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Impact of Flood on Performance of Students
The Case of Secondary School Students in Jaleshwor Municipality, Mahottari

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ABSTRACT

School buildings are vulnerable towards natural disaster in Nepal and many of them are poorly constructed, old and situated on the marginal lands. The school buildings and communities are always flooded with water during rainy season, which threaten the academic performance of the students. The study aimed to assess the perception of school students on the potential effects of floods on the school infrastructures, the students' residents, community infrastructures and overall impacts on their academic performance. The mixed method was used to collect the data and analyzed with the use of simple statistical tools. The well-structured questionnaires were distributed to 100 students of three schools in Jaleshwor municipality in Mahottari district of Nepal. The result of this research showed that flood impacts directly to the performance of the students mainly of secondary level. They were in fear of any upcoming disastrous events like the collapse of infrastructures in school as well as their residence. The study revealed high levels of vulnerability to the impact of floods, reduce the quality of education that disrupt the access of the rights of the education to the students. The research identified that during the flood disaster, the public properties as well as private properties are suffering more. The study recommends familiarizing and giving disaster education to the school students so that they adopt the effects of natural disaster. Operation of the education in good infrastructures ensures the quality education and makes the better performance of the students in overall.

KEYWORDS

Education performance, Flood, Infrastructure, School, Students, Vulnerability

INTRODUCTION

Disasters cause huge impacts on children and youth and overall education systems (Bastidas, 2011). Flood disasters are considered as most leading and significant natural disaster world-wide and cause human impacts and economic losses (Jonkman, 2005). Further, he explained that the flash flood increases the mortality per event and in Asia, the mortality rate is much higher because the rivers are most significant in case of killing and death of humanity. Nepal is prone to frequent flooding and landslide. According to the Climate Change Vulnerability Index prepared by Maplecraft, a British Risk Analysis Firm, Nepal is fourth most vulnerable to global warming making one million people vulnerable to climate induced disasters such as flood, landslide and draught every year (UNDP, 2013). Nepal ranks seventh in the world in the percentage of people exposed to floods per year (Marcela & Gallegos, 2011). In Nepal, flood, disaster mainly occurs in Terai region which lies at south side towards the Indian Territory. The rivers in Terai are covered with the silts, eroded through the "Siwalik" range, which raises the bed level of the rivers and increases the risk of floods. The Siwalik hill is fragile, made of sedimentary rock and gravel and has many faults. The Ratu, Jangaha, Bighi (**Figure 1**) are the main rivers originated from the Siwalik hill and Badhari, Aurahi and Banke flow through Dhanusha and Mahottari districts toward India. During the rainy season, the heavy flood inundates the productive land and settlement of these districts. Jaleshwor Municipality in Mahottari district is one of the most affected areas from flood every year (DRR Mahottari, 2011, p. 6). There is heavy impact of flooding in infrastructures like house, road, and communication (IFRCS, 2009).Housing is the second worst affected sector after agriculture. The situation report of IFRCS (2009) explored that over 200000 people in the Terai area were affected by monsoon

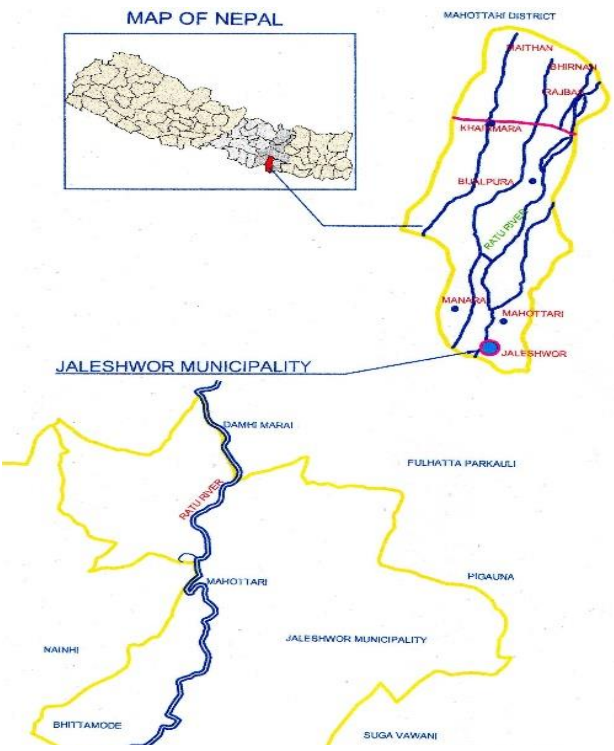

Figure 1. Major Ratu River in Jaleshwor Municipality.

flood and created stress to the vulnerable people. In 2011, the flood that hit Mahottari and neighboring districts have left devastating effect to the community of more than 35 Village Development Committees (VDCs) downstream. The Ratu Khola originated from the Maisthan in the north of Churiya hill. Its major tributaries are Jangha Khola, the Sunjhari Khola and Badahare khola with the average slope 0.76%,which decreases from north to south (Khanal, Shrestha, & Ghimire, 2007). Jaleshwor Municipality is in the lower Terai area and the flood reaches in the plain area inundates the river banks, which causes severe flooding for several days in Nepal as well as in neighboring India (Dixit 2003 cited in (K.C., 2013). The flood carries sediments from the loose, fragile Churiya hill and deposit in plain surface raising the bed level of the rivers, destroying the crops, flooded the settlements.

Among other infrastructures, school buildings as well as student's residents (**Figure 2**) are very important assets of the society. They play an active role in enhancing the capacity of children to develop skills for their future life leading to the development of the nation. There are many types of disasters which have direct or indirect impacts on schools. Among them some disasters have direct impact on administration of the school. When disasters like flood, wind and earthquake occur, they damage school infrastructures including class building, library building, water supply and toilet system. This event is directly related to the closing of school or may be the reduction of the school hours or continuation of education elsewhere in elevated ground or in open space. The school children are vulnerable and "at risk" against natural disasters during the time of school as we see the disastrous pattern of Nepal, (Tuladhar, Yatabe, Dahal, & Bhandary, 2013, p. 113). They further added that the educational rights of the students are disrupted when the natural disasters occur. The school infrastructures collapse that leads to the discontinuation of the education system and increasing rate of drop out of the children. The education system will be disrupted and consequently the quality of education is decreased. If the schools are closed for long duration due to collapse of school infrastructures, the students will go to another school. The teachers will be engaged in

Figure 2. Impact of Flood on utilities.

rescuing and helping the community flood victims. The children will be attracted towards the socially unwanted activities or they get stressed.

Sometimes the indirect effects also play a vital role to keep the students out of the school after the event of disaster. The students are forced to leave the school by their parents and engage them in livelihood activities to cope the flood disaster. Another reason for leaving the school is the unsafe condition of school building and other infrastructures. The parents, after knowing the vulnerability of school against disaster, the parents hesitate to send their children in the school. The children are always in fear during their study in school. Petal (2008) explained that the monitoring the condition of school buildings are under joint concern of several authorities of the Government. It is their responsibility and accountability to ensure the safety of schools (Petal, 2008).

The direct and indirect impacts of the flood disaster in school infrastructures create psycho-social problem among the school children. Shrestha, Subedi, Yatabe and Bhandary (2011) studied that the quality of education in school will be better if the provision of facility, safe and secure situation, children friendly are ensured. The main vulnerable group in the flooding at the school is children of secondary school. When a flood occurred in September 2009 in Kailali district in western Nepal, 56 out of 136 schools were used as a safe shelter for the flood victims. The school opened only 110 days for the students, but it is mandatory to open 220 days in a year. Therefore, Achoka and Julius (2008) stated that better school environment equipped with the basic facilities makes the learning process efficient and effective resulting quality output.

The finding made by Shrestha et al (2012) about the vulnerability of a school building is that the vulnerability of disaster can be reduced by the implementing retrofitting which is the simplest method, cost effective and no skill manpower required. It can be done by local human resource. It also helps to spread the knowledge of safety among the communities. The Government and concerned agencies in Nepal have been implementing “School Safety Program”, aiming at physical, seismic and retrofitting of school buildings (MOAH, 2013, p. 56). We found many researches on the retrofitting of school to mitigate the effect of earthquake in Nepal but insufficient research on the impact of flood disaster on school and school children. Are these buildings safe enough to accommodate children during flood disasters? Are the students eager to attain the school in rainy season and during the flood without fear? Are the performances of the students satisfactory even in the monsoon season and danger of flood? Many researchers and agencies engaged their

efforts in the earthquake risk reduction. Many school buildings are retrofitted to cope with the earthquake disasters in the Kathmandu valley and some districts outside the valley, but fewer studies have been conducted to explore the vulnerability of school buildings against flood disasters in Nepal. The minor population is always neglected and not given proper attention in any type of disaster and emergencies. The objective of this research was to explore how the secondary school going students perceive the flood disaster and their impact on their educational performance. It also aimed to study the vulnerability of existing school infrastructures and physical assets, effect of flood disaster to the academic performance of the school going students, condition of public utilities which affects the students' academic performance and the vulnerability of the infrastructures of student's residents.

It helps the concerned authorities of the schools and other stakeholders including Government about the vulnerability of school against flood disaster and performance of the students in school. If the school facilities are in vulnerable conditions, the government can give proper attention to mitigate the vulnerability of school facilities and protect the life of school children, teacher, staffs and community people as well as improve the academic performance of students.The following research questions were formulated to get the solution of the problems for this research.

i. How do secondary school students perceive the effect of flood influencing their residential infrastructures?
ii. How do secondary school students perceive the effect of flood influencing their school infrastructures?
iii. How do secondary school students perceive the effect of flood influencing their route from residence to school?
iv. How do secondary school students perceive the effect of flood influencing their academic performance?

METHODOLOGY

Mahottari district is situated in the Central region of Nepal which is a highly agricultural productive area. According to the DRR, Mahottari (2011), there are 35 Village Development Committees (VDCs) highly vulnerable to the flood disaster. The main regions of high risk VDCs are the major rivers Ratu, Jangaha, Banke, Budhari and Aurahi (Ref. Fig. No.1). DRR in their

report pointed out that during the rainy season, the heavy flood causes the productive land inundated. Among those rivers, Ratu river carry huge sediment and flooded the Jaleshwor municipality and nearby VDCs. In Jaleshwor Municipality, 1,2,3,4 and 5 wards are at risk to the flood. It was estimated by DRR, (2011) that if the same level of flood occurred in the future as in the 2000 AD, around 65000 population or 9000 households will be affected. Beside this population, 4500 livestock and around 7000 ha land will be flooded.

A random sampling was used for selection of sampling units. Total 100 students (the respondents) were selected from randomly selected different schools in five wards (2, 3, 5, 6, and 7 wards) of Jaleshwor Municipality in Mahottari districts of Nepal. These wards were very vulnerable to the flood disaster and the proximity of schools was near the river. The sample unit was selected keeping in mind that the respondents have resided in the flooded area. The interviews with the students of age, eight to fourteen were conducted through the use of pre-defined questionnaires. The reason behind this stratification is that the students below eight year accompanied with their parents to go to school and back. Similarly, the students having age more than fourteen are assumed that they are matured to protect themselves from any disasters.

The well-structured questionnaires designed to investigate the effect of flood disaster on school students, which was influenced by the previous research work done by (Amadi, 2013, p. 14) but this research was in the context of Nepal. This study was done on those students who were victims of the flood disaster in the past. The limited resources, time and manpower detected the sample size of the population to be surveyed. The interview was conducted with 100 students studying in the schools in Jaleshwor Municipality in Mahottari districts but 99 had responded the questionnaire. The selection of respondent was based on the geographic and socioeconomic categories. The geographic categories means the proximity of their residence to the river and socioeconomic means respondents having insufficient resources to cope with disaster and socially deprived. A collected data were analyzed qualitatively and simple statistical tools were used through the SPSS 20 programme. The interview was proceded by random knocking on doors of these household and in three schools.

The first area of the questionnaire described the vulnerability of residential area of the respondents. The second area described the situation of the school infrastructures and other physical assets and the third area described the condition of public utilities from the respondent's

resident to the school. The fourth area described the academic performance of the respondent that was impacted by the flood disaster.

RESULTS

Question No. 1. How do the students of secondary school perceive the effect of flood disaster influencing their residential infrastructures?

Table 1. Effect of Flood on Students Residential Infrastructures.

Effects of Flooding on the Respondents Residents	Yes (%)	No (%)	Do not know (%)
Damage of House of Students	51.1	45.8	3.1
Health problems in the student's family	35.4	60.4	4.2
Drinking Water Supply and Sanitation Problems	57.9	37.9	4.2

The **Table 1** reflects that the effects of flooding on the respondent's residents. 51.1% of the respondents experienced flooding their houses and 45.8% of respondent (students) did not experience it, while 3.1% of students did not know the flooding consequences. 35.4% of the students claimed that there were some health problems or injuries during flooding in their family. But 60.4% of the students confirmed that there was no any casualty during flooding and 4.2% of the students were undecided. 57.9% of the students believed that their drinking water sources were contaminated and the toilet and septic tank were flooded, while 37.9% of the students had no such causalities. 4.2% of the students were undecided. These three variables were recorded into the infrastructures of the residence of students.

Sampling of 99 students were randomly selected from different schools and evaluated whether the number of students perceived that the occurrence of flood disaster influencing the infrastructures of the residents of the students. The data were analyzed using one sample chi-square goodness for fit test. The result showed that the null hypothesis was rejected. $\mathcal{X}^2(5) = 38.074, p \leq 0.05$. Therefore, it is concluded that there is a significant relationship between flood disaster and its impact on the residents of the students. When there was heavy flood, the infrastructures of the student's houses were damaged.

Question No.2. How do students of secondary school perceive the effect of flood disaster influencing their school infrastructures?

Table 2. Influence of Flood on the Infrastructures of School.

Effects on the Respondent's Schools due to Flood Disaster	Yes (%)	No (%)	Do not know (%)
Class environment in school due to flooding	48.5	50.5	1
Damage of school's infrastructures	87.9	12.1	0
Damage of school's physical assets	64.6	31.3	4.1
Drinking water supply and sanitation problems	62.5	36.5	1
Damage of physical assets in library	53.5	44.4	2.1

The **Table 2** reflects the effects of flooding on the school environment. 48.5% of the students agreed that there were no studying environment in the school because of the flooding in class in the past. But 50.5% of the students said that there were good environment in the schools and classroom to the functioning of the educational activities. There was no any effect of flood in classrooms in the schools, while 1% students were undecided. But 87.9% students responded that there were damages in school's infrastructures due to flooding and 12.1% of the students said that there were no any damage of the schools buildings. 64.6% of the students respondents that there were damages of physical assets in the schools, 31.3% of the students told that there were no any damage of the physical infrastructures in the school. But 4.1% of the students were undecided on this issue. 62.5% of the students claimed that the drinking water system in the schools gets contaminated during a flood and problems in the toilet use. 1% of the students were undecided to answer in this problem. Regarding the physical assets in the library, including books, 53.5% of the student's respondent that books, furniture and other similar physical assets were damaged by flood. 44.4% of the students told that there were no any damage of the books and other assets in their school during flooding, while 2.1% of the students did not know about this problem. These five variables were recorded in the access of the condition of the infrastructures of the schools.

The randomly selected sample was chosen from different schools and evaluated whether the number of students perceived that the occurrence of flood disaster influencing the infrastructures of the school. The data were analyzed using one sample chi-square goodness for fit

test. The result showed that the null hypothesis was rejected. $\mathcal{X}^2(5) = 22.625, p \leq 0.05$. Therefore, it is concluded that there is a significant relationship between flood disaster and its impact on the school's infrastructures. It means when there was flood disaster, the school' infrastructures were affected.

Question No. 3. How do secondary students perceive the effect of flood influencing their route from residence to school to and from?

Table 3. Access to use of Community utilities during flooding.

Effects on the community Infrastructures related to Education due to Flood Disaster	Yes (%)	No (%)	Do not know (%)
Problem in access from home to school	85.9	11.1	3
Problem in access from school to home	82.3	15.6	2.1
Damage of road to school	86.5	12.5	1

From the survey response as indicated in above **Table 3**, 85.9% affirmed that there were problems to go to school from their residence to school through the road due to flood; 11.1% declared unaffected and rest 3% were undecided. 82.3% proclaimed that they faced difficulty to come back home from school when they were in school and flood came. 15.6% of the respondents stated that they did not face any problem and 3 % undecided. 86.5 % averred that the road to school from their home damaged during the flood. 12.5% of the respondents had their road not damaged and 1% undecided.

We sampled 99 students, randomly selected from different schools and evaluated whether the number of students perceived that the occurrence of flood disaster influencing the community utilities like route to school from the student residences. The data were analyzed using one sample chi-square goodness for fit test. The null hypothesis was rejected. $\mathcal{X}^2(4) = 155.354, p \leq 0.05$. Therefore it is concluded that there is a significant relationship between flood disaster and damage

of road from residence of students to their school which hamper the academic activities of the students.

Question No.4. How do secondary students perceive the effect of flood influencing their academic performance?

Table 4. Influence of Flood on Academic performance of students.

Effects on the Students' academic performance due to flood Disaster	Yes (%)	No (%)	Do not know (%)
On academic performance	80.8	18.2	1
On attendance of students	79.8	16.2	
On promotion of students in upper class	69.7	24.2	.1
On students admission in school	71.4	22.4	.2
School off during a flood	72.9	24	.1
Compulsion to study in open space	39.6	57.3	.1
Happy in the falling of flood disaster	75.8	22.1	.1

From the above **Table 4**, 80.8% of the respondents agreed that their academic performance was lower due to flood disaster. 18.2% of the respondents thought that their academic performance was not affected and 1% were not decided about this issue.79.8% of the students respond that they did not attend the school during the flooding situation. Only 16.2 % of the respondents attended the school at that time.4% of the students from above table could not decide. 69.7% of the students from above table 4 showed that the number of students decreased in the promotion of upper class due to flood disaster. 24.4% of the respondents did not agree that there was any problems in the promotion of students and 6.1 % of the respondents did not decide. 71.4% of the students told that there was a decrease of number in admission in the school. 22.4% of the students responded that there were no decrease in admission and 6.2% of the respondents were not aware about this issue. 72.9% of the respondents agreed that the schools were closed during the flood. 24% of the students responded that the schools were open during the flood in the school and 3.1% undecided. 39.6% of the students told that the class operated in the open space during the flood. 57.3% of the students responded, no any class in the open space. 3.1% of the students undecided. 75.8% were happy, 22.1% not happy and 2.1% of respondent's undecided on the falling of the flood disaster.

We sampled 99 students, randomly selected from different schools and evaluated whether the number of students perceived that the occurrence of flood disaster influencing the academic performance of the students. The data were analyzed using one sample chi-square goodness for fit test. The null hypothesis was rejected. $\mathcal{X}^2(9) = 87.915, p \leq 0.05$. Therefore, it is concluded that there is significant relationship between flood disaster and academic performance of the students. The academic performance of the students was decreasing when there was flood disaster.

DISCUSSION

Based on the findings from the study and responses, around 49% of the houses of the students were also vulnerable to the flood. Most of the houses were flooded during the rainy season every year. The structures of their houses were not enough to support the pressure of the flood and get damaged. The observation showed that most of the houses having the wall built with the weaving, the splited bamboo plastered with mud. There was no use of building code in the construction of houses, even in the framed structures, made the house vulnerable to the flood. It was found that few families were wounded when there was damage of the components of houses. Most of the families were forced to use contaminated water for drinking during the flood. The toilet in the houses was also flooded and not usable. The students were go to open elevated area for defecation, made the environment contaminated. This activity also decreased the preparation time to go to school. The students were unable to attain the school and there were greater absenteeism in the schools. All these problems lead to the poor academic performance of the students.

It is clear that the school buildings are vulnerable to the flood. The flood in Ratu River impounded the Jaleshwor municipality in rainy season. The consultation with local people revealed that the Jaleshwor municipality is situated in the depression. The soil erosion along the Churiya hill deposited the silts in the river bed of the Ratu resulted raising the bed level of the river. From the observation, it was found that the school had poor infrastructures, built by local contractors and no building codes were used. During the flood components of the school buildings were found damaged. The students found crack on the wall and roof caused the students in fear and feel insecure. Some physical assets in the classrooms like bench chairs were also got rinsed and unusable when it gets dry. Similarly, the assets in the library also got damaged. The water in the

schools was contaminated and the students were not able to drink it. The septic tank was filled with the floodwater, made the environment contaminated which can pose significant health threats to students. The collapsed and flooded toilet compelled the students to resort to bush toilets which made the water contamination and leads the spreading of cholera disease. During the flood the school had to be closed and it took a week and long days to reopen the school. It resulted the loss of schooling hours affecting the quality of education. Because the teachers were unable to cover the courses in due time, it affected the performance of the students. This fact is supported by the findings made by (Okuom, Simatwa, Maureen, & Wichenje, 2012), which stated that disaster resulting in the failing to complete the syllabus which leads the poor academic performance of the students.

Most of the students always faced difficult access to school from their residence and back from school to residence during a flood. The finding revealed that most of the students could not reach home in time when they were in the school and heavy flood came. Some of the students had to cross the small streams to reach the school. When they were at home they could not reach the school during the flood. This had a great effect on the academic performance of the students. Based on the response, it was agreed that the students' willingness to go to school was decreased. There was a decrease in the school attendance during the flood incident. The school had to close at that moment. The performance of the students was lowered, which ultimately leads to drop out. Many students could not be promoted in the upper class. The students were becoming vulnerable to disaster related problems.

CONCLUSIONS

Achoka and Julius (2008) concluded that the education is seen as a human rights, a key to civilization and enlightenment and as a source of wealth and power. It is obvious that the flood disaster leads the disruption of the learning environment of the students of the secondary school. The vulnerable school infrastructures always make the students afraid of being victimized. The vulnerable residence of the students also plays a great role in the education during the disasters. As a result, the students were unable to give the attention in the study and ends up with drop out. Therefore, it can be concluded that the effect of the flood on the school infrastructure was extreme. Due to the flood disaster in many schools closed, the infrastructures damaged, drop out of the students increased which ultimately impacts on the performance of the students. The outcome of this research

supported the (Achoka & Julius, 2008), (Okuom, Enose, Maureen, & Wichenje, 2012). Those students whose families' financial condition could not permit them for the alternate choice for better education were forced into the early marriage. Mainly the male students, having no guardian pressures were distracted from the study and joined the unwanted social activities. When the school closed for long periods due to the impact of such disasters, their poor parents involve their children in labor work. Slowly the children diverts their attention to earn money rather than going to school. Therefore the academic performance of the students becomes poor.

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