

## Disaster and Education: Impact of Flood on School Going Children at Keshabpur Upazilla in Bangladesh

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### ABSTRACT

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**Introduction:** Presently, there has been an emergent concern that rising numbers of the world's population are deserted due to the undesirable impacts of natural hazards, especially floods. Geographically, Bangladesh is a low-lying flood plain country with only a few hills in the south-east and the north-east part. Undoubtedly, education is a principal factor of socio-economic development, but regrettably, Bangladesh is suffering from the uncontrollable effects of floods. After considering such issues, the foremost focus of this study was to recognize both the academic challenges faced by school-going children during a flood and examine the impact of the flood on the health of the children.

**Methods:** Interview schedule, questionnaire survey, and document analyses had been carried out for this study. The study design was carried out by applying a mixed method. Students of Biddanondokathi Government Primary School and Mangalkot Secondary School from Mirzapur village of Mangalkot union in Keshabpurupazilla were randomly selected. The well-structured questionnaires were disseminated to 80 respondents of two academic institutions of Keshabpurupazilla of Jashore district. Additionally, descriptive statistics and chi-square tests were conducted to attain research objectives.

**Results:** The outcome of this study revealed that flood unswervingly impacts the academic routine and health status of school-going children. Almost 93.8% of students faced academic challenges and 87.5% of children were the victims of waterborne diseases like diarrhea, skin diseases, and dysentery. Almost 82% of respondents did not go to school as the roads were impassable, 28.8% of individuals faced problems due to washed away bridges, and 28.8% faced challenges as their school was surrounded by water. About 66.2% of children dropped out of school and 17.5% of students did not attend their classes at all after the flood.

**Conclusions:** Not only school-going children but also infrastructure is the crucial victims of flood disasters, compromising the children's rights to access to quality education, information, good sanitation, as well as their participation rights. Flood disasters have key impacts on children's education and progress and this study suggests that strategies need to be adapted to attend to the disaster risks encountered by school-going children of Bangladesh.

**Keywords:** Floods, Academic performance, Children

### Introduction

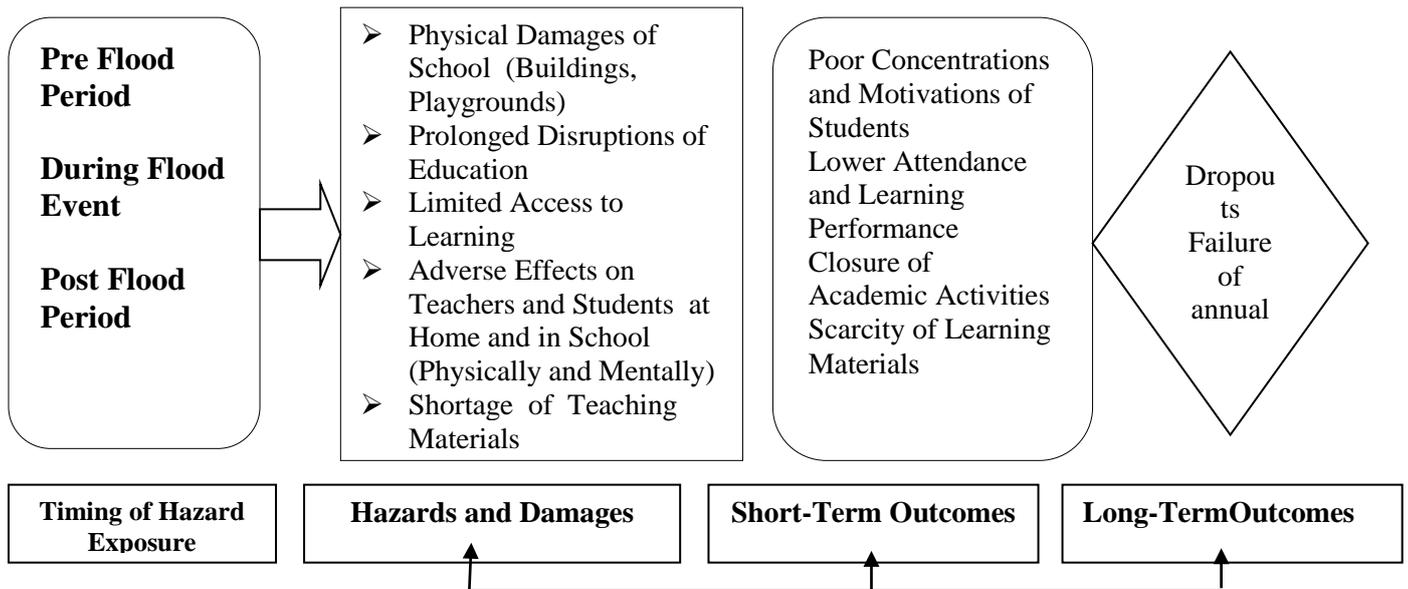
Nowadays, disaster is one of the most humanitarian concerns and poses a threat to the attainment of Millennium Development Goals,

especially the second goal, i.e., achieving universal primary education. A disaster causes massive impacts on children and youth. It also costs a sum

to the education systems all over the world, mainly in developing countries (1). Disasters threaten the lives, rights, and needs of millions of children around the globe. Children are more susceptible because of their unique physiological, psychological, and developmental attributes. The age of children affects their vulnerability and shapes their ability to cope and survive during a disaster. Thus, floods can affect the potentiality of children's future development. If parents' needs are not met after a disaster we can not expect that children's needs are met either as children may necessitate different forms of physical, social, mental, and emotional support as compared to the adults (2). The specific vulnerability of children has been highlighted by current catastrophic events, such as, a landslide that occurred on Leyte Island in the Philippines in February 2006, causing more than 200 school-going children to be buried alive. According to UNCRD (2009), an earthquake occurrence in Gujarat in 2001, took the lives of three million children. The potential impacts of these disasters are multiplied in developing societies where the largest population demographic is children (3). Floods have been responsible for the loss of learning hours affecting the quality of education in Muzarabani district, Zimbabwe and most of the children have always faced challenges to access schools during the rainy season because of road damages and traveling across rivers. Rivers and streams are barriers to children who need to cross them to get to their respective schools. All these factors were mentioned as a contributing factor to a poor learning environment (4).

Unfortunately, Bangladesh is considered one of the utmost catastrophic-prone countries in the world. Due to its weather system, Bangladesh is generally the worst victimized country of natural disasters which jeopardizes lives and properties (5). Almost every year, Bangladesh experiences various natural disasters such as cyclones, floods, tornadoes, land erosion, etc. Among them, floods are one of the most devastating disasters that hit every year. School-going children are severely affected due to this destructive natural calamity. Flood negatively impacts the socio-economic well-being of children. Although this issue has been mostly well acknowledged, the impacts floods have on children's access and right to quality education have received slight attention (6).

According to existing literature, it was found that there is a close relationship between natural calamities and instructive outcomes, and adverse impacts in developing countries (7). In Bangladesh, floods directly or indirectly influence children's academic lives in various ways. The direct impacts are the loss of lives, damages to the physical complementary infrastructure of education (school buildings and material, roads, and transport systems), declined human resources, and the indirect impact of the loss of livelihoods, increased opportunity cost of going to school and in turn parents' lack of incentives to send children to school are among others (Figure 1). In short, floods cause low enrolment of children in school, increase drop-out rates, and result in lower educational attainment (8).



**Figure 1.** Impact of Floods on Education in Developing Countries (Adapted from (3), modified for developing countries)

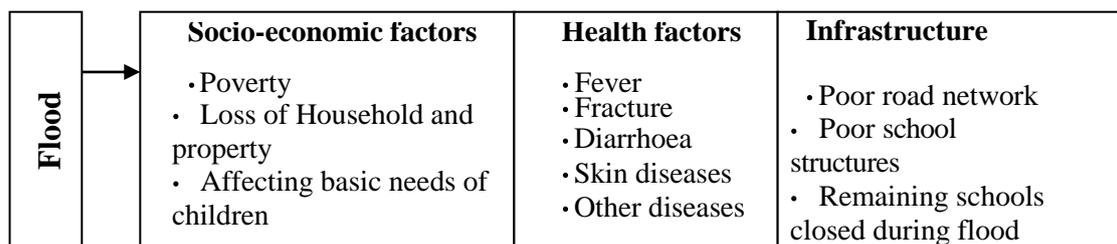
According to Figure 2, disasters generally increase the susceptibility of children (6). The framework shows the responsible factors that contribute to vulnerability, such as environmental, home, and infrastructural matters. Student factors and the effects of disasters on school facilities must not be seen only in terms of the need to prevent catastrophic damage that may destroy the buildings

but also in terms of protecting the lives of children during disasters (5). Sometimes, the indirect effects also play a significant role to keep the students away from the school after the occurrence of a disaster. The students are forced by their parents to leave the school and get engaged in livelihood activities to cope with the flood disasters because of economic losses (10).

**Table 1.** Impact of Floods on Schools in Bangladesh

Years	Effect
2019	Floods affected 6,000 education facilities and 400,000 primary school-aged children had their education disrupted (11).
2018	At least 32% of primary schools (421 schools out of 1300) were damaged and four schools were destroyed. Around 147,000 school-age children from 6-10 years old were unable to attend schools in Kurigram (11).
2013-2015	In these three years, natural disasters, particularly floods, had disrupted the education of more than 1.5 million children (19).
2007	Floods and cyclones damaged 496 school buildings and ruined 2,110 and more (19).
2004	1,259 school buildings were washed away by floods and 24,236 were destructed (19).
1998	The flooding ruined 1,718 school buildings and 12,000 were destroyed (19).

Adapted from (9) with contributions from the author’s research



**Figure 2.** Co-related Factors Affecting Academic Performance Of Children After Flood (Adapted from (6) modified for study purpose)

Another reason for avoiding school is the insecure conditions of the school buildings and other infrastructures. Not only do the parents, after knowing the vulnerability of school against disaster, hesitate to send their children but also the children are constantly in fear during their presence in school (9). The effects of flood also create psycho-social difficulty among the school children directly as well as indirectly.

The mental health of students is also hampered because of flood disasters. Many students suffer from frustration, depressions, and mental disabilities after disasters. Their poor performance is the result of the bad figure in the examination. Many students live far away from their schools. Loss of household and property creates a threat to the student’s academic life. The outcome of flood and poverty are quite similar causing dropouts and a high rate of absenteeism (2). Floods can have a crucial impact on the education stock of the country as it affects complementary infrastructure to education, parents’ incentives to send children to get educated, increase the opportunity costs of going to school, and disturbs school attendance. These situations result in the temporary or permanent discontinuation of schooling which in turn diminishes educational outcomes (8). Disaster risks arise mostly because of the dependence of the majority of the population in the country on climate-sensitive factors for their livelihoods. Flood disasters pose a significant problem for the

people living in Bangladesh. Floods can distress the health and economic situation of school children and their families which may result in lower attendance, lower learning, and higher dropout. Communities living in flood-prone areas of Keshabpur have agonized significant effects of floods over the years and still do so currently. However, no significant initiatives have been taken to mitigate the adverse effects of floods on school-going children in this community. This study was designed to find out the major academic challenges created by floods and estimate the impact of floods on school-going children’s physical and psychological health after this disaster. The general objective of the study is to identify the academic challenges faced by school-going children during floods and the specific objective is to explore the impact of floods on children's health in Keshabpur.

**Materials and Methods**

**Description of Study Area**

Keshabpur was the selected study area for this research. Keshabpur is an upazilla of the Jashore district in the division of Khulna. Keshabpur is regarded as the most flood-affected area in the Jashore district. Every year, many people are affected by floods in Keshabpur. Compared to other upazillas of the Jashore district, flood intensively damages properties and hampers children’s health and education. For this reason, the author tried to conduct the study in Keshabpur.

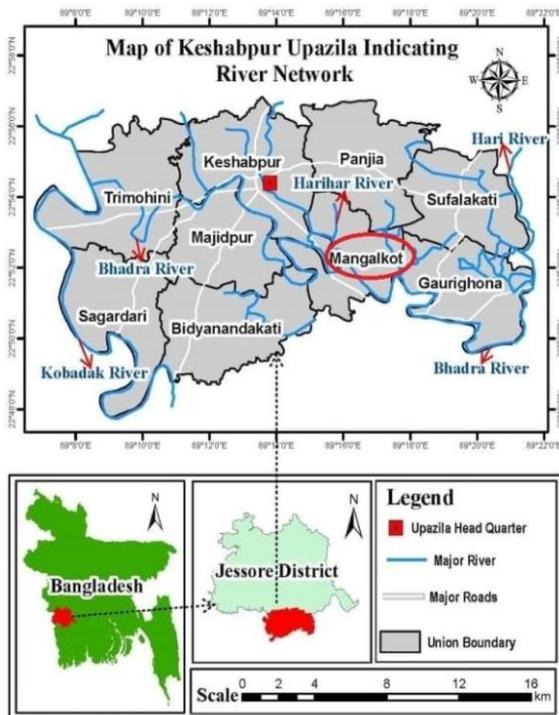


Figure 3. Map of the study area (11)

**Study Design:** The study was conducted during January-June 2019, by using an explanatory research method to assess the impact of floods on school-going children in Keshabpur upazilla. Qualitative and quantitative methods had been followed. Both descriptive and inferential statistical techniques were used to analyze the survey data.

**Study Population:** The study population was the students of Biddanondokathi Government Primary School and Mangalkot Secondary School from Mirzapur village under Mangalkot union in Keshabpur upazilla. Students of class five from primary school and students of class ten from secondary school were selected for this study to get appropriate information easily.

**Sample Procedure and Sample Size:** The total number of students of class five and ten from these two schools were 380. The sample size was 80 for this study. For sample size determination, this study followed the simplified formula (19). These two schools were selected randomly for data collection. The formula was used to calculate at

95% confidence level and  $P= 0.10$  is assumed for equations.

**Sampling Procedure:** The respondents of the study (school-going children) were selected randomly based on the total population.

**Techniques and Instruments of Data Collection:** An interview schedule complemented with open and close-ended questionnaires was used to write down the answers to the questions posed during an interview to the informants. The primary sources included those school-going children who were the key victims of flood disasters. Two case studies were also conducted for primary data collection. Study data were collected from Non-Government Organizations and other relevant organizations were used as secondary data.

**Statistical Analysis:** Statistical analysis of this study was conducted with help of Microsoft excel starter 2010 and IBM SPSS 20. Univariate analysis was operated to identify and sum up all the characteristics of the variables.

Chi-square test ( $\chi^2$ ) of Pearson's identify several relations and involves the analysis of two variables (a dependent variable and an independent variable) and the purpose of determining the empirical relationship between (12). A goodness of fit test for Chi-square with one-sample was conducted to check the desired hypothesis (13).

## Results

### A fundamental outline of the respondents

Presented in Table 2, it was found that more than 40% of students were from the age group of 13-14 (42.4%). Most of the respondents were Muslim (85%). A slight difference between the parentage of nuclear and extended family type was seen in the data set (52.5% vs. 47.5%). Generally, economic stability can be related to the residence of the respondents. 43.8% of respondents had kacca houses (flimsy houses), hence it was concluded that their economic status was not stable. Most of the students were primary students (52.5%) and the rest of them were secondary students (46.2%).

**Table 2.** Distribution of the Fundamental Characteristics

Variable	Category	Frequency Percentage	
		(N)	(%)
Age of the respondents (Years)	9-10	21	26.3
	11-12	21	26.3
	13-14	34	42.4
	14-15	4	5
Gender	Male	47	58.8
	Female	33	41.2
Religion	Islam	68	85
	Hindu	12	15
Family type	Nuclear	42	52.5
	Extended	38	47.5
Residence	Pacca(Furnished house)	22	27.4
	Semi-pacca(Semi-raw house)	23	28.8
	Kacca(Raw house)	35	43.8
Educational background	Primary	43	53.8
	Secondary	37	46.2

**Factors associated with the economic condition and drop out of the students**

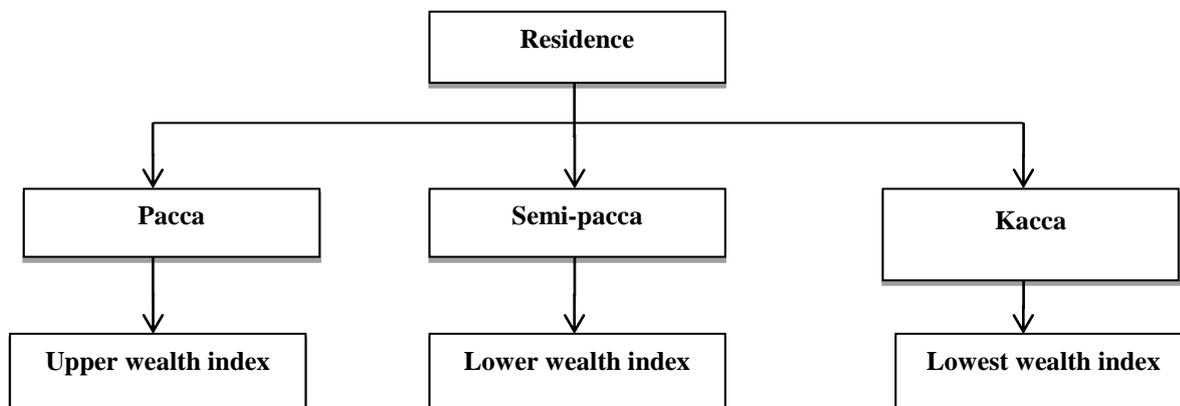
**Wealth index based on residence**

Generally, the economic condition of the people can be understood by looking at the condition of the residence, hence we concluded the wealth index through the condition of their residence and wealth index was converted as per the given diagram (Figure 4). Here, a Chi-square test was conducted to see the association between wealth index and respondents' behavioral life caused by flood and we assumed the following hypothesis:

Null Hypothesis = There was no association between wealth index and students' behavioral life caused by the flood.

Alternative Hypothesis = There was an association between wealth index and students' behavioral life caused by the flood.

The economic condition of the respondents was categorized based on the type of their residencies and we visualized that as follows:



**Figure 4.** Respondent's Wealth Index According to Their Residence

A significant association was found between wealth index and students' behavioral life from the Chi-square test, students' behavioral

life was seen through some factors namely social life, academic problem, and health (Table 3).

**Table 3.** Association Between Wealth Index and Students Behavioral Life

Associative factors	Categories	Wealth index (%)			X <sup>2</sup> (P)
		Upper	Lower	Lowest	
Social life	Severely affected	7.4	3.8	20	34.550(0.000)
	Moderately affected	1.2	18.8	17.5	
	Slightly affected	10	6.2	5	
	No impact	8.8	0	1.2	
Academic problems	Yes	21.2	28.8	43.8	16.061(0.001)
	No	6.2	0	0	
Drop out	Yes	6.2	23.8	36.2	27.708(0.000)
	No	21.2	5	7.5	
Health status	Severely affected	1.2	5	18.8	46.533(0.000)
	Moderately affected	2.5	17.5	21.2	
	Slightly affected	12.5	6.2	2.5	

It was noticeable from Table 3 that social life, academic problems, drop out and health status were all significant determinants ( $p < 0.001$ ) in the wealth index. The social life of the respondents was severely affected in the lowest quintile (20%), where only 7.4% and 3.8% of respondents were severely affected respectively in the upper and lower wealth index. Most of the respondents who suffered no impact on social life had an upper wealth index. The individuals having a lower wealth index mostly faced a moderate effect in their social life. It was revealed that in social life the most affected respondents were the ones in the lowest quintile.

Generally, most of the respondents faced academic problems. Respondents with the lowest wealth index faced the most academic problems (43.8%), whereas respondents with lower (28.8%) and upper wealth

index (21.2%) faced academic problems comparatively less. Respondents who did not face any academic problems were all in the upper wealth index (6.2%).

A large proportion of the respondents who dropped out were in the lowest wealth quintile (36.2%), but only 6.2% of respondents with upper wealth index were quit schooling. Most of the individuals in the upper wealth index did not drop out (21.2%). Respondents with the lowest wealth quintile had a severe (18.8%) and moderate (21.2%) health effects, where most of the respondents having upper wealth quintile faced slight impact (12.5%) or no impact (11.3%) on health. There were hardly any respondents in the lower and lowest wealth quintile that had not faced any impact on health, i.e., 0% and 1.2% respectively (Table 3).

**Table 4.** Associative Factors Regarding Drop Outs

Variables	Category	Drop out		X <sup>2</sup> (P)
		Yes (%)	No (%)	
Social life	Severely affected	25	6.2	15.253(0.002)
	Moderately affected	28.8	8.8	
	Slightly affected	11.2	10	
	No impact	1.2	8.8	
Health status	Severely affected	18.8	6.2	16.447(0.001)
	Moderately affected	35	6.2	
	Slightly affected	8.8	12.5	
Economic problems	Yes	65	28.8	5.104(0.024)
	No	1.2	5	
Academic problems	Yes	58.8	8.7	32.110(0.00)
	No	7.5	25	
Schooling	Yes	66.2	31.2	4.027(0.045)
	No	0	2.5	

**Associative factors regarding drop out**

Significant relationships ( $P < 0.05$ ) between respondents drop out and some influencing factors were found in the study namely social life, health status, economic problems, academic problems, and schooling (Table 4). In Table 10, it was seen that when respondents were severely affected or moderately affected in social life due to flood their dropout rate was excessively high (25% and 28.8% respectively). When the flood slightly affected respondents' life, the dropout rate was low (11.2%). The dropout rate decreased when there was no impact of flood in the social life of the respondents (1.2%). Accordingly, a similar type of relation was seen between dropouts and health status with different percentages. The dropout rate for respondents severely and moderately affected by health was high (18.8% and 35% respectively). On the other hand, the dropout rate decreased when there was a slight effect or no impact of flood in the social life of the respondents (8.8% and 3.8% respectively).

Respondents with economic problems had an excessively high rate in terms of dropout (65%) whereas where there were no economic problems, the dropout rate was as low as 1.2%. The same was observed for academic problems. In other words, when the individuals faced academic problems, the dropout rate was excessively high (58.8%) and was low when they faced no problems (77.5%). Dramatically, there were no dropouts who had no problems in schooling. Respondents who had problems in schooling had a high rate of dropout i.e. 66.2%.

**Impact of flood on respondents overall life**

We conducted the fit test for Chi-square goodness with one-sample to seek the impact of floods on respondents' overall life presented in Table 5.

**Daily life**

Null Hypothesis = There was no association between the effect on students' overall lifestyle caused due to flood and the flood disaster.

Alternative Hypothesis = Effect on students' overall lifestyle caused due to flood and the flood disaster were related.

Indication of flood on respondents' overall lifestyle was organized in Table 5. Respondents were asked if they faced problems in their social, economic, health, educational life, and schools. Almost all the respondents faced problems in social life, schooling, and academic curriculums (90%, 97.5%, and 93.8% respectively). 67.5% of respondents reported that they faced unstable economic conditions. 87.5% of respondents faced health problems and the remaining respondents had little or no health problems. The fit test for Chi-square goodness with one-sample was conducted (Table 5) and the null hypothesis was rejected as a consequence of the findings. Along these lines, it is reasoned that there was a huge connection between floods and their effects on the inhabitants' overall life.

**Problems students face on the way to school during flood**

Null Hypothesis = There was no association between the flood disaster and its consequences on students who had difficulty getting to school.

Alternative Hypothesis = There was an association between the flood disaster and the consequences it had on students who had difficulty getting to school.

Because of floods, communication systems were damaged and students also faced difficulties on the way to their school every year. In the present study, 82.5% of respondents did not go to school as the roads were impassable, 28.8% of individuals faced problems due to washed away bridges, and as a result, they did not go to school. Besides, 28.8% faced challenges as their school was surrounded by water (Table 5). Here the null hypothesis was rejected as a consequence of the findings at a highly significant P-value. Therefore, it was determined that there was a strong association between flood and its influences on the students who had difficulty getting to school.

**Table 5.** Impact of Flood on Respondents Overall Lifestyle

Effect of flood on respondents overall life	Yes (%)	No (%)	Chi-square $\{\chi^2 (P)\}$	Degrees of freedom
Daily life				
Social life	90	10	13.900 (< 0.05)	3
Economic condition	67.5	32.5	9.800 (< 0.05)	1
Schooling	97.5	2.5	72.200 (< 0.05)	1
Academic problems	93.8	6.2	61.250 (< 0.05)	1
Health problem	87.5	12.5	13.900 (< 0.05)	3
Impact of flood on students school going				
Road Impassable	82.5	17.5	33.800 (<0.01)	1
Bridge washed away	28.8	71.2	14.450 (<0.01)	1
School surrounded by water	28.8	71.2	14.450 (<0.01)	1

### Impact of flood on students' regular attendance and health

Null Hypothesis = There was no relationship between the impact of floods on students' regular

attendance and health.

Alternative Hypothesis = There was an association between the impact of floods on students' regular attendance and health.

**Table 6.** Impact of Flood on Students' Regular Attendance and Health

Effect of flood on children's study	No effect (%)	Moderate (%)	Severe (%)	Chi-square $\{\chi^2 (P)\}$	Degrees of freedom
Attendance at school	0	82.5	17.5	33.800 (< 0.01)	1
Health	12.5	53.8	33.7	20.425 (< 0.01)	2

Factors used to measure the components that influenced school attendance were textbooks, classrooms, playground, latrines, roads, and footpaths on the way to school. For the influence of health, the components that were used to measure the effects were physical hazards, diarrhea, snake bites, fever, cholera, fracture, skin diseases, and traumatic situation. Table 6 reflects the impact of a flood on students' regular attendance and health. Most of the respondents faced a moderate effect on the students' attendance (82.5%) at school and health (53.8%). Among the respondents, there were also a significant number of students who faced a severe effect on the students' attendance (17.5%) at school and health (33.7%). We had 80 respondents in our study and all of them experienced flood disasters (Table 6).

Once again, a fit test for Chi-square goodness with one-sample was conducted (Table6) and we rejected the null hypothesis as a consequence of the findings at a highly significant P-value. As a result, it was found that there was a strong association between flood and their effect on

students' school attendance and health.

### Discussion

Focusing on the research outcome and responses, almost 82.5% of students did not attend their classes because roads were not passable after the flood and 28.8% of students faced problems as their schools were surrounded by water after the flood. The majority of the schools in the study region were flooded during the rainy season every year. Their schools' foundations and structures were not strong enough to withstand the flood's force. Previous research indicated that flood affects both primary and secondary education in a variety of ways, including direct impacts such as deaths, losses to physical educational facilities (academic buildings and materials, roads, bridges, and transportation systems), and reduced human resource components. The indirect effects reported were loss of income, expanded opportunity cost of attending school, leading to parents' negative attitude in sending their children to school, and plenty of other things (7).

Floods negatively impact school properties and constructions, including furnishing supplies like chairs and tables, textbooks, classrooms, and sanitation. Each time they face a flood, some class walls and restrooms break with rooftops blown off, according to reports. Children who spent a lot of their hours in school are at risk. Children mentioned that they are still scared and uncomfortable in their classes since the walls are damaged. According to Okuom et al. (2012) fear, uncertainty and general high alert during floods decreased student's willingness and attention to learn, resulting in poor performance. Due to the damaged toilets, many children were forced to use bush toilets, resulting in a high incidence of cholera in schools due to contaminated water. Some children had been required to quit school, while others have chosen to remain at home due to unfavorable learning conditions. Almost 66.2% of students dropped out in Keshabpur upazilla after a flood. 65% of children facing an economic crisis due to flood had an excessively high rate of dropouts, whereas, for those without economic problems, the dropout rate was extremely low (1.2%).

Floods caused low enrolment of children in school, increased drop-out rates, and lower educational attainment. Unfortunately, the damage caused by floods to physical infrastructure hindered school attendance for a longer time, especially in developing countries such as Sindh, where reconstruction of the damaged schools usually occurred long after the disaster (15). Delays in the reconstruction of the destroyed schools (that is schools damaged beyond repair) require a level of reinvestment much higher than the initial small incremental cost of safe buildings. From the observation, it was also found that about 28.8% of students had to cross the small bridges to reach the school. However, they were unable to do so because these bridges were washed away during the flood. This had a great effect on the academic performance of the students and it was agreed that students' willingness to go to school was unbelievably decreased. Almost 53.8% of children moderately suffered from various types of diseases

such as physical hazards, diarrhea, snake bites, fever, cholera, fracture, skin diseases, and traumatic situation after a flood. In the year 2012, it was recorded that 400 school-going children died and in 2011, over 300 students faced health-related problems after floods. These death rates affected the number of children who were unable to go back to school after the floods. Of the children who survived floods, most did not return to school (8). In Muzarabani District, Zimbabwe floods exposed children to multiple health risks. Stagnant water exposes children to diseases such as cholera and malaria with cholera reported to be the most widespread illness causing loss of children's lives. The second most common disease is malaria, which was also reported to be the reason for the deaths of children in the study area. Interviews with health service officials indicated that they have to attend to cholera and malaria sicknesses more during the rainy season (1).

The present study also found that 43.8% of students having the lowest wealth index faced academic problems such as lower attendance rate, drop out, a poor academic performance due to flood, whereas 28.8% of students with lower and 21.2% with upper wealth index faced academic problems comparatively less. Almost 6.2% of students who did not face any types of academic problems belonged in the upper wealth index. Mohidul, a van driver, aged 44 lived in Mangalkot. He had two sons and one daughter. One of his two sons was studying in class six and his daughter was a primary school student. Roads were impassable after the flood. His children did not attend schools regularly during the flood. As a result, their academic performance was very unsatisfactory after the floods. They also faced a lot of physical and mental hazards during and after the flood.

The present study also found that most of the students always faced complications to get to and back from school during a flood. According to the case studies, most of the students could not reach home nor school on time during a heavy flood. This had a great effect on the academic performance of the students. Based on the responses, it was agreed that students' willingness

to go to school was decreased resulting in a reduction in school attendance. The schools had to close during a flood. The performance of the students was degraded, which ultimately led to drop out. Many students could not be promoted to the upper class. The students were becoming susceptible to disaster-related problems.

### Conclusions

Most of the students face a lot of troubles after floods. The floods are largely responsible for students' poor academic performance, lower attendance of their classes, and dropouts. The flood has led to the disruption of the learning environment of the primary and secondary school-going students in Mangalkot union of Keshabpur upazilla. These school infrastructures always make the students afraid of being victimized after floods. Economic status, education, housing conditions, land ownership, political participation, and health exposure during and after a disaster make children more vulnerable. For these reasons, the school dropout rate increases. Ensuring proper health care facilities and adequate mitigation strategies during and post-disaster period can minimize the rate of dropouts and adverse effects of disaster on children's academic performance and health status in our disaster-prone country.

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There was no funding support for this study.

### Authors' contributions

UH designed the research including developing the research concept and overall research plan. FK collected the dataset. TMM conducted the Statistical analyses and developed the results. FTZJ made a major contribution by writing the paper. UH, FTZJ and TMM had primary responsibilities for the final content. All authors have read and approved the final manuscript.

### Conflicts of interest

The authors of this paper announce that they had no funding sources or conflict of interest.

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