

Understanding the Impact of Climate Change on Adolescent Girls: Education, Health and Socioeconomic Challenges

Tania Jannatul Kubra*

Lecturer, Department of Sociology
University of Chittagong, Bangladesh

Md. Arif Uddin Khan

Assistant Professor, Department of Sociology
University of Chittagong, Bangladesh

Eshra Faruky

Lecturer, Department of Sociology
University of Chittagong, Bangladesh

Tahsin Rahman Ritu

Research Assistant, Department of Sociology
Shahjalal Unniversity of Science and Technology Sylhet-3114.

Abstract

Climate change causes diverse challenges, which asymmetrically include the impact on a vulnerable adolescent girl population. The study discovers particular outcomes of climate change on adolescent girls' education, health and socio-economic status and elaborates on a purposive sample of 76 adolescent girls three FGDs from each of the union covering the affected areas and 15 in-depth interviews. The study findings disclose crucial health risks; enlightening interferences and socioeconomic challenges and it emphasizes the urgent need for gender-responsive climate policies. The analysis accentuates on the importance of targeted intercession in strengthening and comforting adolescent girls in the period of continuing climate crisis. Most of the participants reported sufferings from heat-related illness, waterborne diseases and increased mental distress due to climate induced instability and displacement. Psychological health concerns such as stress, anxiety and depression were found to be significant with little access to support systems. Climate change as a major barrier to education was identified that is due to education, due to school closures, economic pressures and damaged infrastructure. Adolescent girls were often dropout and withdrawn from schools which is reflecting deep-rooted gender biases in prioritizing boys' education. Different socio-economic vulnerabilities increased as families experienced many, losses of livelihoods that push girls into labor and early marriage. Limited access to employment facilities and vocational training further restricted adolescent girl's way to economic independence. The finding of this study highlight the necessity of comprehensive interventions on health, both physical and mental, gender sensitive education and planning and skill development programs and also underscores the importance of integrating adolescent girls into climate resilience policies as both vulnerable individuals and representative of transformative change.

Keywords: *adolescent girls, climate change, education, health risks & socioeconomic challenges*

* **Corresponding Author:** Tania Jannatul Kubra, Email: taniakubra@cu.ac.bd
Submission: 12.01.2025; Acceptance: 30.06.2025

1. Introduction

Climate change has been considered as a key global challenges faced in 21st century with mentionable environmental as well as neighborhood impacts (Caruso et al., 2024). Especially, adolescent girls are considered vulnerable due to a combination of age, gender and socio-economic status, facing exceptional challenges increasing inequalities as well as creating new obstacles to opportunities related to health, education and education (UNICEF ROSA, 2020). In order to apply useful policies and interventions, supporting adolescent girls in adjusting and decreasing the effect of climate change, understanding the impacts are mandatory (Arpin et al., 2021).

Due to climate change, adolescent girls suffer from heat related illnesses, malnutrition and water borne diseases influenced by heat waves and floods (Ojala, 2022; Picetti et al., 2023). Furthermore, Displacement and family stress due to climate change leads to psychosomatic stress which results in high rate of anxiety and depression in adolescent girls (Dooley et al., 2021).

Extreme weather events are responsible for school closures, infrastructure damage and absence which lead to disruption of education in case of adolescent girls (Hyndman & Vanos, 2023; O'Neill et al., 2020). Economic pressures from climate disasters often lead families to prioritize boys' education, leading to higher dropout rates for girls (Pal et al., 2023; Sims, 2021). This loss of education hinders their academic development, limits economic opportunities, and perpetuates poverty. Comprehensive action is needed to ensure that climate change does not hinder girls' education (Asadullah et al., 2021; Kwauk, 2021). Climate change has significant socioeconomic impacts on adolescent girls, forcing them to do more housework and reducing time for education and personal growth (Malala Fund, 2021; Marcus et al., 2023). Financial stress often leads families to marry early, further limiting girls' educational and employment opportunities (O'Neill et al., 2020; Sanson & Bellemo, 2021). The lack of vocational training and job prospects affects their economic future (UNICEF, 2024). Empowering adolescent girls through education and economic opportunities is critical to their well-being and resilience.

Bangladesh's low and flat topography makes it highly vulnerable to climate change, a major global challenge, especially for developing and least developed nations (ADB, 2021; World Bank, 2023). Bangladesh ranks ninth in the 2018 and 2024 World Risk Index with a score of 27.73 out of 100 in 2024, reflecting its high vulnerability to natural disasters and limited ability to respond effectively (World Risk Report, 2024). Annual monsoon floods, exacerbated by the inundation of around 700 rivers, have a significant impact on the densely populated country of 163 million people (Fatemi et al., 2020). Floods, affecting more than 5% of the land area, pose major environmental and socioeconomic challenges, particularly in the education sector, as disasters affect the learning and development of children and young people (Habiba et al., 2021). Bangladesh's floods severely affect water resources, agriculture, food security, infrastructure, forestry, fisheries, and human health (Assaduzzaman et al., 2020). Back-to-back flash floods occurred in northeastern Bangladesh in 2022, the second occurring during the recovery from an

earlier flood in May (Akter et al., 2023). The Flood Forecasting & Warning Center (FFWC) had predicted an early monsoon and the region recorded its highest rainfall in 122 years, surpassing the devastating floods of 1998 and 2004. These floods destroyed homes and farmland, forcing people to evacuate their homes abandoned and seeking refuge in emergency shelters (UNICEF, 2022). The Flood Forecasting and Warning Center (FFWC) reported that 94% of Sunamganj and 84% of Sylhet were inundated due to severe flooding. Heavy rains in Bangladesh and upstream water from India caused rivers such as Surma and Kushiara to overflow and triggered flash floods in seven northeastern districts, including Sylhet, Sunamganj and others (UNRCB, 2022). The disaster affected millions of people and left millions of children at risk of waterborne diseases, malnutrition and drowning. While many families sought refuge in high-altitude areas or emergency shelters, women and girls faced significant security risks (Mahmud, 2022). Adolescence, which spans the ages from 10 to 19, involves significant physical, psychological, emotional and social changes, with around 77 million adolescent girls among 1.3 billion adolescents worldwide (WHO, 2024a). This stage is characterized by the "Identity vs. Role Confusion" conflict (Erikson, 1950) and by increased cognitive ability to solve complex problems (Piaget, 1971). Vygotsky's sociocultural theory emphasizes the importance of social interaction and guidance in education (Vygotsky, 1978). Adolescents are vulnerable to climate change, which affects their development and wellbeing (Watts et al., 2019; Ma et al., 2022). These challenges are being influenced by systematic inequities especially where natural disasters make people displaced combining a large part of adolescent girls (Khandekar et al., 2019; IPCC, 2022; Plan International, 2021). This study reflects a large research gap on how climate change has impacts on adolescent girls in Bangladesh as well as the whole world. In Bangladesh, where gender norm is deeply rooted, current research only focuses on adult population, ignoring the vulnerable position of adolescent girls. Climate vulnerable countries like Bangladesh, there remains a critical research gap regarding its specific impacts on adolescent girls, despite increasing global attention on the intersection of climate change and gender. Most of the existing literature and policy interventions tend to focus generally on women or children. However, the unique vulnerabilities of adolescent girls who sit at the intersection of age, gender and socioeconomic disadvantage often overlooking. Different studies primarily emphasize adult women's adaptation strategies or broadly child protection frameworks, failing to address how climate induced events like floods, storms, displacement, heavy rainfall and heat-waves, especially affect adolescent girls' health, wealth and socioeconomic well-being. Moreover, empirical research remains limited in exploring how climate change disrupts adolescent girls' access to education in Bangladesh, increases health risks like malnutrition and waterborne diseases and increases economic burdens can lead to forced labor and child marriage. Current disaster management plans and existing national policies are often gender blind or insufficiently tailored to adolescent girls specific needs. Furthermore there is a notable lack of intersectional analysis that incorporates both age and gender dimensions when assessing climate impacts. Additionally current research does not provide an adequate evidence base to inform gender responsive and age sensitive interventions. This study addresses these crucial gaps by unambiguously on adolescent girls aiming to provide a nuanced understanding of

how climate change affects their health, education and socio-economic conditions and for more inclusive, equitable policy responses offering strategic responses. In doing so, it contributes to a more effective and a targeted climate resilient framework that empowers adolescent girls in Bangladesh and beyond.

2. Literature Review

We can define climate change through the rising temperature, changing weather and extreme events. This study focuses on three major areas: socioeconomic status, education and health. Recent studies prioritize the health risks happened to adolescent girls due to climate change. Heat wave has been considered as responsible for heat exhaustion and stroke, especially where cooling and healthcare is limited (UNICEF,2023; Picetti et al., 2023; WHO,2024b).As adolescent girls play the role of water fetching, they are vulnerable to waterborne diseases like cholera and typhus due to floods and hurricanes(Hellden et al.,2021; Proulx et al.,2024).

Displacement, loss of home and family hardship cause psychological hardship to adolescent girls including trauma and stress (Gemini and Das, 2024). They suffered higher level of anxiety, depression and PTSD from that of boys (Martin et al., 2022; van Nieuwenhuizen et al., 2021). Inappropriate mental health service has a role in the increasing rate of these problems (Trebleet al., 2023).

Drought and unpredictable rainfall causes malnutrition and food shortages (IDMC, 2023). In South Asian region, gender norms lead to malnutrition among adolescent girls during climate induced food crises (Tiwari et al., 2022).

Floods, hurricanes and drought often causes school closure and low rate of attendance which results in hindrance of education among adolescent girls(UNESCO,2021). As the schools remained close during disasters in flood-prone regions, it leads to dropout, hindered academic progress and interrupted instruction (Venegas Martin et al., 2024).

Climate change is creating economic pressures that are causing many families to prioritize boys' education over girls' education. In some cultures, girls are often excluded from school to help with household tasks or contribute financially during economic crises (Delprato & Shephard, 2024). McGaughey (2021) explained that families in sub-Saharan Africa often take girls out of school during droughts to save money for their survival, thereby perpetuating inequalities and limiting opportunities for girls.

Climate change is disrupting girls' education by damaging schools, hindering transportation, and depleting learning resources (Gandidzanwa & Togo, 2021). Musarandega and Masocha (2023) reported that Cyclone Idai destroyed or damaged many schools in Zimbabwe, leading to a sustained collapse in the education sector. The lack of resources often makes people think that they should spend the available educational materials on the youth.

Economic instability caused by climate change increases adolescent girls' housework and income-generating tasks, leaving them little time for education or personal development (Nielsen & Allen, 2021; Pirzadeh et al., 2023). This additional burden negatively affects their physical health and limits their educational and leisure opportunities (Rezwana & Pain, 2020).

In climate-affected regions, economic pressures cause parents to view adolescent girls as a burden, leading to higher rates of early marriage to alleviate this perceived burden (Ainul et al., 2022; Pourtaheri et al., 2024)

Families who go through economic crisis due to climate change show higher intention to marry their daughters before time (Pope et al., 2022). This early marriage leads to less access to education and economic sectors which increases poverty as well as inequality (Valero, 2023).

Climate change causes economic crisis which works as an obstacle to adolescent girls employment, makes them support their families through low paying and insecure jobs (Anton et al., 2024). This economic instability accelerated by climate change leads adolescent girls to informal labor market which exploits and abuse them (Fry & Lei, 2021).

Climate policies sensible to gender are inappropriate as they don't mention the special needs and vulnerabilities of adolescent girls (UNICEF & Karama, 2023). Very few national climate adaptation plans mentioned gender difference and even fewer plans provide interventions necessary to adolescent girls (Roy et al., 2022).

Adolescent girls need specific health and educational interventions. Healthcare, mental health and nutrition can be a way to decrease the health impacts (Crandon et al., 2022; Bolek et al., 2024). Proper support is necessary to continue education system. Schools that have proper preparation and recovery plans are found more active in continuing education and supporting students.

Community based activities works in building support and providing resource to support adolescent girls which is why it is vital (Aziz & Anjum, 2024). There should be engagement of adolescent girls as well as to empower and enhance their position in climate adaptation strategies (Plan International, 2021b).

The literature review highlights how climate change put an impact on adolescent girls, like as health, education socioeconomic challenges. It shows the necessity of gender responsive policies as well as targeted interventions. This review explained the necessity of increased research in order to understand specific effects and develop guidelines.

3. Research Question and Objectives

The study seeks to explore the core issue in which way does climate change put an impact on education, health and socioeconomic wellbeing of adolescent girls and what strategies should be there to mitigate these challenges?

This study aims to identify how climate change put impacts on adolescent girls, highlighting their health, education and socioeconomic status. It focuses on uncovering the challenges they face as well as providing guidance to implement gender responsive policies and interventions. Other specific objectives are:

- i. To investigate how climate change put impact on the health of adolescent girls.
- ii. To evaluate how climate change become an obstacle to the education of adolescent girls.
- iii. To examine which socioeconomic challenges do the adolescent girls faced due to climate change.

4. Theoretical Framework

This research explores the intersection of gender and environmental issues whereas vulnerability and resilience works as a foundation (Adger & Brown, 2009). It explains that climate change have different impact on men and women as well as gender specific adaptation strategies are necessary as adolescent girls are more vulnerable to climate change as a result of social, economic and environmental factors (Schwerhoff & Konte, 2019).It explains the challenges adolescent girls faces as a result of their age, gender and socioeconomic status, increasing their risk to being victim of climate related issues(Burns & Mutunga,2024). The major concerns are related to health risks, educational disruptions and increased socioeconomic pressures. This framework has the motive to influence gender responsive climate policies and interventions in order to develop the well-being of adolescent girls (Shabib & Khan, 2014). This framework aims to motivate climate policies and interventions so that they can promote the well-being of adolescence girls in the continuous change of environment.

5. Research Methodology

In conducting this research the study is carried out in a qualitative nature. It has covered the required steps to gather the data from the study areas.

5.1 Study area:

The study is at Sunamganj district in Bangladesh. Tahirpur Upazila is the main center of study including Tahirpur Sadar, South Sripur and Balijuri Union. This upazila has often been affected by flooding and the mentioned three areas are most vulnerable to flood there. A total number of nine focus group discussions (FGD) have been organized to hold in the three unions: Tahirpur Sadar, South Sripur and Balijuri.

5.2 Respondents

In the field, qualitative data is collected from the respondents mainly adolescent girls aged in between 15-18 who experienced climate impacts have been included with their consent.

5.3 Sampling

This sample size is fixed by 76 adolescent girls in number. A purposive sampling technique has been followed in collecting data from different adolescent girls.

5.4 Methods

Data was collected through an interview questionnaire. Interview schedule, field diary, field notes and voice recordings have been used here.

5.5 In-depth interview

15 in depth interviews were arranged among these participants to capture the causes behind the real scenario of challenges faced by adolescent girls.

5.6 Focus group discussion

Three focus group discussions (FGD) were held in each union for deeper understanding and each FGD consists of in between 7 to 10 participants to ensure a convenient and productive discussion. FGDs have been conducted to collect data throughout a proper connection with participants by sharing their perspectives and experiences on health, education and socioeconomic status.

Table: List of the FGDSs and Participants and Sample Areas

| Union | Number of the participants of 9 different FGDSs | | | |
|----------------|---|---|---|----|
| Tahirpur Sadar | 10 | 9 | 8 | 27 |
| South Sripur | 10 | 8 | 7 | 25 |
| Balijuri | 9 | 8 | 7 | 24 |
| Total | | | | 76 |

5.7 Secondary data:

Different journal articles, news reports, previous research papers and different websites have been utilized as the sources of secondary data.

5.8 Data analysis:

The qualitative data has been analyzed through thematic analysis. The FGDSs have been re-written and coded manually as well as the themes have been elaborated and refined by the researchers thoroughly. Researchers discussed the data and ensured the reliability, increasing the transparency and accuracy of the study. The themes have been identified to explore the patterns and relationships among the data.

6. Findings and discussion

Familiarization, coding, theme identification and refinement have been used to examine the data collected through FGDSs and in-depth interviews. Through this thematic analysis method, detailed insights and key themes have been identified on how the climate change affects health, education and socioeconomic status of adolescent girls.

6.1 Health impacts

Health related illnesses: Areas lacking cooling systems and healthcare facilities have been claimed with a higher rate of heat related illness including heat exhaustion and dehydration (Sapari, 2024). It was stated by a respondent that: *“I can’t tolerate the heat waves. As we don’t have ventilators or enough medical care, it makes me feel less energetic”* (Tahirpur Sadar). An FGD member also discloses the same opinion: *“I got sick as a result of collecting water in the blazing sun. My parents were worried, but there was nothing else to do”* (Balijuri). Therefore, it can be one of the most important health impacts. Different health related illness disproportionately affects adolescent girls like extreme heat, combined with poor infrastructure and lack of medical care leading to exhaustion and dehydration. These findings underscore the need for localized cooling solutions and improved healthcare access to reduce the burden of heat-related illness.

Waterborne diseases: Climate change causes a rise in flooding and poor sanitation which leads to larger amount of waterborne disease like cholera, skin infections and diarrhea. Adolescent girls become victim to these diseases mostly as they fetch water traditionally (Anikeeva et al., 2024). A 15 years old girl specified that: *“When the flood was over, I was attacked by diarrhea several times. The water was polluted and despite being risky, I had to fetch water regularly”* (South Sripur). A participant stated their sufferings: *“I couldn’t go outside for weeks as I had skin*

diseases. Most of friends suffered the same” (Tahirpur Sadar). Poor sanitation and frequent floods contribute to the spread of waterborne diseases among adolescent girls particularly as they bear water fetching responsibilities. To protect them from frequent health hazards it is essential to addressing clean water access and sanitation infrastructure.

Anxiety and depression: Psychological stress from climate-related displacement and family hardships emerged as a significant theme, with many girls reporting heightened anxiety and depression due to the unpredictability and disruptions caused by climate change (Treble et al., 2023). A typical view was: *“I had trouble sleeping for weeks after our house was destroyed by floods. Will this happen again? I kept wondering” (Tahirpur Sadar).* One of the participants described that: *“There are moments when I want to cry for no apparent reason. The difficulties at home and the uncertainty about the future are simply too great” (Balijuri).* Climate related displacement has left adolescent girls vulnerable to psychological burden like anxiety, stress, and depression. To address trauma and build resilience these types of emotional struggles call for crucial mental health interventions and community base support systems.

Coping appliances: Participants noted a lack of mental health support and coping appliances in their regions, leaving them to face the psychological challenges of climate-related issues on their own (Boyd et al., 2024). One interviewee expressed: *“We have no one to turn to when we are afraid. I wish there was someone who could help us get through these difficult time” (South Sripur).* A participant strongly believes that: *“I try to keep myself busy with my work so I don’t have to think about our problems, but it’s hard to stay resilient” (Balijuri).* The absence of coping tools and emotional health services exacerbates the mental toll of climate change on adolescent girls. Their narratives emphasis a pressing need for peer support system, resilience building strategies that is culturally appropriate and psychological counseling.

6.2 Educational disruptions

Missed School Days: Intense weather events, such as floods, storms, and heat waves, led to school closures and absenteeism, disrupting participants' academic progress (Habiba et al., 2021). One of the participants stated that: *“Our school was closed for weeks during the floods. I had forgotten half of what we had learned by the time we reopened” (Balijuri).* A 16 years old girl disclosed: *“I often missed school during storms because the streets were either flooded or unsafe to cross” (South Sripur).* Due to floods, storms and extreme heats, adolescent girls frequently miss school thus disrupting their academic progress. To ensure educational continuity during environmental crisis climate resilient school planning and early warning systems must be prioritized.

Economic pressures: Economic hardship from climate events led many families to prioritize boys' education over girls', resulting in higher dropout rates among girls (Caruso et al., 2024).

A 15 years old girl revealed that: *“I had to stop going to school, but my brother is still there. According to my parents, they can only afford to send one of us, and he is the most important” (Tahirpur sadar).* An interviewee remarked that: *“My family needed my help at home after the flood destroyed our crops even though I wanted to study.” (South Sripur).* Economic crisis caused by climate shocks often result in families sacrificing girls' education, which reinforces gender

disparity in learning access. To keep girls in school despite financial stress, a shift in policy and family support programs is essential to keep girls in school despite financial stress.

Damaged schools: Participants from disaster-stricken areas reported significant damage to school infrastructure, leading to reduced attendance and a decline in the quality of education (Vinsela, 2024). A respondent stated that: *“The storm destroyed the roof of our school. Classes were suspended and repairs took several months”* (Balijuri). One participant described it as: *“We cannot concentrate on learning because the classrooms are so damaged. Occasionally we take lessons while sitting under trees”* (Tahirpur sadar). During disasters destruction of school buildings directly girls ability to learn and hampers their total education system. In addition, poor school infrastructures create unsafe, demotivating learning environments. For continued learning rebuilding efforts must prioritize safe, inclusive and climate resilient educational spaces.

Lack of resources: Climate change caused a shortage of educational resources, with girls reporting that inadequate study materials and poor classroom conditions hindered their academic progress (Hyndman & Vanos 2023). A common statement was: *“The classrooms are full and we don’t even have enough books to share. We seem to be falling behind”* (Tahirpur sadar). In the experience of one group member: *“It is difficult to study in the heat at our school because we cannot use fans or lights because we have no electricity”*(Balijuri). Insufficient books, electricity and classroom environments contributing to falling academic standards thus, lack of resource shortages in climate resilient educational spaces for continued learning. It is vital to address these gaps for long term development and educational equity.

6.3 Socio-economic challenges

Increased labor: Climate change-induced economic uncertainty increased household labor and wage-earning responsibilities for girls, leaving them with less time for education and personal development (Chitiga-Mabugu et al., 2023). According to a 15 years girl: *“I don’t have time to study because I have to help my mother at home and work in the fields”* (South Sripur). As reflected in this statement: *“After my father lost his job due to the floods, my family relies on me to do more work”* (Balijuri). Climate induced economic shocks force adolescent girls into heavier domestic and wage labor and reduces time for education and self-care. To reduce girls’ labor burden and protect their right to learn and grow, targeted interventions are needed to reduce girls’ labor.

Early marriage: Families viewed girls as household burdens, leading to an increase in early marriages. Participants explained that climate change-induced poverty significantly contributes to this trend (Ainul et al., 2024). One interviewee stated: *“My parents said they could no longer afford to care for me, so they arranged my marriage to ease their financial burden”* (Tahirpur sadar). A participant expressed: *“Because her family was in financial difficulties, a girl from our village got married at the age of fifteen. It scares me that I could experience the same thing”* (Balijuri). Girls are often viewed as economic burden and thus poverty worsened by climate change leads to early marriage. To combat this requires strong social protection, awareness campaigns and community engagement to delay marriage and promote girls’ empowerment.

Limited Employment: Climate-induced economic fallout reduced employment opportunities for adolescent girls, forcing those seeking to support their families into low-paying and insecure jobs (Anton et al., 2024). As highlighted by a participant: *“I looked everywhere for a job, but there is nothing in our area. Even the meager work that exists pays so little”* (Tahirpur sadar). It was noted by a respondent that: *“I wanted to support my family, but there are no jobs for girls like me or they are dangerous”* (South Sripur). Adolescent girls fight for safe work, meaningful task in climate affected areas, often resorting to low paid jobs. It is essential to empower them through gender sensitive employment programs and local job creation for their economic freedom and better livelihood.

Skill Development: The lack of education and vocational training opportunities hindered girls' skill development, making economic prosperity difficult to achieve. Participants emphasized the need for skill development and employment support programs (Allen, 2022). One participant described it as: A 17 years old girl said that: *“There are no training options nearby. I would like to learn something practical, but there is no one available to teach us”* (Balijuri). An opinion stated by a participant: *“We don't have the opportunity to learn computers or tailoring, but I could make money if I did”* (South Sripur). The cycles of poverty and dependency traps girls for lack of vocational training. To achieve financial stability and resilience in a changing climate it is essential to equipping girls through access to practical skill building opportunities.

The thematic analysis reveals that educational disruptions and worsening socioeconomic challenges significantly expose adolescent girls to the impacts of climate change, affecting their physical and mental health. It underscores the urgent need for gender-responsive interventions to safeguard and enhance their health, education, and economic opportunities in the face of the climate crisis. The study emphasizes the unique impacts of climate change on adolescent girls, offering insights into their specific vulnerabilities. It advocates for targeted policies and programs that prioritize their well-being and empowerment, acknowledging their vital role in fostering resilient communities.

This study, based on a limited sample of 76 adolescent girls, may not represent all regions or communities affected by climate change due to geographic and socioeconomic variations. Self-reported data from interviews and focus groups may introduce biases, and the study offers a snapshot rather than long-term insights, highlighting the need for longitudinal research. Additionally, it does not account for the influence of cultural and social norms, which play a crucial role in shaping girls' experiences and responses to climate challenges.

7. Conclusions and Recommendations

This research works on finding how climate change poses an impact on adolescent girls. A qualitative study has been held to sort out the findings. With the help of purposive sampling, focus group discussion (FGD), in-depth interviews and thematic analysis, this study highlighted the importance of proper policy implementation to make the climate change less harmful to adolescent girls. It explains resilience-building and community adaptation strategies as important to reduce the impact of climate change on adolescent girls. It suggests more research to make effective policies to protect and empower adolescent girls. Among the participants the health

impacts emerged as one of the most crucial concerns and they reported sufferings from heat related illness such as exhaustion and dehydration. Different waterborne diseases like cholera, diarrhea and skin infections were also reported. Despite of physical health the findings point to a significant rise in psychological aspects such as anxiety, stress and depression caused by climate related displacement such as family instability and lose of homes. Many girls expressed a lack of mental health resources and support system to help them cope with these hard situations and manage their trauma alone. A comprehensive health response for both physical and psychological care is urgently needed to the unique challenges faced and experienced by adolescent girls in climate affected regions. In the sphere of education, many participants described, climate change as one of the persistent barrier, extreme weather events, for example floods and storms often led to school closures, learning disruptions and prolonged nonattendance. Climate related damage lead economic strain that forced families to withdraw girls from school, prioritizing boys' education instead which reflecting rooted gender biases. Lack of educational resources and infrastructural damage to school buildings further hampered the learning environment, reducing girls' academic performance and motivation. Educational disruptions are not only setbacks in academic development but also prolong long term implications for girls' empowerment. In the domain of socio-economic challenges, adolescent girls were also found to be closely linked with climate change. Due to the loss of crops and loss of livelihoods, leaving little time or energy for education, many of them were pushed into contributing to household labor or earning wages, as family income plummeted. In this crucial time families are unable to bear the financial burden, married of their daughters' prematurely and a trend of early marriage emerged. Girls also struggled to find safe and supportable employment and lack of job opportunities. Moreover, limited vocational training programs and limited access to skill development restricts their opportunities to gain economic independence. While this study offers a crucial portrait of the issues facing adolescent girls amidst climate change, it also encourages for a transformation in how we approach climate change. Not only as vulnerable populations but also as a key agent of change, at the center of policy responses adolescent girls must be placed. It is essential for empowering them not only for their individual well-being but also for the development of more resilient, equitable and climate ready communities through access to education, healthcare and economic resources. On these findings further research should build that safeguard the rights, health, education, socio-economic challenges to inform interventions and futures of adolescent girls in a warming world.

Adolescent girls face numerous challenges due to climate change. There should be proper design for policy implementation so that the adolescent girls have adequate access to healthcare, education and economic opportunities. There should be programs to address and make the adolescent girls aware of their physical and mental health challenges. Building of resilient educational infrastructure and remote learning facilities should be enriched so that girls' can continue their education before and after climate induced events. Families should be given financial support which will decrease early marriage and exploitation. Developing community based activities will make people more aware. Cultural and social norms have an impact on

peoples climate induced behavior and it should be studied. Long term and studies are necessary to understand the multi-dimensional impact of climate change on adolescent girls.

References

- ADB. (2021). *Bangladesh climate and disaster risk atlas*. Retrieved June 8, 2022, from <https://www.adb.org/sites/default/files/publication/760776/bangladesh-climate-disaster-risk-atlas-volume1-cover-pg29.pdf>
- Adger, W. N., & Brown, K. (2009). Vulnerability and resilience to environmental change: Ecological and social perspectives. In N. Castree, D. Demeritt, D. Liverman, & B. Rhoads (Eds.), *A companion to environmental geography* (pp. 109-122). <https://doi.org/10.1002/9781444305722.ch8>
- Ainul, S., Saha, J., Hossain, M. I., & Amin, S. (2022). Climate change and child marriage: Evidence from Bangladesh. *The Bangladesh Development Studies*, 45(1&2), 1–25. <https://doi.org/10.57138/VNEO7557>
- Akter, N., Islam, M. R., Karim, M. A., Miah, M. G., & Rahman, M. M. (2023). Spatiotemporal rainfall variability and its relationship to flash flood risk in Northeastern Sylhet Haor of Bangladesh. *Journal of Water and Climate Change*, 14(11), 3985–3999. <https://doi.org/10.2166/wcc.2023.165>
- Allen, N. (2022). Gender disparity and climate change: Addressing the disproportionate effects of climate change on women. *Global Energy Law and Sustainability*, 3(2), 206–226. <https://doi.org/10.3366/gels.2022.0080>
- Anikeeva, O., Hansen, A., Varghese, B. M., Borg, M., Zhang, Y., Xiang, J., & Bi, P. (2024). The impact of increasing temperatures due to climate change on infectious diseases. *BMJ*. <https://doi.org/10.1136/bmj-2024-079343>
- Anton, B., Cuevas, S., Hanson, M., et al. (2024). Opportunities and challenges for financing women's, children's and adolescents' health in the context of climate change. *BMJ*. <https://doi.org/10.1136/bmjgh-2023-014596>
- Arpin, E., Gauffin, K., Kerr, M., Hjern, A., Mashford-Pringle, A., Barros, A., Rajmil, L., Choonara, I., & Spencer, N. (2021). Climate change and child health inequality: A review of reviews. *MDPI*. <https://www.mdpi.com/1660-4601/18/20/10896>
- Asadullah, M. N., Islam, K. M. M., & Wahhaj, Z. (2021). Child marriage, climate vulnerability and natural disasters in coastal Bangladesh. *Journal of Biosocial Science*, 53, <https://doi.org/10.1017/S0021932020000644>
- Assaduzzaman, M., Filatova, T., Coenen, F., & Lovett, J. (2020). Freedom of choice to migrate: Adaptation to climate change in Bangladesh. *International Journal of Sustainable Development & World Ecology*. <https://doi.org/10.1080/13504509.2020.1754959>
- Aziz, M., & Anjum, G. (2024). Transformative strategies for enhancing women's resilience to climate change: A policy perspective for low- and middle-income countries. *Women's Health*. <https://doi.org/10.1177/17455057241302032>
- Bolek, M., Dobrzeniecki, K., Błaszczyszyn, K., Hopej, N., Muc, K., & Turek, K. (2024). The impact of climate change on mental health of children and adolescents. *Quality in Sport*, 16, 52387. <https://doi.org/10.12775/QS.2024.16.52387>

- Boyd, C. P., Jamieson, J., Gibson, K., Duffy, M., Williamson, M., & Parr, H. (2024). Eco-anxiety among regional Australian youth with mental health problems: A qualitative study. *Early Intervention in Psychiatry*. <https://doi.org/10.1111/eip.13549>
- Burns, P. A., & Mutunga, C. (2024). Addressing the impact of climate change on sexual and reproductive health among adolescent girls and young women in low- and middle-income countries. *Global Health: Science and Practice*, 12(1), e2300374. <https://doi.org/10.9745/GHSP-D-23-00374>
- Caruso G, de Marcos I, Noy I. 2024. Climate changes affect human capital. *Economics of Disasters and Climate Change* 8:157–196. https://www.cesifo.org/DocDL/cesifo1_wp10374.pdf
- Chitiga-Mabugu, M., Henseler, M., Maisonnave, H., & Mabugu, R. (2023). Climate change and women: Impacts and adaptation. *International Review of Environmental and Resource Economics*, 17(1), 99–152. <https://doi.org/10.1561/101.0000015>
- Crandon, T. J., Scott, J. G., Charlson, F. J., et al. (2022). A social–ecological perspective on climate anxiety in children and adolescents. *Nature Climate Change*, 12, 123–131. <https://doi.org/10.1038/s41558-021-01251-y>
- Delprato, M., & Shephard, D. (2024). Climate change and its impact on education completion rates across four sub-Saharan African countries: A non-parametric approach at the community level. *International Journal of Educational Development*, 110, 103129. <https://doi.org/10.1016/j.ijedudev.2024.103129>
- Dooley, L., Sheats, J., Hamilton, O., Chapman, D., & Karlin, B. (2021). Climate change and youth mental health: Psychological impacts, resilience resources, and future directions. *Los Angeles, CA: See Change Institute*. <https://seechangeinstitute.com/wp-content/uploads/2022/03/Climate-Change-and-Youth-Mental-Health-Report.pdf>
- Erikson, E. H. (1950). *Childhood and Society. The landmark work on the social significance of childhood*. New York: W.W. Norton & Company.
- Fatemi, M. N., Okyere, S. A., Diko, S. K., Kita, M., Shimoda, M., & Matsubara, S. (2020). Physical vulnerability and local responses to flood damage in peri-urban areas of Dhaka, Bangladesh. *Sustainability*, 12(10), 3957. <https://doi.org/10.3390/su12103957>
- Fry, L., & Lei, P. (2021). A greener, fairer future: Why leaders need to invest in climate and girls' education. *Malala Fund*. https://assets.ctfassets.net/0oan5gk9rgbh/OFgutQPKIFoi5IfY2iwFC/6b2fffd2c893ebdebee60f-93be814299/MalalaFund_GirlsEducation_Climate_Report.pdf
- Gandidzanwa, C., & Togo, M. (2021). Impacts of Cyclone Idai and the road to recovery in education systems in Zimbabwe. In *Climate Change Research, Policy and Actions in Africa* (pp. XX–XX). Springer. https://doi.org/10.1007/978-3-030-74303-1_7
- Gemini, G., & Das, O. (2024). The psychological impact of climate change: Anxiety, stress, and coping mechanisms. *Non Human Journal*, 1(7). <https://doi.org/10.70008/nhj.v1i07.34>
- Habiba, U., TuzZohora Jui, F., Meem, T., & Kabir, F. (2021). Disaster and education: Impact of flood on school going children at Keshabpur Upazilla in Bangladesh. *Journal of Disaster and Emergency Research*. <https://doi.org/10.18502/jder.6028>

- Helldén, D., Andersson, C., Nilsson, M., Ebi, K. L., Friberg, P., & Alfvén, T. (2021). Climate change and child health: A scoping review and an expanded conceptual framework. *The Lancet Planetary Health*, 5(3), e164–e175. [https://doi.org/10.1016/s2542-5196\(20\)30274-6](https://doi.org/10.1016/s2542-5196(20)30274-6)
- Hyndman, B., & Vanos, J. (2023). The impact of extreme weather on school communities. *Routledge*. <https://doi.org/10.4324/9781003103165>
- IDMC. (2023). *GRID 2023: Internal displacement and food security*. IDMC. https://api.internaldisplacement.org/sites/default/files/publications/documents/IDMC_GRID_2023_Global_Report_on_Internal_Displacement_LR.pdf
- IPCC (2022). *Climate Change 2022: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. <https://doi.org/10.1017/97810093258444>.
- Khandekar, N., Gorti, G., Bhadwal, S., & Rijhwani, V. (2019). Perceptions of climate shocks and gender vulnerabilities in the Upper Ganga Basin. *Environmental Development*, 31, 97-109. <https://doi.org/10.1016/j.envdev.2019.02.001>
- Kwauk, C. (2021). Why is girls' education important for climate action? *Brookings Commentary*. <https://www.brookings.edu/articles/why-is-girls-education-important-for-climate-action/>
- Ma, T., Moore, J., & Cleary, A. (2022). Climate change impacts on the mental health and wellbeing of young people: A scoping review of risk and protective factors. *Social Science & Medicine*, 301, 114888. <https://doi.org/10.1016/j.socscimed.2022.114888>
- Mahmud, F. (2022, May 25). 'Children are starving': A cry for help from flood-hit Bangladesh. *Aljazeera*. <https://www.aljazeera.com/news/2022/5/25/children-are-starving-a-cry-for-help-from-flood-hit-bangladesh>
- Malala Fund. (2021). *A greener, fairer future: Why leaders need to invest in climate and girls' education*. Malala Fund. <https://malala.org/newsroom/malala-fund-publishes-report-on-climate-change-and-girls-education>
- Marcus, R., et al. (2023). Children affected by internal migration and displacement in Latin America and the Caribbean. *UNICEF*. <https://www.unicef.org/lac/en/media/40981/file/Children-affected-by-internal-migration.pdf>
- Martin, G., Reilly, K., Everitt, H., & Gilliland, J. A. (2022). The impact of climate change awareness on children's mental wellbeing and negative emotions: A scoping review. *Child and Adolescent Mental Health*, 27(1), 59–72. <https://doi.org/10.1111/camh.12525>
- McGaughey, C. (2021). Girls' education and climate resilience in Sub-Saharan Africa's agricultural sector. *International Human Rights Internship Program | Working Paper Series*. https://www.mcgill.ca/humanrights/files/humanrights/mcgaughey_clara_girls_education_and_climate_resilience_in_sub-saharan_africas_agricultural_sector.pdf
- McGushin, A., Gasparri, G., Graef, V., Ngendahayo, C., Timilsina, S., Bustreo, F., & Costello, A. (2022). Adolescent wellbeing and climate crisis: Adolescents are responding, what about

- health professionals? *BMJ*, <https://doi.org/10.1136/bmj-2022-071690>
- Musarandega, H., & Masocha, W. (2023). Disasters and the education system: Cyclone Idai and schooling disruption in eastern Chimanimani, Zimbabwe. *Jamba: Journal of Disaster Risk Studies*, 15(1), 1349. <https://doi.org/10.4102/jamba.v15i1.1349>
- Nielsen, A., & Allen, R. (2021). *Futures at risk: Protecting the rights of children on the move in a changing climate*. UNICEF UK. https://www.unicef.org.uk/wp-content/uploads/2021/05/UNICEFUK_FuturesAtRisk_Displacement_Report-1-Compressed.pdf
- O'Neill, B. C., Jiang, L., KC, S., Fuchs, R., Pachauri, S., Laidlaw, E. K., Zhang, T., Zhou, W., & Ren, X. (2020). The effect of education on determinants of climate change risks. *Nature Sustainability*, 3(7), 520–528. <https://doi.org/10.1038/s41893-020-0512-y>
- Ojala, M. (2022). How do children, adolescents, and young adults relate to climate change? Implications for developmental psychology. *European Journal of Developmental Psychology*, 20(6), 929–943. <https://doi.org/10.1080/17405629.2022.2108396>
- Pal, A., Tsusaka, T. W., Nguyen, T. P. L., & Ahmad, M. M. (2023). Assessment of vulnerability and resilience of school education to climate-induced hazards: A review. *Development Studies Research*, 10(1). <https://doi.org/10.1080/21665095.2023.2202826>
- Piaget, J. (1971). *The theory of stages in cognitive development.* In *Measurement and Piaget*, edited by D. R. Green, M. P. Ford, and G. B. Flamer, New York, NY: McGraw-Hill.
- Picetti, R., Juel, R., Milner, J., Bonell, A., Karakas, F., Dangour, A. D., Yeung, S., Wilkinson, P., & Hughes, R. (2023). Effects on child and adolescent health of climate change mitigation policies: A systematic review of modeling studies. *Environmental Research*, 238(Part 1). <https://doi.org/10.1016/j.envres.2023.117102>
- Pirzadeh, A., Solórzano, J., Xiong, Y., Irfan, M., Kwasi, S., Hanna, T., Moyer, J. D., Azcona, G., Bhatt, A., & Duerto Valero, S. (2023). *Gendered analysis of the impact of climate change on poverty, productivity and food insecurity: A technical report*. Frederick S. Pardee Center for International Futures and UN Women. <https://data.unwomen.org/sites/default/files/documents/Publications/2023/Gender-Climate-technical-report.pdf>
- Plan International. (2021a). *Girls' rights in climate strategies*. Plan International. https://plan-international.org/uploads/2021/12/publication-girls_rights_in_climate_strategy-v5.pdf
- Plan International. (2021b). Study on Women and Girls' Participation in Community Disaster Risk Management in Bangladesh. <https://plan-international.org/uploads/sites/57/2022/06/Research-Findings-Bangladesh-Elements-of-Replicable-models-to-increase-inclusion-of-vulnerable-groups.pdf>
- Pope, D. H., McMullen, H., Baschieri, A., Philipose, A., Udeh, C., Diallo, J., et al. (2023). What is the current evidence for the relationship between the climate and environmental crises and child marriage? *Global Public Health*, 18. <https://doi.org/10.1080/17441692.2022.2095655>
- Pourtaheri, A., Mahdizadeh, M., Tehrani, H., Jamali, J., & Peyman, N. (2024). Socio-ecological

- factors of girl child marriage: A meta-synthesis of qualitative research. *BMC Public Health*, 24(1), 428. <https://doi.org/10.1186/s12889-023-17626-z>
- Proulx, K., Daelmans, B., Baltag, V., & Banati, P. (2024). Climate change impacts on child and adolescent health and wellbeing: A narrative review. *Journal of Global Health*, 14. <https://doi.org/10.7189/jogh.14.04061>
- Rezwana, N., & Pain, R. (2020). Gender-based violence before, during and after cyclones: Slow violence and layered disasters. *Disasters*, 45(4), 741–761. <https://doi.org/10.1111/disa.12441>
- Ross, D. A., Hinton, R., Melles-Brewer, M., Engel, D., Zeck, W., Fagan, L., Herat, J., Phaladi, G., Imbago-Jácome, D., Anyona, P., Sanchez, A., Damji, N., Terki, F., Baltag, V., Patton, G., Silverman, A., Fogstad, H., Banerjee, A., & Mohan, A. (2020). Adolescent wellbeing: A definition and conceptual framework. *The Journal of Adolescent Health*, 67(4), 472–476. <https://doi.org/10.1016/j.jadohealth.2020.06.042>
- Roy, S., Tandukar, S., & Bhattarai, U. (2022). Gender, climate change adaptation, and cultural sustainability: Insights from Bangladesh. *Frontiers in Climate*, 4. <https://doi.org/10.3389/fclim.2022.841488>
- Sanson, A., & Bellemo, M. (2021). Children and youth in the climate crisis. *BJPsych Bulletin*, 45(4), 205–209. <https://doi.org/10.1192/bjb.2021.16>
- Sapari, H. (2024). The impact of heat waves on healthcare services in developing countries: A systematic review. *Educational Administration: Theory and Practice*, 30(5). <https://doi.org/10.53555/kuey.v30i5.3683>
- Schwerhoff, G., & Konte, M. (2019). Gender and climate change: Towards comprehensive policy options. In *Women and sustainable human development* (pp. 51–67). https://doi.org/10.1007/978-3-030-14935-2_4
- Shabib, D., & Khan, S. (2014). Gender-sensitive adaptation policy-making in Bangladesh: Status and ways forward for improved mainstreaming. *Climate and Development*, 6(4), 329–335. <https://doi.org/10.1080/17565529.2014.951017>
- Sims, K. (2021). Education, girls' education and climate change (K4D Emerging Issues Report 29). *Institute of Development Studies*. <https://doi.org/10.19088/K4D.2021.044>
- Tiwari, I., Tilstra, M., Campbell, S. M., Nielsen, C. C., Hodgins, S., Osornio Vargas, A. R., Whitfield, K., Sapkota, B. P., & Yamamoto, S. S. (2022). Climate change impacts on the health of South Asian children and women subpopulations: A scoping review. *Heliyon*, 8(10). <https://doi.org/10.1016/j.heliyon.2022.e10811>
- Treble, M., Cosma, A., & Martin, G. (2023). Child and adolescent psychological reactions to climate change: A narrative review through an existential lens. *Current Psychiatry Reports*, 25, 357–363. <https://doi.org/10.1007/s11920-023-01430-y>
- UN Women. (2023). Gendered impacts of climate change: Evidence from Asia. <https://data.unwomen.org/sites/default/files/documents/Publications/2023/impact-climate-change->

gender-asiapacific.pdf

- UNESCO. (2021). Out-of-school children and youth. *UNESCO*. <https://uis.unesco.org/en/topic/out-school-children-and-youth>
- UNICEF ROSA. (2020). Rising to the challenge: Youth perspectives on climate change and education in South Asia. *UNICEF ROSA*. <https://www.unicef.org/rosa/media/11296/file/Rising%20to%20the%20Challenge.pdf>
- UNICEF, & Karama. (2023). *Climate change: Impact on adolescent girls – Technical cohort advocacy brief*. UNICEF. <https://www.unicef.org/mena/media/23806/file/Climate%20Change%20Impact%20on%20Adolescent%20Girls%20-%20Advocacy%20Brief%20.pdf>
- UNICEF. (2022). Bangladesh floods situation report. Retrieved from <https://www.unicef.org/>
- UNICEF. (2023). Triple threat: How disease, climate risks, and unsafe water, sanitation, and hygiene create a deadly combination for children. *UNICEF*. <https://www.unicef.org/media/137206/file/triple-threat-wash-EN.pdf>
- UNICEF. (2024). Future ready: Powering girls for a green economy transformation in Asia. *UNICEF*. https://www.unicef.org/eap/media/16461/file/Future%20Ready_Powering%20girls%20for%20a%20green%20economy%20transition%20in%20Asia_FINAL_1.pdf.pdf
- UNRCB. (2022, June 19). Bangladesh: Severe flash flood Office of the UN Resident Coordinator situation. *Relief Web*. <https://reliefweb.int/report/bangladesh/bangladesh-2022-severe-flash-flood-office-un-resident-coordinator-situation-update-1-19-june-2022>
- Valero, S. (2023). Gendered analysis of the impact of climate change on poverty, productivity and food insecurity: A technical report. *PCIF and UN Women*. <https://data.unwomen.org/sites/default/files/documents/Publications/2023/Gender-Climate-technical-report.pdf>
- Van Nieuwenhuizen, A., Hudson, K., Chen, X., & Hwong, A. R. (2021). The effects of climate change on child and adolescent mental health: Clinical considerations. *Current Psychiatry Reports*, 23(12), 88. <https://doi.org/10.1007/s11920-021-01296-y>
- Venegas Marin, S., Schwarz, L., & Sabarwal, S. (2024). The impact of climate change on education and what to do about it. *The World Bank*. <https://documents1.worldbank.org/curated/en/099043024150036726/pdf/P180005171cc7c0c91a8b011d03080e9086.pdf>
- Vinsela, T. J. (2024). Causes and effects of climate change in education. *Shanlax International Journal of Arts, Science and Humanities*. <https://doi.org/10.34293/sijash.v11is2-feb.7423>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* Cambridge, Mass. Harvard University Press.
- Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Beagley, J., Belesova, K., ... & Woodward, A. (2019). The 2019 report of The Lancet Countdown on health and climate change: Ensuring that the health of a child born today is not defined by a changing climate. *The*

- Lancet*, 394(10211), 1836–1878. [https://doi.org/10.1016/S0140-6736\(19\)32596-6](https://doi.org/10.1016/S0140-6736(19)32596-6)
- WHO. (2024a, October 10). Mental health of adolescents. *WHO* <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>
- WHO. (2024b, November 26). Adolescent and young adult health. *WHO*. <https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions>
- World Bank . (2023). DataBank – World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators>
- World Risk Report. (2024). *Bündnis Entwicklung Hilft, & Ruhr University Bochum – (IFHV)*. <https://weltrisikobericht.de/download/4145/?tmstv=1725790430>