17-year-old boy in site 2 noted that, *"I don't want to spend my life in such a small house"*. Both adolescent girls and boys talked about lack of privacy in the small space provided for them in the shelters. Another 17-year-old boy from site 2 echoed this concern, *"Even if I want to be alone for a while, it is not possible because there is no space here"*. Some Rohingya—who can afford the costs involved—extend their shelters even though it is not permitted by the camp authority. A 13-year-old girl from site 1 said, *"[the] government has provided two-room houses, that are 12 haat (18 feet) in length and 6 haat (9 feet) in width. We made a third room with a fence in the middle of the second room. We also built a kitchen outside of the house. We have cemented the floor using our own money"*.

It was evident in our data that many families tend to also build private toilets adjacent to their shelter, which created additional problems. An officer working for a WASH program explained: *"Many Rohingya build a toilet at their house, which is not permitted by the rules and regulations. Making toilets at the household level brings many problems in terms of cleaning and discharge of sewage and maintaining hygiene practices"*.

Adolescents and key informants alike noted that the limited number of toilets in the camps is a key challenge. A *majhi* (Rohingya community leader) from site 1 said, *"Our toilet is used by 20–25 families. It is very difficult for us. We have to wait a long time to use the toilet. The entire situation is terrible for us"*. Another official (a service provider from the WASH

program) explained that one toilet should be used by four families, but it is often the case that 12–16 families have to share one toilet. He said, *“According to the standard, one toilet is for every 20 people. It is not possible to ensure an adequate number of toilets because of scarcity of space”*.

5.1.2. Energy Supply

There is no supply of electricity in the shelters and they do not have good ventilation. In the summer, the heat is extreme. Some people use small solar panels to provide energy for electric fans but not everybody can afford it. As already noted, building the makeshift camps involved massive deforestation, so there are not many trees inside the camp areas. A *majhi* from site 2 highlighted that they are not allowed to plant trees without permission from the camp authority. He said, *“If we could plant trees here, we would get shade, would get wind. The extreme heat now would not have been like that then”*.

The lack of electricity and solar panels also means that adolescents have challenges accessing sufficient light, with important safety implications. Most people use kerosene-based lamps at night. In these densely populated camps, using kerosene in shelters made of flammable materials bring risks of fire accidents—something that adolescents have expressed anxiety about. A 13-year-old girl from site 1 said, *“There was a fire incident a few months ago and many houses were burnt. We are always in fear of fire accidents since then”*. Although there are some lights in the common areas of the camps that use solar power, they are not sufficient to meet the camps’ needs, and many of the lights have not been working for a long time. A community leader from site 1 expressed concern about adolescents’ security at night, as many areas in the camps are not well lit. He said, *“Going to the toilet at night is not safe for adolescents, especially in those areas where proper solar lighting is not available or dysfunctional”*. Another key informant echoed these concerns, saying, *“Out of 600 solar lights, about 250 are dysfunctional. But there is no active agency to fix them. Light bulbs are being stolen as well”*.

Adolescents also reported that they receive inadequate gas supplies for their family—just one gas cylinder per family per month. Most of the time, that is not enough to meet the family’s cooking needs and they run out of gas before the month ends. In these situations, households need to buy more gas from the local market, which not everyone can afford. As a 15-year-old boy living in site 1 explained, *“We cook with a gas stove. Most of the people in the camp use gas stoves for cooking. They give us one gas cylinder for 30 days. But we run out of gas one week prior to the month’s end. Then we need to buy another cylinder for the rest of the days”*. As a result, people tend to buy firewood for cooking because it is cheaper than gas. They cannot get firewood from the forest as it is prohibited by the camp authority and the forest area is not safe, so they have to buy firewood from local markets. Adolescent boys also mentioned that the gas cylinders are very heavy and it is very difficult to carry them from the service centers to their shelter. It is usually men and boys who are responsible for carrying the heavy gas cylinders; sometimes they need to carry them uphill, and if it rains, the roads become very slippery and can make it very difficult to transport the cylinders.

5.1.3. Waste Disposal

Solid and human waste management systems are a major problem in the Rohingya camps and result in high levels of pollution in the surrounding environment. Participants in this research mentioned the organized waste management system in the camps is inadequate to manage the huge amounts of waste produced in the overcrowded camps. An officer working in the WASH program said, *“Each camp has a huge population. There are so many public toilets and these are used by this huge population. As a result, the pits of these toilets are filled quickly”*. Adolescent boys reported that they clean the garbage as well as toilet pits when needed rather than waiting for the cleaners to come. An 18-year-old boy from site 2 said, *“Solidarités [International, a non-governmental organization] takes the rubbish from the toilet. Sometimes we clean it up when the toilets are odorous as a result of overfilled toilets. Especially, in rainy season, we need to clean up, because the cleaners take a long time to come after*

cleaning the other blocks. In the meantime, the toilet tank is already filled and overflowing as a result of rainwater”.

Adolescents also reported that there is a high level of mismanagement in terms of the waste disposal system, including delays in collecting waste by the cleaners assigned at the camp. A community leader from site 1 reported that, *“Only 23 community-level dumping stations are available. Now that is insufficient, because we have 57 blocks here”*. Waste bins provided by the WASH organizations are often misplaced or broken. A 17-year-old boy from site 1 explained, *“Previously, there was a waste bin beside our toilet. But now there is no bin. Now we have no choice. We dump our waste behind our house. That’s why we are suffering from skin disease”*. Adolescents and key informants also reported that the odor from uncollected garbage makes the camp environment suffocating.

Moreover, our research found a lack of awareness among the camp community about waste disposal. A number of adolescents mentioned that people throw waste materials in different places in the community. A 15-year-old boy from site 1 said, *“Sometimes, we fill the waste in a polythene bag and bury that in the back of the house. As the back of the house is on a slope, throwing waste would help to hold the soil. Mostly, we bury the raw waste in the ground so that the smell cannot spread around”*. Some people reported that waste is thrown into the canal in the camp, thinking it will be washed away, but it instead causes water-logging. A 15-year-old girl from site 1 noted that, *“There is no problem in the rainy season to throw waste in the canal because waste is washed away, but in summer and winter, waste accumulates, so the smell spreads everywhere, and people suffer from many diseases such as diarrhea and fever”*.

5.1.4. Risks of Climate-Related Hazards

The poor infrastructure of the camp shelters is severely impacted by extreme weather and provides limited protection against both high temperatures and heavy rain and wind. Participants in this study expressed their anxiety about this. Many shelters have leaky roofs and experience flooding when it rains heavily. As a 15-year-old from site 1 boy explained: *“During the rain, the floor becomes damp and water leaks from the ceiling. Our community people are doing many things to improve their houses. Some are covering the shed with a blanket to keep cool inside during summer, keeping wet foams on the shed to reduce the temperature inside the house. If we had an extra tarpaulin, we could lay it on the floor in the rainy time”*.

At a community mapping session, adolescent girls explained that they have to tie their shelters down every year so that they do not get blown away by storms. A 13-year-old girl from site 1 narrated that, *“Every year the house is tied; we tied our house four times in the past four years. This year we have tied our house tightly so that it does not get blown away. We fill sacks with soil and put those on the roof so that it does not fly away”*. A number of adolescents reported that their shelters were damaged during the rainy season. An 18-year-old girl from site 2 said, *“Our roof was blown away during the storm, then we tied the roof with rope during the storm season. On a rainy day, water comes from the hills above and it gets into our house right up to our knees”*.

The maintenance of these shelters is not adequate and is mostly done by the refugees themselves. They receive housing materials from the camp-in-charge (CIC) office for building or fixing the shelters; however, families often need to buy housing materials from the local market and most refugees cannot afford to buy them. As a 14-year-old girl from site 1 explained, *“We are worried about our shelter. We don’t know when our shelter will be ruined completely. We informed the CIC office about this. Some officers have visited to see the damaged part of our shelter but no one has taken steps to repair this. They don’t do anything”*. Similarly, a 19-year-old boy from site 1 said, *“Our houses are situated in the sloppy hill. Gradually our surrounding area is collapsing due to heavy rain. We are at risk and don’t feel safe in our home. One side of our house is gradually breaking down. We just try to tackle this for our own safety but it doesn’t work properly because we have no proper equipment to fix it”*. A 19-year-old girl from site 1 described how terrified they were when the most recent storm hit. She said, *“Our kitchen was collapsing that time. I was so scared of hearing that. One of my uncles came here and took us*

with him to save our life . . . We always live in fear of landslides. The CIC office knows about it but does nothing”.

Climate change has caused extreme weather in Bangladesh, in all seasons, but the Rohingya refugees are highly vulnerable to these disruptive weather patterns due to their already adverse living conditions. A 19-year-old boy from site 1 commented, *“We have to face problems in all three seasons. During the winter, it is very cold. During the rainy season, if there is heavy rain, the edges of our houses break down. Mobility is very difficult for us as we have to walk on mud through a narrow alley between two houses and we often slip while walking. During summer, the houses are very hot”.* A hygiene promotion officer working in site 2 said, *“[Our] country is prone to natural calamities. The shelters are so vulnerable as they are built with plastic sheets, tarpaulin, and bamboo. There are many camps which are in hilly areas. Landslide is a common issue there. Due to this, many refugees have lost their shelters”.* In addition to flash floods and landslides, heavy rain also causes water-logging as the drainage system is not maintained properly. A community leader from site 2 explained that, *“[Many] blocks get submerged even with a little rain. For example, two blocks have been flooded with rainwater this morning”.*

Heavy rain severely restricts adolescents’ mobility and can be particularly challenging for those with disabilities. The muddy roads and slippery slopes of the hilly terrain disrupt adolescents’ ability to meet their daily needs. It can even be troublesome to go to the toilet because of damaged roads during the monsoon season. A 19-year-old adolescent with a visual impairment, who lives in site 2, explained, *“Our toilet is installed four houses down from my house. The path to that toilet is damaged due to a landslide, so it is difficult to go there. In the dark, it becomes more troublesome as there are no lights in this road”.* Another boy with a physical disability, aged 15 years and living in site 2, who needs hospital-based physiotherapy every day, reported that heavy rain disrupts his visits: *“I go to hospital every day with my father at 7 a.m. and return to my house at 1 p.m. or 2 p.m. When it rains heavily, there is water-logging, which is problematic for me. On those days, I cannot go to the hospital”.*

This situation is more acute in the camps that are located in hilly terrain compared to those located on the plains. While adolescents from both study sites reported many environmental challenges, those living in the hilly area talked about weather-related mobility restrictions and expressed more worries and fear of landslides.

5.1.5. Water Access and Quality

Water supply is not adequate in the camps. Adolescents experience difficulty accessing water sources and collecting water. Sources of drinking water are scarce and supply of water at those sources is scheduled. There are tap stands in the camps, although people who live far from where they are located face difficulties fetching water. Typically, men and older boys are responsible for collecting water for their households. Adolescent boys described their challenges when trying to collect water. A 17-year-old boy from site 2 said, *“Drinking water source is 10–15 min away from my home. I have to go there three times a day to fetch drinking water. Every day I bring water for bath, toilet, and cooking from different sources . . . We need 10–15 pitchers of water for bathing and 4–5 pitchers of water for drinking and cooking every day”.*

Due to gender norms that restrict their mobility, women and older girls are not allowed to fetch water from the public stands. Young girls (before they reach puberty) are allowed to collect water but it is difficult for them to carry heavy pitchers. A 13-year-old girl from site 1 said, *“To fetch water from down the hill is too difficult because it is far away and we have to go down the stairs. As a result, we get tired and it is difficult to take breath. It is very difficult for me because I have to carry the heavy pitcher”.* In households that have no men or boys to collect water, the family has to pay for help getting water. A 19-year-old girl from site 2 explained: *“My mother and I can’t collect water, because in this area fetching water is a very difficult task. So, my family pays 300 taka as a water bill to a villager. The villager brings water through a pipe near our shelter. My mother goes there to fetch water”.*

Adolescents talked about seasonal variation in availability of water. During the rainy season, they collect rainwater to use for washing, bathing, and cooking, although fetching drinking water from water sources is difficult during that season because of the muddy roads and slippery slopes. A 19-year-old boy from site 1 said, *“In rainy season more than three people are needed if we want to fetch water from the tap stand. It is so difficult not only for me but also for my neighbors who need to go down the slope from their homes”*.

In the summer, water is scarcer. During a community mapping session, adolescent girls said they cannot take a bath because of limited water supply. While adolescent boys can bathe at the nearby canals or in the public bathing spaces, older adolescent girls cannot do so because of men’s presence there. Even though they have bathing spaces adjacent to their shelter, they cannot fetch water for themselves and the water collected for the household chores is not sufficient for bathing too. A 13-year-old girl from site 1 said, *“With the fetched water, I clean the kitchen and house first and then take a bath if there is water left. We cannot collect enough water always, so I take a bath after three to seven days”*. This can have implications for girls during menstruation, as one 13-year-old girl living in site 1 explained: *“Since I can’t take a bath regularly due to lack of water, when I have my menstrual period, I just change the sanitary napkin if it feels dirty”*. The community leaders in both sites mentioned that there are not enough tap stands to meet the needs of the community. In site 1, where houses are located up and down the hills, location of the tap stands is crucial. A *majhi* said, *“On the upper side of the camp, there is no tap stand. They have to collect water from the tap stand down the slope. Collecting water and fetching water from this tap stand is tough for them. A few people got pipes to get water from this tap stand source to their shelter. But this is illegal. This is strictly prohibited by the CIC office”*.

5.2. Socioeconomic Disadvantage—Compounding Inequalities

Compounding the environmental challenges they face, Rohingya refugees also experience significant socioeconomic challenges, which further exacerbate the impacts of climate change and add multiple dimensions of vulnerability.

5.2.1. Restricted Mobility and Safety Challenges

Adolescent girls face greater challenges due to social norms that restrict their mobility. Compounded by environmental risks such as high temperatures during summer, these restrictions on their mobility can result in very challenging living conditions for girls. A 13-year-old girl from site 1 said, *“We do not have solar [panel]. It is too hot but I cannot get any air. Even if I feel very hot I cannot go outside. If I stand at the door to get some air, people will see me and that will be a sin. It would have been nice if we had a fan”*. Another 14-year-old girl said, *“[In] summer, there is no electricity so we have to live in the extreme heat. We cannot go outside, so we just sit at home in the heat”*. Adolescent boys, on the other hand, have more freedom to escape the high temperatures inside the shelters, as a 17-year-old boy from site 2 explained: *“Every day I spend much time outside because it is very difficult to stay at home because of extreme heat”*.

Although mobility is also impacted by the difficult terrain and frequent climate-related hazards, adolescents experience further restrictions on their mobility due to safety concerns. Girls have very restricted mobility due to the risk of sexual harassment and/or kidnapping. Girls are confined at home as soon as they reach menarche. The restrictive social norms mean that girls do not go to the toilets during the day, as men can see them; yet they also fear going to the toilets at night due to the risk of being kidnapped. A 13-year-old girl from site 1 said, *“If there are people around the toilet, we cannot go to the toilet so we go to another toilet further away from our house or wait to go at night. At night, we ask someone to come along [with us] because of fear”*. Another 15-year-old girl living in site 1 reported experiencing verbal abuse on the streets: *“We can’t go to market because on the road boys said many kinds of bad words. The boys shouted and said, ‘look at me!’”* An official from the WASH program in the camps commented: *“Because of their conservative cultural customs, most of the time adolescent girls are not using the toilet in the daytime, they hold the pressure all day, and then go to the toilet*

in the evening time". This can have serious health implications for girls, especially during menstruation. Some households try to build a toilet next to their house to prevent these challenges, but this is a cost that many cannot afford.

Boys' mobility can be restricted in some cases as they are afraid of being kidnapped by extremist groups active in the camps. One 17-year-old boy from site 2 explained his fears: *"Going outside at night is not safe here, because hijacking is a common phenomenon. Children as well as youth disappear with hijackers who beat them and demand money as ransom. In the last winter, an incident happened near my house. Hijackers tried to pick a boy from here and luckily they failed to catch him. It is one of the great fears about living here"*. Adolescent boys also expressed fear of robbery incidents within the camps. A 15-year-old boy from site 1 said, *"The camp situation is not good. We can't go outside at night because the activities of robbers increase here at night"*.

Lockdowns introduced in response to the COVID-19 pandemic created more restrictions for boys and their mobility has been further disrupted. One 17-year-old adolescent boy from site 1 highlighted that, *"I used to go to madrasah (Islamic school) before lockdown. Due to lockdown, we don't go anywhere. Police do not allow us to go outside"*. Girls also face further restrictions on their mobility due to COVID-19 measures. A 19-year-old girl from site 2 mentioned that they could not go to visit relatives during the pandemic: *"We girls do not go out much, but boys go. But if boys go out at night, the army [military] beat them"*.

Boys have more opportunities than girls to socialize, which can reduce their levels of stress and negative feelings. One adolescent boy living in site 2 explained, *"Playing football is a matter of comfort, it gives me pleasure. I can lessen my sad feelings by playing football"*. Girls instead spend most of their time doing chores, as an 18-year-old girl from site 1 explained: *"We don't have permission to go out so most of the time I do household chores (cooking, cleaning dishes, etc.) and take prayers every time. I want to go somewhere outside"*. However, the research also found a lack of recreational places for Rohingya adolescents. A 17-year-old boy from site 2 noted that, *"We can't take free breath like the locals and we can't even walk like locals because there is no suitable and free spaces. There is no formal educational institutions where we can spend our time, so we have to stay at home most of the time"*. Regardless of pandemic-related lockdowns, confinement to the camps due to their refugee status makes adolescents feel anxious, as a 19-year-old boy from site 1 highlighted: *"Before the COVID lockdown, sometimes, I used to go to my relatives' house, but COVID has confined us at home. Although camps are always under lockdown. Actually, the pre- and post-COVID situations are the same for us. Always unemployed, always confined"*.

5.2.2. Economic Challenges and Refugee Status

Rohingya refugees do not have legal permission to work in Bangladesh. Some adults work within the camps under "cash-for-work" programs implemented by humanitarian organizations supporting refugees. Adolescent Rohingya refugees are excluded from the local job market. A 17-year-old boy from site 1 described how, *"I want to work. We have nothing to do here. We pass our day idly. No one gives work to Rohingya people. We have to pay bribes if we want to get any job. One of my brothers joined a non-governmental organization [NGO] by paying bribes"*. Older adolescents do not have educational opportunities as Rohingya are not allowed to have access to formal education. Some adolescents have private tutors but that has additional costs that many families cannot afford. Another 17-year-old boy from site 2 explained: *"I used to go to a private tutor twice a day for my study. It cost me 500 taka per month. These teachers are Rohingya from our community . . . but it is too much sorrow for me that I cannot continue my studies due to lack of money. I cannot proceed towards my future goals"*.

The vulnerability this creates for both boys and girls results in a number of risks, including forcing them into dangerous jobs such as drug dealing and trafficking to other countries. A key informant explained, *"For adolescents, there is no secondary-level education system after finishing primary-level education, so they pass their time leisurely, but lack recreational spaces. For this practical reason, adolescent boys are getting involved in drug dealing"*. A 15-year-old from site 1 described the dangers of getting involved in this type of activity: *"There were*

two brothers who were dealing drugs from this camp. I hardly remember their names. Both of them were killed by Bangladesh police when they were caught with drugs. It happened a year ago”.

Due to their economic situation, trafficking to other countries (boys being trafficked for work and girls for child marriage) is a major risk. Girls are being trafficked to Malaysia for child marriage in the hope of getting a better life there. Many Rohingya parents have resorted to negative coping mechanisms such as child marriage. A 17-year-old boy from site 2 said, *“Parents who cannot afford to marry their daughters due to financial constraints often send them to Malaysia for marriage”*. This can put girls in dangerous situations, as a 14-year-old girl living in site 2 described: *“A few days ago my family received a marriage proposal from a Rohingya man in Malaysia, but didn’t accept it. The crucial reason is my elder sister’s sister-in-law is missing for the last 18 months. She was trafficked for marriage in Malaysia. Her would-be husband paid half of the trafficking cost and her family paid the rest. Her family hired a broker to send her to Malaysia. But still, they have no news about that girl. They tried to contact her but failed. Her would-be husband also tried to find her, but he also failed to find her”*. Another girl from site 1, aged 15 years, said, *“50 girls in this camp went abroad. They reached [the destination] but were caught. Some of them are imprisoned and some came back to the camp”*.

Adolescents highlighted that trafficking mostly happens in winter. Since the traffickers use sea routes, winter is safer than the monsoon season. As a 19-year-old boy from site 1 explained, *“Winter is a trafficking-prone season. Two routes are used—by boat and on foot. Walking through Myanmar, India, and Thailand; the destination is Malaysia. This way, it takes around a month to reach Malaysia. This route is comparatively safer than traveling by boat. Another way is by boat. Despite the hazardous and dangerous journey to Malaysia by boat, a number of people are going”*.

The COVID-19 pandemic has added to these vulnerabilities and significantly increased the economic constraints on adolescents’ lives. Adolescent boys and girls reported that their household income has been significantly reduced because of lockdown. Before the COVID-19 restrictions, men and boys in some households could earn cash that would help provide for their family, but this has not been possible under lockdown. A 17-year-old boy living in site 2 said, *“Before coronavirus arrived, I used to do some work, but due to corona, it is not possible [now] to do any kind of work”*.

These economic challenges leave Rohingya refugees even more vulnerable to the environmental risks discussed earlier. They do not have enough money or resources to improve their living infrastructure, which could help protect them against climate-related natural hazards. Most households cannot afford to buy housing materials to extend or reinforce their shelter. A 15-year-old boy from site 1 said, *“I think the government could give some economic support for me. Extreme rain may cause floods. If we make a good drainage system, it will be helpful for our community. We don’t need to be stuck in water-logging situation for long. If we could build our house strongly, it would be able to withstand cyclones or storms”*.

Economic challenges also prevent Rohingya adolescents and their families from accessing electricity and other resources. Sometimes they need to pay for drinking water, as water is scarce in the camps. A 17-year-old boy from site explained, *“We have to pay 500 taka monthly for water. A villager distributes water for 10 min through the pipeline. We collect water in drums”*. This situation gets worse during climate-related hazards, and people have few resources to help them recover. Rohingya refugees are thus “trapped”, unable to adapt to the impacts of climate change through migration or by diversifying their livelihoods. As a 13-year-old boy from site 1 said, *“We want to go back to Myanmar. If the Bangladesh government could find a solution with the Myanmar government and send us back to Myanmar, it would be better for us”*.

6. Discussion

This article fills a gap in the literature on the intersection of environmental, economic, and social challenges for adolescent refugees in Bangladesh. It highlights the compounding vulnerabilities facing Rohingya adolescents due to the challenging living environments in the refugee camps of Cox’s Bazar, which are highly vulnerable to climate change and

climate-related hazards. These challenges intersect with the socioeconomic vulnerabilities experienced by adolescents affected by forced displacement due to exclusion from education and the job market, and strict gendered social norms.

Many low- and middle-income countries (LMICs) such as Bangladesh are extremely vulnerable to the impacts of climate change despite having limited contributions to emission levels [14]. This article has highlighted that Rohingya adolescent refugees living in Bangladesh are particularly vulnerable to the impacts of climate change and face environmental injustice due to high levels of climate-related hazards such as landslides and flooding during the monsoon season.

Adolescents' capabilities depend on their surrounding environment [53]. The findings presented in this article show that environmental challenges (such as not having adequate access to water, electricity, and cooking gas) have negatively impacted Rohingya adolescents' health and hygiene, as well as their mobility and safety. In the rainy season, challenges in mobility can disrupt access to water, health facilities, and toilets. Furthermore, extreme temperatures during the dry season bring particular challenges for Rohingya adolescents due to the limited protection afforded by their shelter, the lack of electricity, and lack of shade in their surrounding environment. The broader literature (not only in the context of LMICs) highlights that these environmental challenges can significantly impact adolescents' physical health [61,62] and their mental health [63–66]. The findings presented in this article echo similar challenges and add additional evidence on the specific challenges brought about by climate change.

Taking an intersectional approach, environmental justice cannot be separated from social and other forms of justice, as these often intersect and exacerbate each other [67]. The negative impacts of environmental challenges have a disproportionate impact on refugee adolescents who are disproportionately growing up in poor and marginalized households. This article underscores that the socioeconomic vulnerabilities of Rohingya refugee adolescents have further impacted the challenges they face due to climate change—for example, as a result of their families not having enough money to reinforce their shelters and by being less able to adapt economically to climate-related shocks.

These multi-dimensional vulnerabilities are heightened for girls due to entrenched gendered social norms that restrict girls' mobility. Adolescent girls are at heightened risks from extreme weather as they are confined at home, often unable to go outside the shelter even during extremely high temperatures. The intersection between environmental and social restrictions means that girls have very limited freedom within the camp. Economic pressures on the household, in addition to these gendered norms, additionally put adolescent girls at increased risk of being trafficked for child marriage.

Adolescent boys also face specific challenges. In contrast to the literature that usually highlights collecting water as a female responsibility [68–70], our research found that men and boys are responsible for collecting water in the camps. Due to the environmental challenges they face, especially during the rainy season, boys spend a significant amount of time exposed to safety and health risks during this regular task. With increased water scarcity due to climate change [71], these impacts are only likely to worsen in the future.

This article also highlights that COVID-19 has further increased Rohingya adolescents' intersecting vulnerabilities by restricting their access to livelihoods and mobility in the Cox's Bazar camps. This supports findings from other studies, which show that Rohingya refugees face significant challenges in accessing services and sustaining their livelihoods during the pandemic restrictions [72–74].

Rohingya refugees in Cox's Bazar, Bangladesh are trapped in a situation of protracted displacement. Unsuccessful attempts at repatriation have left them in a situation where they cannot go back to Myanmar nor can they settle, as citizens, in Bangladesh. Adolescents and youth who have been deprived of educational and economic opportunities find themselves in a difficult and frustrating situation. Unable to get the means for the future they aspire to, they may resort to negative coping mechanisms. As Rohingya refugees do not have permission to work in Bangladesh, adolescent boys—who are often relied upon to secure

income for their household—are also at heightened risk of getting involved in dangerous activities such as drug dealing or trafficking.

These risks notwithstanding, despite their very difficult situation, some Rohingya adolescents who participated in our research showed resilience in facing these challenges, including by adapting their shelters to cope better with climate-related hazards. However, greater economic support from government and development partners through increased social protection is urgently needed for Rohingya adolescent refugees to be able to prepare for climate-related shocks.

7. Conclusions and Policy Implications

The findings presented in this article highlight the intersecting environmental and economic vulnerabilities facing Rohingya adolescent boys and girls in the refugee camps of Cox's Bazar, Bangladesh. We found that Rohingya adolescent refugees are at high risk of a number of environmental challenges, which have been exacerbated by climate change. Economic challenges due to the exclusion of refugees from labor markets, and strict gender norms, further compound these risks, resulting in multiple barriers to adolescent wellbeing.

To support these young people to deal with the intersecting challenges of forced displacement and climate change, the Bangladesh government, non-governmental organizations, and development partners need to introduce supportive policies and programs to enhance Rohingya adolescents' capabilities and help them secure a more sustainable future. Priority actions could include: (1) scaling up climate-responsive social protection, including providing materials to support Rohingya families to reinforce their shelters to protect against climate-related hazards; (2) making changes in laws and policies in Bangladesh to expand educational and economic opportunities for adolescent refugees; (3) disseminating messages about the negative consequences of child marriage and trafficking by working closely with community and religious leaders; (4) investing in adolescent-friendly spaces for young people, and providing awareness sessions with parents to encourage them to allow their daughters more mobility outside the home; (5) increasing the amount of monthly gas supplies; (6) increasing solar lighting in the camps, particularly around toilets; and (7) scaling up the WASH infrastructure in the camps to promote better health and hygiene.

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