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Regular Article

Gender based knowledge difference on social-environmental risk: a study on secondary school students of southwest coastal areas of Bangladesh

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ABSTRACT

This study examines gender-based differences in the understanding of social and environmental risks among secondary school students in the southwest coastal region of Bangladesh, a disaster-prone and socioeconomically vulnerable area. Drawing on survey data from 514 students across Khulna, Bagerhat, and Satkhira districts, the study employed independent sample t-tests and chi-square tests to assess differences in knowledge and information sources by gender. The analysis revealed that girls exhibited relatively higher awareness of social risks and mental health issues, while boys demonstrated slightly greater understanding of environmental risks and made more use of digital platforms. School-based learning was the primary source of information for both groups; however, boys more frequently cited online sources, while girls relied more on teachers and family members. The findings underscore how structural inequalities and sociocultural norms shape gendered access to knowledge. The study calls for educational and policy interventions that promote equitable information dissemination, strengthen inclusive risk communication, and address intersectional vulnerabilities in disaster-prone regions.

1. Introduction

Adolescents are particularly vulnerable to environmental and social risks due to their ongoing cognitive, emotional, and physiological development. This vulnerability is further exacerbated by the consequences of globalization, rapid technological advancement, and climate change, which increase exposure to a variety of hazards, such as natural disasters, biohazards, and social threats (Hasan & Sony, 2022; Rashid et al., 2023). In order to develop effective, context-sensitive intervention strategies, it is imperative to comprehend how young individuals perceive and respond to these hazards as societies become more interconnected (Yu et al., 2024). There is an increasing academic demand to examine the variation in risk awareness among population subgroups, particularly during the formative years of adolescence, in accordance with Beck's (2014) "risk society" theory.

Simultaneously, institution plays an essential role in the development of adolescents' perceptions of risk. Educational institutions are well-positioned to incorporate disaster risk reduction (DRR) into the curriculum and foster critical thinking about social and environmental challenges, as they provide a structured environment for disseminating knowledge (Khan et al., 2020, 2021). In such regards, Khan et al. (2021), Velásquez-Espinoza and Alcántara-Ayala (2025) and Shoji et al. (2020) have highlighted school-based education as a critical factor in the development of resilience, particularly among children and adolescents, who are frequently most impacted by crises but are often least prepared to respond. Curricular content and textbooks serve as potent social

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instruments that not only disseminate knowledge but also reinforce societal values and government priorities (Khan et al., 2020, 2021; Velásquez-Espinoza & Alcántara-Ayala, 2025). Therefore, it is essential to provide students with comprehensive and precise risk information that is presented in a manner that is culturally pertinent and age-appropriate to cultivate future generations that are capable of enduring disruptions.

Moreover, the significance of gender perspectives in disaster preparedness and risk awareness has been increasingly highlighted by recent research. Gender, as a social construct, affects the way individuals perceive, respond to, and recover from hazards (Rashid et al., 2023; Yu et al., 2024). The unique requirements and experiences of boys and girls are adequately addressed through gender-disaggregated risk management approaches (Yu et al., 2024), which encompass areas such as housing, healthcare access, and psychological support during emergencies (Lassa et al., 2025). These issues are especially pertinent in the contemporary postmodern, interdependent world, where environmental and social crises have severe repercussions on economic stability, community resilience, and well-being (Chen et al., 2024; Lassa et al., 2025). Despite these advancements, there is a scarcity of research on the comprehension and mitigation of social and environmental hazards by school-aged adolescents of different genders in the context of developing countries (Lassa et al., 2025; Sony et al., 2023).

Bangladesh, due to its unique geographical location and ongoing socioeconomic transformations, is acutely exposed to environmental and social vulnerabilities (Roy et al., 2022, 2023). The southwest coastal region, in particular, faces regular threats from cyclones, flooding, salinity intrusion, and social insecurity (Roy et al., 2020, pp. 57–66). These challenges have led to an urgent need for understanding how adolescents living in such high-risk zones perceive and internalize risk, and how these perceptions differ by gender (Rashid et al., 2023). Studies (i.e., Evertsen (2023); Hossain and Li (2024); Roy et al. (2022); Roy et al. (2023); UNICEF (2024)) have previously explored age-specific and gender-specific patterns in environmental vulnerability, but there is a noticeable absence of integrated research that connects gendered risk knowledge with school-based educational responses in high-risk regions of Bangladesh.

Furthermore, the increasing frequency and severity of extreme events—such as pandemics, natural disasters, and socio-political crises—has heightened the urgency of this issue (Chen et al., 2024). These events can result in a spectrum of physical, emotional, and psychological effects for affected populations, particularly children and adolescents (Chowdhury et al., 2025; Lassa et al., 2025). In response, the World Health Organization (2020) has underscored the role of risk perception and emergency preparedness in managing unforeseen events, especially in school settings (Lassa et al., 2025). Research (e.g., Khan et al. (2021); Rashid et al. (2023); Sony (2023); Sony et al. (2023); Yu et al. (2024)) suggests that students' risk knowledge and coping strategies are significantly influenced by the presence (or absence) of crisis preparedness programs and inclusive education policies. It is, therefore, essential for national education systems to incorporate gender-sensitive and locally relevant strategies into their disaster preparedness frameworks.

Subsequently, this study contributes to the growing scholarship on adolescent risk perception by offering a critical, gender-based analysis of how secondary school students in Bangladesh's southwest coastal region—specifically the districts of Khulna, Bagerhat, and Satkhira—understand and respond to environmental and social threats. These districts are among the most disaster-prone in the country, frequently affected by tropical cyclones (e.g., Sidr, Aila, Amphan, Remal), tidal surges, salinity intrusion, and riverbank erosion, as well as by high rates of child marriage, school dropout, and gender-based insecurity. Their recurring exposure to both environmental and social hazards makes them uniquely suitable for examining how adolescents, particularly along gender lines, perceive risks and access information. By integrating the dimensions of gender, culture, and education within this high-risk context, the study addresses a significant gap in the literature and supports the development of evidence-based policies and localized educational tools. This effort aligns with global commitments under the Sendai Framework and Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 5 (Gender Equality), which emphasize inclusive, context-responsive learning environments and the reduction of gender disparities in disaster preparedness.

2. Theoretical background, literature review, and hypotheses

In accordance with Ulrich Beck and Anthony Giddens's concept of the risk society, a new era has commenced following technological advancement, which is characterized by technical and environmental uncertainties (Beck, 2014; Giddens, 2020). The asymmetrical distribution of risks, including pollution, ecological degradation, and technological hazards, is influenced, and exacerbated by the social, political, and economic structures of a society (Sony & Rashid, 2025; Wichmann et al., 2022). Beck (2014) and Giddens (2020) contend that the way individuals perceive risk is influenced by institutional mistrust, rival claims to expertise, and the increasing severity of systemic emergencies.

In addition to this concept, recent research has underscored the impact of individuals' perceptions of peril on their responses to environmental hazards (Lassa et al., 2025; Yu et al., 2024). Trust in institutions, personal experience, and the social environment all contribute to the formation of these perceptions (Khan et al., 2020; Lassa et al., 2025; Ng, 2023). When individuals perceive an elevated level of peril, they are more inclined to endorse and plan for public safety measures, including relocating from regions that are susceptible to hazards (Sony et al., 2024; Velásquez-Espinoza & Alcántara-Ayala, 2025; Yu et al., 2020). In contrast, individuals may encounter deficient or delayed responses as a consequence of their failure to take into account regional perspectives on risk as a result of disparities in information and perception (Khan et al., 2020).

Nonetheless, according to earlier studies (i.e., Bradley and Fry (2024); Chen et al. (2024); Guodaar et al. (2023); Jing et al. (2023); Sony et al. (2023); Yu et al. (2024)), perceptions of risk are significantly influenced by gender. Recent studies have shown that women often report higher sensitivity to socio-emotional risks, while men tend to prioritize physical threats (Lassa et al., 2025). Adolescent girls, especially in vulnerable regions, face compounded exposure to environmental and social hazards (Lassa et al., 2025; Yu et al., 2024), from displacement to gender-based violence (Rashid et al., 2023; Sony & Rashid, 2025). In Bangladesh's southwest coastal regions—marked by cyclonic storms, salinity intrusion, and land instability—such gendered vulnerabilities are further exacerbated by social norms, poverty, and uneven access to education (Roy et al., 2020, 2022; Sony et al., 2023).

Adolescents' mental health and development are seriously jeopardized by social hazards, which are on par with environmental challenges (Lassa et al., 2025). These hazards include things like aggression, bullying, harassment, fires, and traffic accidents. Anxiety, sadness, stress, and post-traumatic stress disorder (PTSD) are some of the psychological effects of these hazards that humans create (Bao & Han, 2025). Here, gender dynamics converge once more, putting girls at a greater risk of experiencing domestic violence, eve-teasing, and child marriage (Lassa et al., 2025; Rashid et al., 2023).

In addition, the media, social institutions, and formal education all play important roles in disseminating information about risks (Abi Jumaa et al., 2023; Chowdhury et al., 2025), which in turn shapes both awareness and readiness (Elmer et al., 2024; Rashid et al., 2023). Despite the continued importance of schools in fostering risk literacy, gender, institutional type, and geographic inequalities continue to be identified (Sony et al., 2023; Yu et al., 2024). Adolescent females, in particular, face barriers when it comes to accessing informal sources that shape their knowledge, such as radio, television, and stories (Bao & Han, 2025).

Consequently, in accordance with the Sendai Framework and the recommendations on inclusive risk education issued by the IPCC (2023)

and UNDRR (2022)(Khan & Mishra, 2022), this study examines the gender disparities in the comprehension of environmental and social hazards among secondary school pupils in the southwest coastal regions of Bangladesh. Thereafter, following the latest scholarship the researchers have hypothesized:

H1. There is a significant gender gap in comprehension of environmental risks among secondary school students in the southwest coastal region of Bangladesh.

H2. There is a significant gender gap in comprehension of social risks among these students.

H3. There is a significant gender difference in awareness and understanding of mental health issues that emerge from social risk factors among secondary school students.

H4. There is a significant gender difference in primary sources of risk knowledge (social and environmental).

H5. There is a significant gender difference in the most frequently used sources of risk knowledge.

3. Methodology

To investigate gender-based disparities in gender-based knowledge and perceptions regarding socio-environmental hazards among secondary school pupils in the southwest coastal region of Bangladesh, this study implemented a cross-sectional, empirical research design following Yu et al. (2024). To gather primary data, a self-administered questionnaire (SAQ) was developed in accordance with validated instruments from prior research (Khan et al., 2020, 2021; Rashid et al., 2023), with modifications to accommodate the local context. To guarantee comprehensibility among a variegated student body, the questionnaire was composed in both Bengali and English.

Adolescents aged 14 to 19 who were enrolled in secondary institutions situated in three subdistricts—Khulna, Bagerhat, and Satkhira—within the Khulna division comprised the unit of analysis. These areas were purposively selected due to their frequent and layered exposure to both environmental and social risks, which include tidal surges, flooding, waterlogging, salinity in both surface and groundwater, heatwaves, and cyclones, along with social risks such as early marriage, harassment, lack of mobility for girls, and school interruption (Roy et al., 2020, 2023; Sony et al., 2023). Notably, these coastal districts also experience disproportionate gendered vulnerabilities, with girls facing greater barriers in accessing digital platforms and formal disaster education (Roy et al., 2020, pp. 57–66). These factors make the region an ideal context for exploring how gender shapes adolescents' knowledge and perception of risk. The selection further responds to the limited availability of granular, adolescent-level data from these high-risk zones and aligns with national DRR strategies that prioritize capacity-building and resilience among youth in hazard-prone areas.

All analyses were designed to test the five hypotheses derived from the theoretical framework, focusing on gender-based differences in knowledge, perception, and sources of information related to socio-environmental risks. Although a judgmental (purposive) sampling strategy was employed due to contextual constraints—such as limited access to comprehensive student databases and logistical limitations in disaster-prone regions—the sample was drawn with clear inclusion criteria to maintain internal consistency. These criteria included school enrollment status, age range (14–19 years), and geographic location within high-risk subdistricts. While this non-probability method limits statistical generalizability, it aligns with established practice in exploratory and region-specific disaster education studies and has proven effective for capturing meaningful group differences, such as gendered knowledge patterns (cf. Khan et al., 2021; Yu et al., 2024).

The questionnaire was initially distributed to approximately 600 students in the selected districts. Nevertheless, a final sample of 514 students (n = 250 male and 264 female) was retained for analysis after excluding incomplete responses and withdrawals—over 50 students either opted out or failed to return the questionnaire. The study's purpose, voluntary nature, and confidentiality assurances were explicitly explained to each participant in the presence of school authorities, and informed oral consent was obtained to ensure ethical compliance. A five-point Likert-type scale was employed to evaluate a succession of cognitively demanding items in the questionnaire. The scale ranged from 0 ("I believe I don't know") to 4 ("I am able to express everything I know"). Various degrees of students' self-assessed cognizance and ability to articulate their knowledge were captured by these indicators

Table 1
indicators and questions for accessing students' socio-environmental risk knowledge.

Indicators and asked question	Supporting Literature
Environmental risk knowledge assessment	Roy et al. (2022); Rashid et al. (2023); Sony et al. (2023)
Do you know what is/are …	
Environmental risks?	
Types of disasters?	
Cyclone safety measures?	
Flood safety measures?	
Earthquake response?	
Thunderstorm safety?	
Cyclone signals count?	
Heat wave response?	
Social risk knowledge assessment	Beck (2014); Giddens (2020); Rashid et al. (2023); Yu et al. (2024); Chen et al. (2024); Lassa et al. (2025)
Do you know what is/are …	
Social risk?	
Snake bite response?	
Swimming ability?	
Water rescue response?	
Electrocution response?	
Fire emergency response?	
Fire brigade contact?	
Illness response?	
Eve-teasing response?	
Sexual harassment response?	
Discrimination response?	
Emergency phone number 999?	
Emergency phone number 333?	
Bullying response?	
Terrorist attack response?	
Drug abuse discussion?	
Self-defense techniques?	
First-aid?	
Road accident prevention methods?	
Mental health and social evil risk knowledge assessment	Rashid et al. (2023); Khan et al. (2020); Khan et al. (2021); Velásquez-Espinoza and Alcántara-Ayala (2025)
Do you know what is/are …	
Teenaged vulnerability?	
Mood swing?	
Mood swing response?	
Friend interaction?	
Nonbinary gendered friend interaction?	
Child marriage prevention?	
Women & child abuse helpline number?	
Source of knowledge	Rashid et al. (2023); Yu et al. (2024)
Where you did first time hear about it?	
Where most you have heard about it?	
Family	
School teacher	
Newspaper	
Reading book	
TV/radio	
From online	
None of above	

(Table 1), which were devised in accordance with established literature. Furthermore, participants were requested to specify their principal sources of information, selecting from six categories: family, schoolteachers, newspapers/books, television/radio, internet, and none of the aforementioned.

Besides, a pilot study was conducted with a randomly selected group of 50 students to guarantee the instrument's reliability and validity. Minor revisions were implemented in response to their feedback to enhance the intelligibility of specific items. The instrument's reliability was confirmed by the scores obtained above the accepted threshold of 0.70, which were obtained by evaluating the questionnaire's internal consistency using Cronbach's alpha.

To analyze the data, SPSS version 21 was employed. The primary demographic and response variables were summarized using descriptive statistics. Associations between gender and knowledge sources were investigated using chi-square tests. Furthermore, independent sample t-tests were implemented to investigate statistically significant disparities in knowledge and perception scores between male and female students. Despite the absence of logistic regression to account for potential confounding factors, such as socioeconomic status, the study adhered to the methodology of a comparable study—Yu et al. (2024)—which indicated that two-sample t-tests are adequate for addressing baseline gender-based questions in emergency knowledge assessments. To further isolate the effects of background variables, future research may benefit from the application of regression-based analyses.

In general, this methodological framework enabled an ethically sound and inclusive examination of adolescents' comprehension of environmental and social risks in a climate-vulnerable region of Bangladesh. All participants were clearly informed of the purpose of the study and participated voluntarily. The survey was conducted anonymously, and no personally identifiable information was collected at any stage of data gathering. This study was conducted in accordance with ethical standards for non-interventional educational research. It was reviewed and approved by the Research Cell, University of Barisal (Approval No. FBS-EC-53/2024). Given the minimal-risk, observational nature of the study, involving only self-reported educational data, this approach ensured ethical compliance and age-appropriate engagement throughout.

4. Findings

4.1. Demographic information of the respondents

With gender differences visible in several areas, the descriptive data (Table 2) paints a complex picture of the respondent demographic. In the first place, there are differences observed in the sample as different age groups are examined, even though the overall gender distribution is equal. Between the ages of 14 and 16, girls make up somewhat more of the respondents (30.4 %) than boys (26.1 %). On the other hand, boys make up 4.1 % of the sample, compared to 3.7 % for girls, in the elder age group of 17 or older. This raises the possibility of variations in gender-specific participation rates or adolescent experiences. Next, differences in housing arrangements draw attention to the various living circumstances that boys and girls face. Boys are more prevalent in traditional (16.7 %) and concrete (23.9 %) homes, but girls are more common in semi-concrete constructions (12.1 %). The variation can be the result of underlying socioeconomic variables affecting access to different kinds of housing arrangements or housing decisions depending on family dynamics or gender-specific characteristics. Lastly, differences in parental education and employment status are clearly gendered. Boys

Table 2
descriptive information of the respondents.

Descriptive information		Gender of the respondent					
		Boy		Girl		Chi-Square test	
		Frequency (N = 250)	Subtotal (%) N = 48.2 %)	Frequency (N = 264)	Subtotal (%) (N = 51.8 %)	X^2	*p-value*
Age	≤13	95	18.5	89	17.3	1.584	0.453
	14–16	134	26.1	156	30.4		
	17 ≥	21	4.1	19	3.7		
Housing structure	Traditional [bamboo & tin]	86	16.7	93	18.1	5.023	0.081
	Semi-concrete [brick wall & tin-shed]	41	8.0	62	12.1		
	Concrete	123	23.9	109	21.2		
Father's occupation	Government officer	4	0.8	9	1.8	7.340	0.062
	Government employe	4	0.8	12	2.3		
	Private Service (Officer)	6	1.2	9	1.8		
	Private Service holder	18	3.5	15	2.9		
	Big Business	46	8.9	39	7.6		
	Small Business	118	23.0	124	24.1		
	Non-resident of Bangladesh	34	6.6	36	7.0		
	Unemployed	20	3.9	20	3.9		
Mother's occupation	Govt. Officer	1	0.2	5	1.0	14.842	0.011
	Govt. servant	3	0.6	11	2.1		
	private service officer	5	1.0	3	0.6		
	Private servant	6	1.2	8	1.6		
	Small Business owner	7	1.4	0	0.0		
	Big Business owner	0	0.0	0	0.0		
	Non- Resident Bangladesh	0	0.0	0	0.0		
	Housewife	228	44.4	236	46.0		
Father's level of education	SSC or less	132	25.7	121	23.5	3.504	0.173
	HSC	69	13.4	64	12.5		
	Degree or graduate	18	3.5	30	5.8		
	Master or above	31	6.0	49	9.5		
Mother's level of education	SSC or less	163	31.7	158	30.7	2.66	0.447
	HSC	49	9.5	56	10.9		
	Degree or graduate	19	3.7	30	5.8		
	Master or above	19	3.7	20	3.9		
Number of Family members	≤4	78	15.2	66	12.8	7.661	0.667
	5–6	129	25.1	139	27.0		
	7 ≥	43	8.4	59	11.5		

(Source: Author Produces, 2024)

are more likely than girls to have fathers who work in large corporations (8.9 % vs. 7.6 %), whereas girls' mothers are more likely to be housewives (46.0 %) than boys' mothers (44.4 %). Furthermore, a marginally greater percentage of parents of girls have completed higher education, especially the HSC or above. These variances highlight how intricately socioeconomic variables interact to shape gender roles and opportunities in the population of respondents.

4.2. Environmental risk knowledge of the respondent

With an emphasis on a number of factors, Table 3 compares the knowledge of boys and girls with regard to major natural disaster risk comprehension. When evaluating the differences, *t*-test results are presented alongside the gender-specific mean scores and standard deviations. Here, a positive t-value indicates that the mean perceived knowledge of boys is higher than that of girls, whereas a negative t-value suggests that the mean perceived knowledge of girls is higher than that of boys. Analysis from this table revealed significant disparities between boys and girls in perceived knowledge for thunderstorm safety (*t-value*= −2.189, *p value*= 0.029) and a suggestive trend for cyclone signals (*t-value*= 1.819, *p value*= 0.070). However, no significant differences were observed for knowledge about environmental risks (*t-value*= −1.523, *p value*= 0.128), cyclone safety measures (*t-value*= 1.043, *p value*= 0.284), flood safety response (*t-value*= −0.474, *p value*= 0.636), or earthquake response (*t-value*= −1.243, *p value* = 0.215). Overall, it appears that boys and girls have a somewhat equal understanding of natural disaster risk, even though there are some discrepancies in knowledge levels between the genders across many areas of the understanding of the risk.

4.3. Social risk knowledge of the respondent

Table-4 presents that the participants show a comparison of gender-based differences in perceived knowledge about social risk responses in the southwest coastal areas of Bangladesh. Boys had slightly higher knowledge of emergency phone number 999 (*t-value*= 2.230, *p value*= 0.026), bullying response (*t-value*= 1.898, *p value*= 0.058) compared to girls significantly. Though boys have higher level of knowledge on emergency social risk (*t-value*= 0.489, *p value*= 0.625), snake bite response (*t value*= 1.011, *p value*= 0.312), fire brigade contact (*t-value*= 1.628, *p value*= 0.104) but girls were not found significant. On the other hand, girls scored slightly higher in knowledge of water rescue response (*t-value*= −2.036, *p value*= 0.042), electrocution response (*t-value*= −2.275, *p value*= 0.023) compared to boys. These findings imply that, despite a few minor variances, overall patterns indicate that gender does not significantly affect knowledge levels since both sexes have a roughly equal grasp of social risk response indicators. For both girls and boys, this is true.

Table 3
gender-based knowledge difference on major natural disaster risk comprehension.

Indicators	Boy (N = 250)		Girl (N = 264)		*T*-test	
	Mean	SD	Mean	SD	t-value	P-value
Knowledge about Environmental risks	2.33	1.008	2.47	1.096	−1.523	0.128
Knowledge about Types of disasters	2.26	1.397	2.34	1.471	−0.640	0.522
Knowledge about Cyclone safety measures	2.02	1.271	1.89	1.381	1.073	0.284
Knowledge about Flood safety measures	2.87	1.015	2.91	1.125	−0.474	0.636
Knowledge about Earthquake response	2.96	1.078	3.08	1.167	−1.243	0.215
Knowledge about Thunderstorm safety	2.39	1.328	2.64	1.283	−2.189	0.029
Knowledge about Cyclone signals count	1.95	1.379	1.73	1.420	1.819	0.070
Knowledge about Heat wave response	1.04	1.190	1.10	1.323	−0.596	0.551

Table 4
gender-based knowledge difference on social risk comprehension.

Indicators	Boy (N = 250)		Girl (N = 264)		*T*-test	
	Mean	SD	Mean	SD	t-value	P-value
Knowledge about social risk	2.12	1.301	2.06	1.451	0.489	0.625
Knowledge about Snake bite response	2.98	1.022	2.88	1.235	1.011	0.312
Knowledge about Swimming ability	2.54	1.742	2.53	1.720	0.076	0.939
Knowledge about Water rescue response	2.77	1.347	3.00	1.231	−2.036	0.042
Knowledge about Electrocution response	2.75	1.190	3.00	1.241	−2.275	0.023
Knowledge about Fire emergency response	2.82	1.188	2.84	1.225	−0.269	0.788
Knowledge about Fire brigade contact	1.56	1.655	1.33	1.553	1.628	0.104
Knowledge about Illness response	2.68	1.214	2.78	1.362	−0.882	0.378
Knowledge about Eve-teasing response	2.66	1.394	2.67	1.359	−0.043	0.966
Knowledge about Sexual harassment response	2.32	1.432	2.42	1.374	−0.779	0.436
Knowledge about Discrimination response	2.18	1.361	2.16	1.471	0.199	0.842
Knowledge about Emergency phone number 999	2.77	1.421	2.47	1.565	2.230	0.026
Knowledge about Emergency phone number 333	2.07	1.573	2.08	1.627	−0.109	0.914
Knowledge about Bullying response	2.30	1.374	2.06	1.478	1.898	0.058
Knowledge about Terrorist attack response	2.24	1.448	2.05	1.469	1.484	0.139
Knowledge about Drug abuse discussion	2.72	1.452	2.81	1.492	−0.699	0.485
Knowledge about Self-defense techniques	2.45	1.391	2.32	1.364	1.068	0.286
Knowledge about First-aid	2.36	1.132	2.51	1.180	−1.522	0.129
Knowledge about Road accident prevention methods	2.73	1.218	2.77	1.203	−0.383	0.702

Boys' and girls' knowledge of social evils and mental health is compared in Table 5, with variations in mean scores and standard deviations as well as *t*-test results highlighted. Each gender's comprehension is revealed by the indicators, which span a wide range of subjects. Although the difference is not statistically significant, females exhibit a little higher mean score than boys in their overall comprehension of teenage vulnerability. However, girls seem to have a better understanding of mood swings (*t value*= −3.495, *p value* = 0.001), and they know how to respond to mood swings (*t-value* −2.268, *p value* 0.024) more effectively compared to boys. Also, girls may possess better knowledge or understanding of how to interact with individuals with autism compared to boys (*t-value* = −2.104, *p value*= 0.036). On the other hand, the results showed that knowledge regarding teenage vulnerability (*t-value*= −1.458, *p value*= 0.145), child marriage prevention (*t-value* = −0.767, *p value*= 0.444), women and child abuse helpline number (*t-value* = −1.563, *p value* = 0.119) are higher among girls than boys but not significant.

Overall, the table-5 shows how boys and girls differ in their understanding of several areas of mental health and social evils. There are differences as well as commonalities regarding topics like preventing

Table 5
gender-based knowledge difference on mental health and social evil risk comprehension.

Indicators*	Boy (N = 250)		Girl (N = 264)		*T*-test	
	Mean	SD	Mean	SD	t-value	P-value
Knowledge about teenaged vulnerability	3.05	1.115	3.19	1.083	−1.458	0.145
Knowledge about mood swing	2.10	1.386	2.53	1.427	−3.495	0.001
Knowledge about mood swing response	1.82	1.441	2.12	1.527	−2.268	0.024
Knowledge about autistic friend interaction	3.06	1.231	3.27	1.061	−2.104	0.036
Knowledge about nonbinary gendered friend interaction	2.56	1.488	2.70	1.380	−1.142	0.254
Knowledge about Child marriage prevention	2.85	1.280	2.94	1.308	−0.767	0.444
Knowledge about Women & child abuse helpline number	1.12	0.813	1.22	0.686	−1.563	0.119

child marriage and teenage vulnerability. These differences are especially evident when it comes to interacting with people who identify as nonbinary or autistic, understanding mood swings, and knowing where to find supports for victims of abuse. These results highlight the value of all-encompassing education and awareness campaigns that address social inequalities affecting people of all genders and promote mental health literacy.

4.4. Source of knowledge of the respondents

In Fig. 1, it is observed that family and school teacher are the 1st primary sources of knowledge about social-environmental risk and adaptation. As family source, girls acknowledged by 40.9 percentages and boys by 44.8 percentage. After that, both girls and boys responded for school teacher by 36.7 % and 24.4 % respectively, but biggest differences were observed about online source where girls responded only 1.9 percentages and boys responded 12.4 percentages. Also, reading books (boys 5.2 %, girls 11.7 %), newspaper (girls 1.5 %, boys 5.2 %), and TV/Radio (girls 5.3 %, boys 4.4 %) were seemed as primary knowledge source. The results, with a p-value of 0.00 and a chi-square value of 40.33, strongly suggest a strong association between gender and primary sources of knowledge. The study found a significant difference in primary sources of knowledge regarding social and environmental risk understanding among secondary school students in Bangladesh's southwest coastal regions.

Fig. 2 depicts the predominant sources of knowledge among the surveyed population. The mostly heard sources identified include school teachers accounting for 40.3 % of responses, and family members at 31.9 %. Additionally, the data illustrates that reading books, TV/Radio, online sources, and newspapers were also significant contributors, with percentages of 8.4 %, 7.2 %, 6.0 %, and 3.3 %, respectively. Specifically, girls were more likely than boys to report learning from schoolteachers (47 % vs 33.2 %), indicating that they are more likely to do so.

On the other hand, boys proved to be more dependent on their family members for information; 38.0 % of them acknowledged this source, compared to 26.1 % of girls. With a p-value of 0.023 and a chi-square value of 14.657, the study revealed a significant difference between genders in terms of the most common sources of information about social and environmental risk awareness among secondary school students from Bangladesh's southwest coastal region. This finding rejected the null hypothesis and suggested a moderate relationship between gender and knowledge sources.

5. Discussion

The purpose of this investigation was to investigate the gender-based disparities in the knowledge and perceptions of social and environmental hazards among secondary school pupils in the southwest coastal region of Bangladesh. This region has frequently been subjected to a variety of climate-induced hazards, such as cyclones, salinity intrusion, tidal surges, and thunderbolts, which present distinctive obstacles to local adaptation and resilience-building initiatives (Roy et al., 2022; Sony et al., 2023). Social structures, gender norms, and access to information all influence risk perception (Khan et al., 2020), which has broadly defined as an individual's cognizance of the potential impact and probability of hazards. Lassa et al. (2025) underscored the importance of comprehending gendered disparities in risk perception to develop interventions that used to context-specific and inclusive. The present study, in accordance with this perspective, has identified both convergence and divergence in the perceived risk knowledge of male and female pupils in disaster-prone areas.

In terms of environmental hazards, the results of *Hypothesis 1* indicated that boys exhibited a stronger recognition of cyclone warning signs, even though girls reported a higher perceived knowledge of thunderstorm safety. These draw attention to modest but important differences between the two genders. This comes in line with the findings of Khan et al. (2020, 2021) and Yu et al. (2024), who also found similar changes in knowledge according to different types of hazards. However, the present results indicate that the gender disparity was narrowing, in contrast to previous assertions that both genders generally lack sufficient understanding of risk communication and emergency actions. In a line with these findings, Roy et al. (2022) and Sony et al. (2023) also found that there was no statistically significant difference in awareness regarding flooding, earthquakes, or protective measures. This suggests that recent educational reforms may have contributed to a more uniform level of risk literacy.

Analysis of social hazards indicated that the data pertinent to *Hypothesis 2* exhibited inconsistent patterns. Boys displayed somewhat greater awareness of emergency contact information and bullying reactions, but girls showed superior comprehension of electrocution response and water rescue methods. These findings somewhat correspond with Elmer et al. (2024), who emphasized how gendered experiences and roles influence individuals' sensitivity to forms of social peril. Nevertheless, the lack of statistically significant differences in most social risk indicators—such as snakebite reaction and fire department engagement—indicates that boys and girls are progressively attaining similar levels of knowledge in this area. This is a significant divergence from Yu et al. (2024), who documented enduring gender disparities in educational settings susceptible to disasters. Subsequently, supporting Rashid et al. (2023), present findings may indicate the effects of a cohesive national curriculum and focused awareness initiatives promoting gender inclusion.

Regarding mental health and social concerns, disparities in perceived knowledge were also apparent, but statistically insignificant. Girls had a comparatively greater knowledge of teenage vulnerabilities, including child marriage, and displayed a superior comprehension of mood management and emotional coping techniques. These findings corroborate Roy et al. (2020, pp. 57–66) and Ng (2023), who discerned a prevailing trend of heightened psychological awareness among female adolescents in low- and middle-income nations. Furthermore, the heightened empathy and social inclusion demonstrated by girls—especially in their comprehension of peer identities, such as nonbinary and neurodivergent individuals—emphasizes the necessity of improving diversity education in educational institutions. This corresponds with Lassa et al. (2025), who highlighted the significance of emotional and social competences in influencing juvenile reactions to psychosocial hazards. The findings underscore the necessity for specialized mental health education for males to address the deficiencies in empathy and awareness, particularly for emotional control and

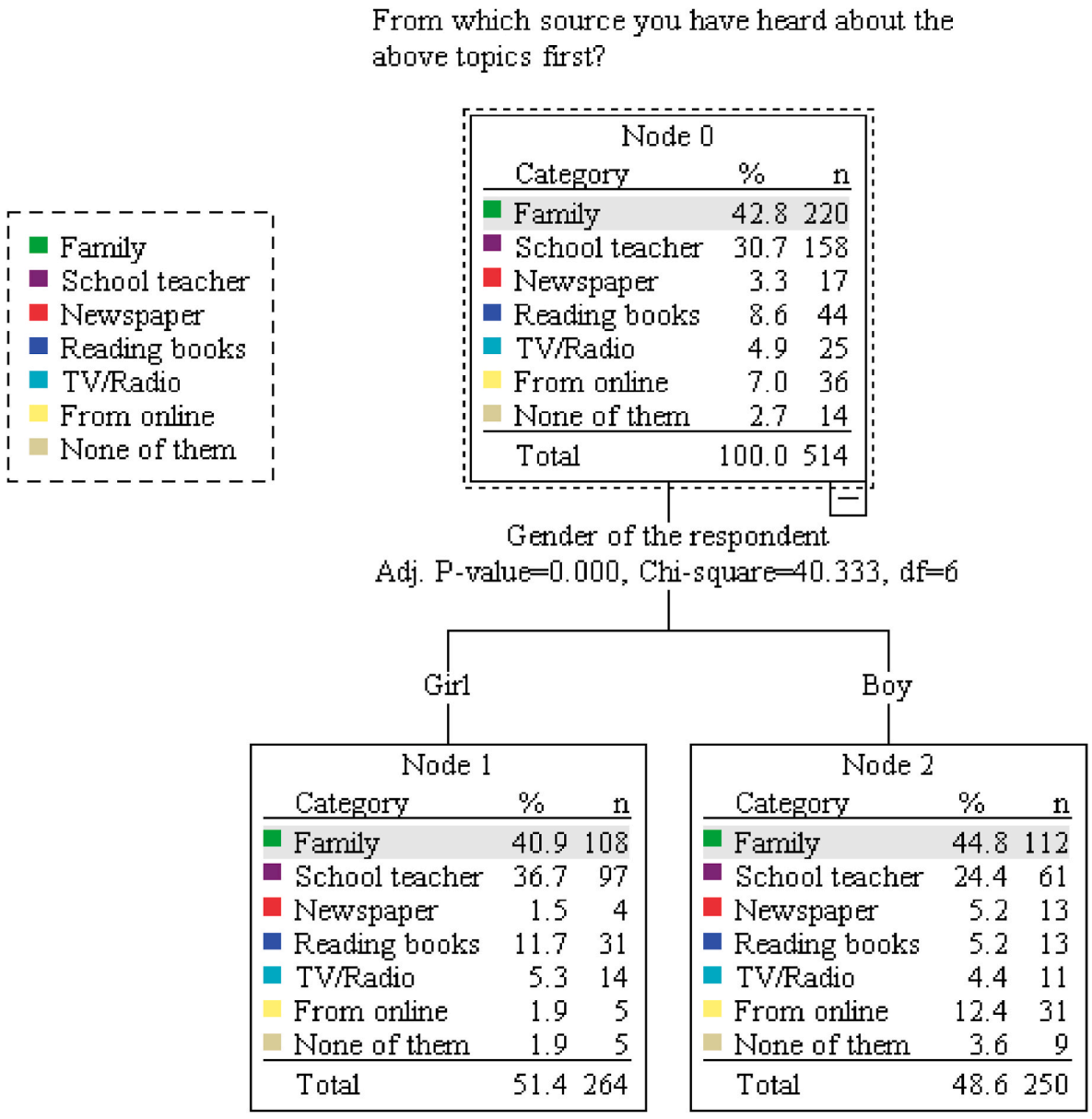

Fig. 1. different gender responses on primary source of knowledge about social and environmental risk comprehension.

inclusive conduct.

The examination of information sources pertinent to Hypotheses 5 uncovered notable gender-specific tendencies. Both genders predominantly identified family members and schoolteachers as the principal providers of risk-related knowledge. Nevertheless, boys exhibited a greater dependence on digital sources, whereas girls favored conventional media, including books, television, and radio. These tendencies align with the findings of Shoji et al. (2020) and Velásquez-Espinoza and Alcántara-Ayala (2025), which indicate that boys mostly utilize online platforms for information access, whereas girls depend on traditional sources—potentially attributable to disparities in digital access, parental oversight, or media literacy. Rashid et al. (2023) and Sony et al. (2023) similarly identified significant differences in rural Bangladeshi settings, indicating the necessity to tackle gender gaps in digital literacy within the framework of comprehensive educational reforms.

Further, the foundational role of both home and school in shaping adolescents' risk perceptions has been demonstrated by the observed preference for familial and institutional knowledge sources. The necessity of gender-sensitive communication strategies to ensure equitable access to accurate and actionable risk-related information is further underscored by a statistically significant correlation between gender and information source preferences. Yu et al. (2024) underscored the necessity of multi-level, inclusive risk communication models, which these results substantiate. In general, the results are consistent with national policy changes that are designed to integrate gender considerations into disaster education and risk reduction (Rashid et al., 2023). To encourage community-level engagement, decentralization, and gender inclusivity, Bangladeshi government and non-governmental organizations have implemented an increasing number of adaptation and mitigation strategies (Sony et al., 2023). The impact of these integrated efforts may be reflected in the evidence of narrowing knowledge disparities between genders.

5.1. *Theoretical implication*

The results support Ulrich Beck's "Risk Society" theory, which holds that risks and uncertainties are ubiquitous in modern society and influence people's perceptions of and reactions to different kinds of dangers. According to Beck (2014), people in risk societies are more dependent on their own reasoning and knowledge development to

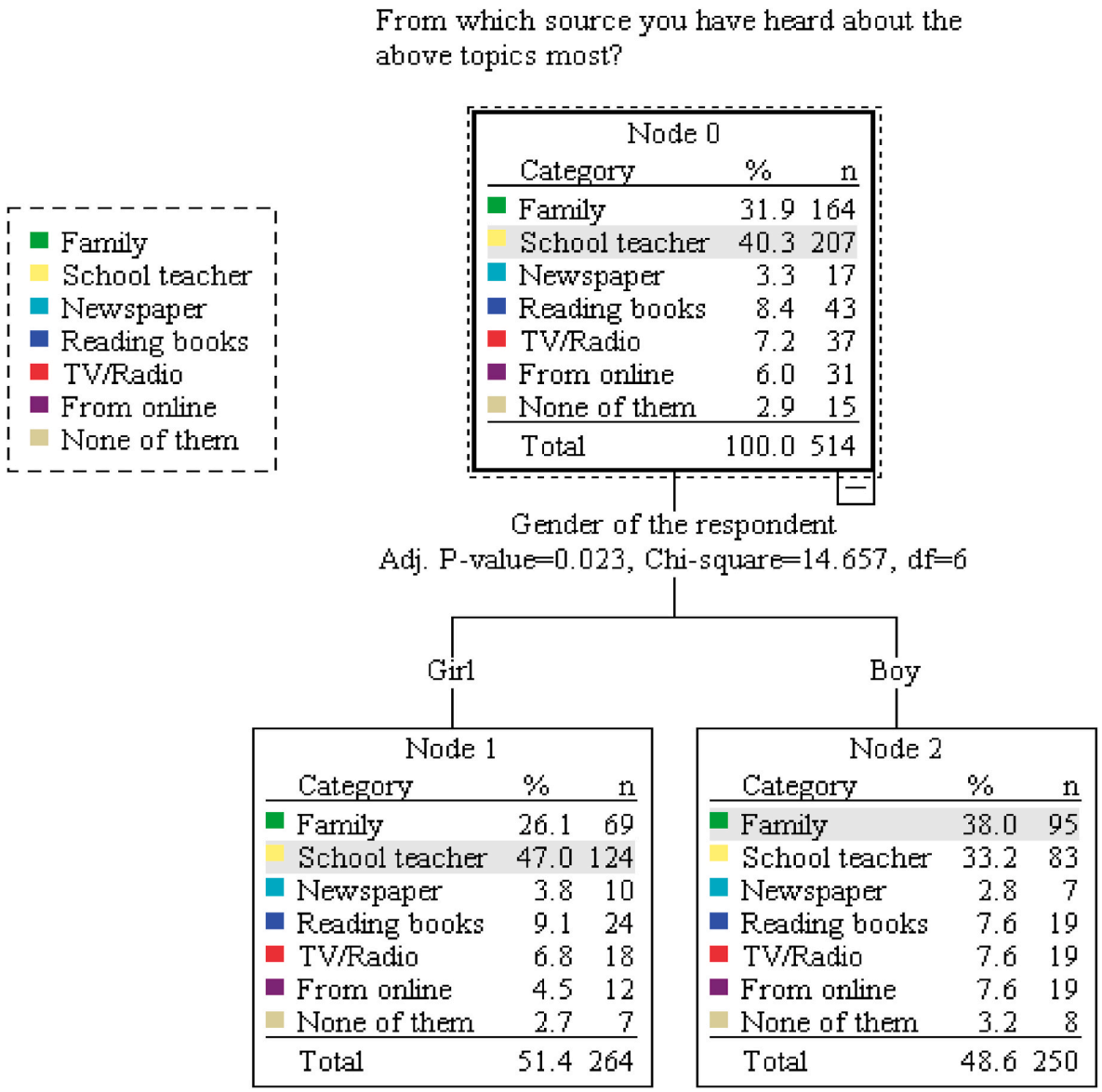

Fig. 2. different gender responses on most common source of knowledge about social and environmental risk comprehension.

manage complicated risks, and conventional sources of authority and expertise are under threat. Considering the study's findings, the disparities in knowledge levels among boys and girls concerning environmental risks and social risk responses highlight the ever-changing nature of risk understanding as well as governance within the risk society framework.

Howsoever, individuals seek out a variety of sources to understand and reduce risks, which highlights the decentralized character of risk knowledge transmission (Ng, 2023). Examples of these numerous sources of information include family, teachers at school, and online platforms. Gender norms and roles are examples of societal factors that impact individual access to and understanding of risk-related information (Khan et al., 2021). These gender-specific disparities in knowledge also underscore the overlapping nature of perceived risk. All things considered, the study's conclusions offer empirical support for Beck's theory of the risk society, highlighting the necessity of continued investigation and legislative actions to address the complex aspects of risk in modern societies.

5.2. Policy implication

The findings of this study carry important implications for disaster education, adolescent mental health promotion, and inclusive community resilience policies in climate-vulnerable regions. First, the observed gender-based differences in knowledge—where girls demonstrate stronger awareness of social and emotional risks, while boys report greater familiarity with environmental hazards—suggest that current DRR education frameworks are not equally responsive to gendered learning needs. Besides, the findings of this study also align with recent recommendations from the IPCC (2023) and UNDRR (2022), which stress the importance of incorporating gender-sensitive and youth-centered strategies in disaster risk reduction efforts to effectively enhance resilience in vulnerable communities (Khan & Mishra, 2022). Policymakers should therefore prioritize gender-responsive curriculum development that ensures boys and girls receive balanced, context-relevant information across both environmental and psychosocial dimensions of risk.

Second, the disparities in access to risk-related information—especially the limited digital literacy and media access reported among girls—point to an urgent need to address the gendered digital

divide in rural educational contexts. This can be addressed through targeted interventions such as safe digital learning spaces in schools, teacher training on inclusive pedagogy, and family-based awareness programs that encourage equitable media use among adolescents. Third, the study model—focused on school-aged youth in under-resourced, high-risk coastal areas—offers a scalable framework for other developing countries facing similar ecological and gender-based vulnerabilities. By integrating adolescent perspectives into DRR strategy design, national governments and development agencies can more effectively meet the goals of the Sendai Framework and Sustainable Development Goals 4 and 5, which call for inclusive, equitable, and quality education systems resilient to disaster and climate disruptions. Lastly, the findings highlight a critical opportunity for policymakers to treat adolescent students not merely as beneficiaries but as active agents in local resilience planning. Schools should be empowered to play a central role in building both disaster literacy and social resilience through participatory risk communication, scenario-based learning, and mental health awareness initiatives that are sensitive to students' lived experiences and sociocultural realities.

6. Conclusion

This study examined gender-based differences in the knowledge and perceptions of social and environmental risks among secondary school students in the southwest coastal region of Bangladesh. Findings revealed that while overall knowledge levels were relatively balanced between boys and girls, notable domain-specific differences existed: boys demonstrated greater familiarity with environmental hazards and digital information sources, whereas girls showed stronger awareness of social risks and emotional well-being. Traditional sources of knowledge, such as family and schoolteachers, remained central for both genders, highlighting the ongoing importance of community and educational settings in risk communication.

The study contributes to advancing scientific understanding of gendered risk perception in disaster-prone and socioeconomically vulnerable contexts by integrating social, environmental, and mental health dimensions. Its findings hold important implications for educational policy and practice, emphasizing the need for gender-responsive disaster risk reduction curricula, targeted interventions to bridge digital access gaps, and inclusive mental health literacy programs. In alignment with the Sustainable Development Goals—particularly SDG 4 (Quality Education) and SDG 5 (Gender Equality)—the study underscores that policymakers and practitioners should prioritize culturally relevant, gender-sensitive approaches to risk communication and resilience-building. Such integration will foster equitable preparedness among adolescent populations in climate-vulnerable regions, while simultaneously advancing global commitments to inclusive education and the reduction of gender disparities.

Despite these contributions, the study has limitations that warrant consideration. The use of self-reported data may introduce bias, and the focus on secondary school students in a single geographic area limits generalizability. Future research should employ mixed-method designs incorporating qualitative data and extend to broader demographic groups, including nonbinary adolescents. Longitudinal studies could also assess the impact of educational reforms on gendered risk knowledge. Intersectional analyses incorporating socioeconomic status, ethnicity, and disability will further enrich understanding of vulnerability and resilience in disaster contexts.

CRediT authorship contribution statement

M. M. Abdullah Al Mamun Sony: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Methodology, Formal analysis, Conceptualization. **Musammat Mahzebin:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Taimia Binte Arif:** Writing – original draft, Visualization, Supervision, Software, Formal analysis. **Sukanto Roy:** Writing – review & editing, Resources, Investigation, Formal analysis, Data curation. **Md Atekul Islam Nur Shuvo:** Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Funding acquisition, Formal analysis. **Md Mamunur Rashid:** Writing – review & editing, Supervision, Project administration, Methodology, Formal analysis, Data curation.

Informed consent

An informed oral consent has taken each of respondents involved in this research.

Ethical approval

This study was reviewed and approved by Research Cell, University of Barisal with the approval number: FBS-EC-53/2024, dated April 29, 2024.

Data availability statement

Data associated with this manuscript are available at this Mendeley system, Sony, M M Abdullah Al Mamun; Rashid, Md. Mamunur (2024), "Bangladeshi students' knowledge difference on emergency response and crisis management", Mendeley Data, V1, doi: 10.17632/c8f3csjx2x.1.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Quillbot in order to improve the Academic English since the Authors are not native speaker. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of the use of AI

During the preparation of this work the author(s) used Quillbot.com, a paraphrasing tool, in order to improve English writing. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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References

Abi Jumaa, J., Catena, R., Brown, E., Sanyang, S., Tridico, A., & Weaver, D. (2023). Exploring pandemic preparedness in higher education: Lessons learnt from students'

lived experiences during a critical time. *Discover Health Systems, 2*(1), 9. https://doi.org/10.1007/s44250-023-00024-y

Bao, C., & Han, L. (2025). Gender difference in anxiety and related factors among adolescents [Original Research]. *Frontiers in Public Health, 12*. https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2024.1410086.

Beck, U. (2014). Errata to: Ulrich beck. In U. Beck, & B. Ulrich (Eds.), *Pioneer in cosmopolitan sociology and risk society*. Springer International Publishing. https://doi.org/10.1007/978-3-319-04990-8_15. E1-E1.

Bradley, W. A., & Fry, C. (2024). Gender and entrepreneurial intention in low-income countries: The relative roles played by anticipated financial returns versus perceived barriers for university students in Sierra Leone. *International Journal of Entrepreneurial Behavior & Research, 30*(7), 1750–1778. https://doi.org/10.1108/IJEBR-11-2022-0980

Chen, S., Cárdenas, D., Zhou, H., & Reynolds, K. J. (2024). Positive school climate and strong school identification as protective factors of adolescent mental health and learning engagement: A longitudinal investigation before and during COVID-19. *Social Science & Medicine, 348*, Article 116795. https://doi.org/10.1016/j.socscimed.2024.116795

Chowdhury, S., Rashid, M. M., Amin, M. B., Roy, T., Sony, M. M. A. A. M., & Rahaman, M. A. (2025). Quality education and institutional facilities: A comparative study between students and teachers opinion at NU-affiliated colleges of Bangladesh. *Social Sciences & Humanities Open, 12*, Article 101708. https://doi.org/10.1016/j.ssaho.2025.101708

Elmer, E. M., van Tilburg, T. G., & Fokkema, T. (2024). Age and gender identity in the relationship between minority stress and loneliness: A global sample of sexual and gender minority adults. *The Journal of Sex Research*, 1–20. https://doi.org/10.1080/00224499.2024.2339511

Evertsen, K. F. (2023). Women as subjects of risk in Bangladesh's coastal riskscapes. *The Sociological Review, 71*(5), 1154–1171. https://doi.org/10.1177/00380261231175223

Giddens, A. (2020). Modernity and self-identity: Self and society in the late modern age. In *The new social theory reader* (pp. 354–361). Routledge. https://doi.org/10.4324/9781003060963.

Guodaar, L., Kabila, A., Afriyie, K., Segbefia, A. Y., & Addai, G. (2023). Farmers' perceptions of severe climate risks and adaptation interventions in indigenous communities in northern Ghana. *International Journal of Disaster Risk Reduction, 95*, Article 103891. https://doi.org/10.1016/j.ijdrr.2023.103891

Hasan, M. K., & Sony, M. M. A. A. M. (2022). Covid-19, social change, and society 5.0. In *The palgrave handbook of global social change* (pp. 1–19). Springer International Publishing. https://doi.org/10.1007/978-3-030-87624-1_48-1.

Hossain, M. L., & Li, J. (2024). Salinity challenges and adaptive strategies in salinization-affected coastal Bangladesh: Implications for agricultural sustainability and water resource management. *Environmental Research Letters, 19*(11), 114048. https://doi.org/10.1088/1748-9326/ad7edb

Jing, L., Shan, W., & Zhang, Y. (2023). Risk preference, risk perception as predictors of risky driving behaviors: The moderating effects of gender, age, and driving experience. *Journal of Transportation Safety & Security, 15*(5), 467–492. https://doi.org/10.1080/19439962.2022.2086953

Khan, S., & Mishra, J. (2022). Critical gaps and implications of risk communication in the global agreements—Sfdrr, SDGs, and UNFCCC: 3 select case studies from urban areas of tropics in South Asia. *Natural Hazards, 111*(3), 2559–2577. https://doi.org/10.1007/s11069-021-05148-z

Khan, A. A., Rana, I. A., & Nawaz, A. (2020). Gender-based approach for assessing risk perception in a multi-hazard environment: A study of high schools of Gilgit, Pakistan. *International Journal of Disaster Risk Reduction, 44*, Article 101427. https://doi.org/10.1016/j.ijdrr.2019.101427

Khan, A. A., Rana, I. A., Nawaz, A., & Waheed, A. (2021). Gender-based emergency preparedness and awareness: Empirical evidences from high-school students of Gilgit, Pakistan. *Environmental Hazards, 20*(4), 416–431. https://doi.org/10.1080/17477891.2020.1839375

Lassa, J. A., Amri, A., Haynes, K., Towers, B., Abunyewah, M., Zander, K., & Erdiaw-Kwasie, M. O. (2025). Children and adults' perception of risk and risk management: Insights from long-term participatory data and implication for child-centric climate and disaster risk reduction. *Social Sciences & Humanities Open, 11*, Article 101459. https://doi.org/10.1016/j.ssaho.2025.101459

Ng, S. L. (2023). The role of risk perception, prior experience, and sociodemographics in disaster preparedness and emergency response toward typhoons in Hong Kong. *Natural Hazards, 116*(1), 905–936. https://doi.org/10.1007/s11069-022-05703-2

Rashid, M. M., Sony, M. A. A. M., & Aninda, S. J. (2023). State of knowledge on emergency response and crisis management: Evidence of sample secondary students of Bangladesh. *GiLE Journal of Skills Development, 3*(1), 57–74. https://doi.org/10.52398/gjsd.2023.v3.i1.pp57-74

Roy, T., Chandra, D., Sony, M. M. A. A. M., & Rahman, M. S. (2020). *Impact of salinity intrusion on health of coastal people: Reflections from dacope UPAZILA of khulna district, Bangladesh*. Khulna University Studies. https://doi.org/10.53808/KUS.2020.17.1and2.1906-S

Roy, T., Hasan, M. K., & Sony, M. M. A. A. M. (2022). Climate change, conflict, and prosocial behavior in Southwestern Bangladesh: Implications for environmental justice. In D. Madhanagopal, C. T. Beer, B. R. Nikku, & A. J. Pelser (Eds.), *Environment, climate, and social justice: Perspectives and practices from the global south* (pp. 349–369). Singapore: Springer Nature. https://doi.org/10.1007/978-981-19-1987-9_17.

Roy, T., Nasreen, M., Hasan, M. K., & Sony, M. M. A. A. M. (2023). Community priorities in disaster risk reduction interventions. In K. M. H. Mahbuba Nasreen, & M. Moniruzzaman Khan (Eds.) (1 ed„ *Vol. 1. Coastal disaster risk management in Bangladesh* (p. 21). Routledge. https://doi.org/10.4324/9781003253495.

Shoji, M., Takafuji, Y., & Harada, T. (2020). Formal education and disaster response of children: Evidence from coastal villages in Indonesia. *Natural Hazards, 103*(2), 2183–2205. https://doi.org/10.1007/s11069-020-04077-7

Sony, M. M. A. A. M. (2023). Different gender priorities amid EU labor laws and practice. *Nurani Hukum, 6*(No 2) (2023): Delving into Global Laws: A Journey through Justice and Legal Protections https://jurnal.untirta.ac.id/index.php/nhk/article/view/21795.

Sony, M. M. A. A. M., Hasan, M. K., & Roy, T. (2023). Coping with disasters: Changing patterns of disaster risk reduction activities in the Southwestern coastal areas of Bangladesh. *SN Social Sciences, 3*(12), 202. https://doi.org/10.1007/s43545-023-00791-8

Sony, M. M. A. A. M., Hasan, M. K., Roy, T., & Basu, B. K. (2024). 'It's a rich people's disease…': Community perceptions about and responses to the coronavirus pandemic in Bangladesh. *Research Square PREPRINT*, (Version 1)https://doi.org/10.21203/rs.3.rs-3846446/v1

Sony, M. M. A. A. M., & Rashid, M. M. (2025). Status of gender literacy in academia: A critical analysis of secondary school students in Bangladesh. In N. Pant (Ed.), *Psychology of sexuality & mental health vol. 2: Modern approaches* (pp. 67–96). Singapore: Springer Nature. https://doi.org/10.1007/978-981-97-8971-9_2.

UNICEF. (2024). 3.2 million children are at risk as cyclone remal hits hard in the coastal areas of Bangladesh. https://www.unicef.org/press-releases/32-million-children-are-risk-cyclone-remal-hits-hard-coastal-areas-bangladesh.

Velásquez-Espinoza, G., & Alcántara-Ayala, I. (2025). Flood risk perception and preparedness in Nicaraguan educational contexts: A study of student perspectives. *International Journal of Disaster Risk Reduction, 120*, Article 105375. https://doi.org/10.1016/j.ijdrr.2025.105375

Wichmann, C. S., Fischer, D., Geiger, S. M., Honorato-Zimmer, D., Knickmeier, K., Kruse, K., Sundermann, A., & Thiel, M. (2022). Promoting pro-environmental behavior through citizen science? A case study with Chilean schoolchildren on marine plastic pollution. *Marine Policy, 141*, Article 105035. https://doi.org/10.1016/j.marpol.2022.105035 [Article].

Yu, X., Amin, M. B., Olga, P., Rahaman, M. A., & Sony, M. M. A. A. M. (2024). Gender-based emergency response and crisis management knowledge assessment: A cross-sectional study on Chinese tertiary student. *International Journal of Disaster Risk Reduction, 112*, Article 104800. https://doi.org/10.1016/j.ijdrr.2024.104800

Yu, T.-K., Lavallee, J. P., Di Giusto, B., Chang, I. C., & Yu, T.-Y. (2020). Risk perception and response toward climate change for higher education students in Taiwan. *Environmental Science and Pollution Research, 27*(20), 24749–24759. https://doi.org/10.1007/s11356-019-07450-7