

The impact of flooding on primary education in Kroch Chmar District, Tbong Khmum Province, Cambodia

HENG Chanla*

Planning and Finance Office, Heng Samrin Tboung Khmum University, Tboungkhmum District, Tboungkhmum Province, Cambodia

*Corresponding Author: HENG Chanla (hengchanla@gmail.com)

To cite this article: Heng, C. (2019). The impact of flooding on primary education in Kroch Chmar District, Tbong Khmum Province, Cambodia. *Cambodia Journal of Basic and Applied Research (CJBAR)*, 1(2), 83–97.

សង្ខេប

ប្រទេសកម្ពុជាជាប្រទេសដែលងាយទទួលរងនូវគ្រោះធម្មជាតិ ដូចជា គ្រោះទឹកជំនន់ និងព្យុះត្រូពិចជាដើម និងស្ថិតក្នុងលំដាប់ទី៩ក្នុងបណ្តាប្រទេសដែលងាយរងគ្រោះបំផុតក្នុងពិភពលោក។ ជាពិសេស ទឹកជំនន់បានប៉ះពាល់យ៉ាងខ្លាំងដល់ជីវិតមនុស្ស និងការអប់រំរបស់កុមារគ្រប់អាយុចូលរៀនគ្រប់ភូមិសាស្ត្រ នៅតាមតំបន់ដែលងាយរងគ្រោះថ្នាក់ដោយសារទឹកជំនន់។ ការសិក្សាស្រាវជ្រាវនេះមានបំណងផ្តល់នូវការស្វែងយល់ស៊ីជម្រៅអំពីផលប៉ះពាល់នានានៃទឹកជំនន់ទៅលើការអប់រំ និងមូលហេតុនានា ដែលបង្កការរងគ្រោះដល់សហគមន៍ផងដែរ។ ការស្រាវជ្រាវនេះបានពិនិត្យយ៉ាងហ្មត់ចត់និងល្អិតល្អន់អំពី៖ ផលប៉ះពាល់នៃទឹកជំនន់ទៅលើការសិក្សារបស់សិស្ស ការយល់ឃើញរបស់ឪពុកម្តាយ គ្រូ នាយកសាលា និងមន្ត្រីអប់រំ លើដំណើរការសិក្សានិងសុវត្ថិភាពសិក្សារបស់សិស្សនៅសាលាក្នុងគ្រាមានទឹកជំនន់ និងបញ្ហាប្រឈមនានាចំពោះសហគមន៍ដែលតែងមានទឹកជំនន់ ដូចជា កម្មវិធីសិក្សា និងហេដ្ឋារចនាសម្ព័ន្ធសាលារៀនជាដើម។ ការសិក្សាស្រាវជ្រាវបានរកឃើញថា៖ (១) សាលារៀន ដែលបានចុះស្រាវជ្រាវ ត្រូវបានបិទទ្វារឬពន្លាញពេលការសិក្សា ពីពីរសប្តាហ៍ទៅមួយខែ ដោយសារការរំខានដោយទឹកជំនន់។ (២) ក្មេងស្រីងាយរងគ្រោះដោយសារទឹកជំនន់ខ្លាំងជាងគេ ហើយឪពុកម្តាយតែងតែមានការព្រួយបារម្ភយ៉ាងខ្លាំងអំពីសុវត្ថិភាពកូនៗនៅពេលមានទឹកជំនន់។ (៣) មានទំនាក់ទំនងតិចតួចរវាងគ្រោះថ្នាក់ពេលមានទឹកជំនន់និងការមករៀនរបស់សិស្ស ប៉ុន្តែ មានទំនាក់ទំនងយ៉ាងជិតស្និទ្ធរវាងឥទ្ធិពលនៃទឹកជំនន់និងលទ្ធផលសិក្សារបស់សិស្ស ជាពិសេស ការរៀនត្រួតថ្នាក់។ សិស្សមានការពេញចិត្តចំពោះហេដ្ឋារចនាសម្ព័ន្ធរូបវន្តនិងសេវាសិក្សារបស់សាលា ព្រោះសាលាទាំងនោះមានបរិយាកាសល្អសម្រាប់ការសិក្សា។ ទៅថ្ងៃអនាគត ផលប៉ះពាល់នៃទឹកជំនន់លើការសិក្សាអាចនឹងត្រូវបានកាត់បន្ថយ តាមរយៈការកៀរគរធនធានពីអ្នកពាក់ព័ន្ធនានា និងការពង្រឹងសមត្ថភាពសាលារៀនទាំងនោះក្នុងការគ្រប់គ្រងហានិភ័យនានា ដែលកើតពីទឹកជំនន់ប្រកបដោយប្រសិទ្ធិ។

Abstract

Cambodia is a vulnerable country to natural disasters such as flood and tropical storms; it ranked as the world's 9th worst affected by disaster. In particular, flood has affected to people's lives and education in the flood-prone areas. Accordingly, the research aimed to provide a thorough understanding of the impact of floods on the education and underlying causes of the community's vulnerability. The research takes a close look upon: how worst flood has affected children schooling, perception of parents regarding children performance and safety at school during flood, as well as problems and challenges faced from flooding on flood-prone community vis-à-vis curriculum, and infrastructure. The research found that (1) flood interrupted schools because classes were suspended or closed between two weeks and a month. (2) Girls were the most vulnerable to the floods and their parents concerned about their safety during the flood. (3) There was related association between risks happened during flood and coming to schools; but it was significantly associated between impacts of flood and students' repetition. (4) The students satisfied with physical infrastructures and school services because the schools could create fairly good learning environment. In the future, impacts of flood on education may be improved through resource mobilization and capacity building of the schools to implement flood risk management effectively.

Keywords: basic education, enrolment, drop-out, flooding, vulnerability

Introduction

Cambodia has been ranked ninth most affected country, in terms of natural disasters, globally (Chea and Sharp, 2015), which highlights the low-level of technical skills within the country to manage these risk. Many Cambodians are heavily dependent on agriculture; which means they are highly vulnerable to flood and drought (Chea and Sharp, 2015). The most prevalent natural disaster risk in Cambodia is floods, followed by drought, occasional epidemics, and storms (NCDM, 2013). In both 2011 and 2013, a combination of successive typhoons, brought torrential rains and caused extensive flooding across the country (RGC, 2010). Cambodia's vast floodplain is one of the country's most prominent geographical features and is representative of her natural susceptibility to annual flooding, particularly along the Tonle Sap and Mekong River. Natural disasters carry risks that can damage economic growth, contribute to the experience of poverty, and affect the education of children (ADB, 2012). A 2013 flood impact assessment report indicated that natural disasters impact living conditions, education and the overall economic position of the country (NCDM, 2014).

Cambodia experiences two major seasons—a dry season from November to April, where rain ceases to be available for agriculture—and a rainy season from May to September, linked to

high agricultural production. In September each year, rainfall levels are generally higher than other months and this inundates a large, low-lying agricultural region. The National Committee for Disaster Management (NCDM, 2014) reported that the 2013 flooding in Cambodia damaged more than ten thousand households, affecting millions of people across 20 provinces. More than 100 people died as a result and many were children (HRF, 2013a). Flood waters rose across the entire country; albeit more slowly than expected, in the most-affected provinces in the north west of the country. Some of these locations were flooded for long periods. More than 200,000 houses, 1,000 school facilities, and many health centers, hospitals, and pagodas were directly affected, resulting in significant levels of infrastructure damage (HRF, 2013b).

Floods and other natural disasters have become a fact-of-life in Cambodia and continue to present significant challenges. While these disasters are often caused by natural processes of rainfall and catchment run-off, flood impacts are conditioned by human behavior and affect vulnerable people disproportionately (MoEYS, 2013). Human-related factors, including land-use changes like deforestation and the urbanization of river basins play a significant role. For instance, urbanization transforms of natural permeable surfaces and limits the percolation of water into the soil. It increases the velocity at which surface water flows over land, leading to a higher frequency of flash floods, which are associated with increased casualties and property damage (UNDP, 2014).

Floods cause significant damages to the education sector. Each year, floods disrupt study programs and damage school infrastructure, especially in flood prone areas (MoEYS, 2013). Flood-prone schools face challenges such as disrupted learning activities, damage to school infrastructure, as well as high drop-out rates and student repetition. Drop outs occur when families are affected by floods. This may occur due to diverse factors such as learning materials become destroyed, with parents unable to replace them; or the temporary migration of families in search of work, forcing their children to drop out of school (NCDM, 2014). For example, during the 2013 flooding, it is estimated that over 100,000 teaching hours were lost, disrupting the function of schools. Teachers were required to set up temporary learning spaces. Teachers may also be indirectly affected by floods because of a need to care for their family outside of school or being evacuated. They may also need to act to protect household livelihoods (NCDM, 2014).

Flood events often force children to delay their schooling for a period of weeks or even months. Many school facilities in Cambodia have been constructed without consideration of the need for disaster proofing, such as raised plinths. School infrastructure is often constructed with limited local building materials. Old wooden school buildings that have been partial structural damage become a hazard for children (NCDM, 2014). There are often no organized maintenance schedules for school infrastructure due to lack of financial resources or leadership. Communities are often left with the burden of maintaining safe, usable buildings. After flood events, students encounter difficulties when travelling to school due to damage roads and the need to cross rivers without bridges. They are often required to catch a boat to school, which is more time consuming and results in higher costs to access education. This can result in higher levels of absenteeism, particularly among poorer students (UNDP, 2014).

During sudden flood events, it can be impossible to relay timely information to isolated communities, who are then required to depend on their own resources and capacity (Siudak, 1999). The development of disaster risk reduction strategies often does not involve the provision of education during and after these events. This should be promoted to different stakeholders in the education sector (Pahl-Wostl, et al., 2013). Disaster risk reduction (DRR) programs could be integrated into education projects that not only address disaster risks within the school curriculum, but also provide relevant training to other stakeholders, including development planners, local authorities, development partners, NGOs and local government officials (UNESCO, 2010).

Research Methodology and Study Area

This exploratory study applies descriptive statistics to examine the impacts of seasonal flooding from the Mekong River on schools. At the same time it looks toward solutions based on answering the research questions. The experiences of three schools from Kroch Chhmar district in Tbong Khmum province are compared. The focus on the study is on student learning outcomes, the rate of progression of students from flood-prone areas, parental perceptions of the importance of education, and schooling strategies during seasonal flood events. *Kroch Chmar* district was selected as it is an area along the Mekong River that is regularly affected by seasonal flooding. Overall, student drop-out and repetition rates of districts in the selected research site

have historically been higher compared to other districts in the province. This is also representative of neighboring districts, such as *Dabme* and *Tbong Khmum*. These rural communities are located quite a distance from the urban center and schools often lack of resources, have inadequate infrastructure, and experience low levels of community cohesion. Local livelihoods are generally based on rice or vegetable production along the Mekong River, as well as fishing. The livelihoods of people in these communities are heavily prone to flood impacts, as is the education of their children, generally at the beginning of the academic year.

Tbong Khmum was officially established as the 25th Province of Cambodia on the 1st of December 2014 by the Ministry of Interior, and its Provincial Departments, including the Provincial Department of Education were only established in August 2014. The province was formed when Kampong Cham province was divided into two. It comprises 6 districts and 1 municipality, Suong, which is located 175 kilometers from Phnom Penh on the National Road 7. It has 62 communes, and 2 khans, and 865 villages, with a population of 844,314 people (426,811 females), at a population density of 156 people per km² (MoP, 2008). The province is located within the floodplain region to the east of Cambodia and borders Kampong Cham, Prey Veng, and Kratie provinces; as well as Vietnam, another ASEAN member country. The province possesses rich soil, which is used for agricultural production, largely focused on rubber, cassava, pepper, cashew, soy crops, as well as extensive orchards.

Two of the six districts in Tbong Khmum are regularly affected by seasonal flooding. These are Tbong Khmum and Kroch Chhmar, of which the latter is the most affected. Kroch Chhmar district covers 558 km² and is divided into 12 communes and 76 villages. The district population is 105,241 people (53,490 female). There are 95 schools in the district, comprising with 18,485 (8,992 female). Up to 38 of these schools are regularly flooded in the rainy season including 32 primary, 4 lower secondary and 2 upper secondary schools. These schools are situated within three communes—*Trea*, *Koh Pi* and *Tuol Snuol*. Purposive sampling was used to select one primary school from each of these communes in which to conduct the research. The selected schools represented a high risk, medium risk and low risk school, in terms of seasonal flooding. A total sample cohort of 91 students was selected across the three schools on the basis of a maximum standard statistical error of 7% (Yamane, 1967)² for a survey. Additional students in

Grades 4 and in Grade 5 were also randomly sampled to participate in face to face interviews using structured questionnaires and checklists.

Table 1. Numbers of students interviewed students.

Target School	Total Population	Sample Size	Percentage of total
Trea Pourn Primary school	45	37	83%
Koh Pi Primary school	32	28	87%
Tuol Snuol Primary school	30	26	87%
Total	107	91	85%

A range of quantitative and qualitative data was collected using primary and secondary sources about the status of the school infrastructure and environment. The research was designed to collect a significant amount of information, which may be used for follow-up studies. A questionnaire was formulated to collect information about the impacts of flood events on education, in terms of progression rates, community perceptions of flood impacts, proposed solutions, and immediate strategies that may be employed to respond to flood events. Both close- and open-ended questions were used. Qualitative surveys were also used for interview key informants including parents, community leaders, NGOS, school principals, district and provincial officials relevant to these students. These interviews collected additional information on their roles in supporting students to reduce the risk associated with flood events during each term. At each school, a focus group comprising five students was invited to sit and share about information about the difficulties they faced as a result of floods and how these affected their schooling. Interviews were conducted with primary school students from either Grade 4 or 5, with the proportion of students from these grades being similar in each school. Students were classified in terms of who was most vulnerable to flood events; or whether flood events regularly interrupted their education.

The data collected was entered into an Excel spreadsheet and then SPSS software was used to analyze the data using various descriptive statistics including Chi-square tests, t-test, and a weight averaged index. Content analysis was used to analyze the qualitative process data, which was crucial for elaborating upon the impact of flooding on education and school infrastructure in the flood-prone district, communes and villages Tbong Khmum.

Table 2. Number of students from each grade taken participating in the research

Grade	Koh Pi		Trea Bourn		Tuol Snuol		Overall	
	N	%	N	%	N	%	N	%
Grade 4	14	50.0	17	45.9	13	50.0	44	48.3
Grade 5	14	50.0	20	54.0	13	50.0	47	51.6

Findings and Results

Impacts of flood events on access to education

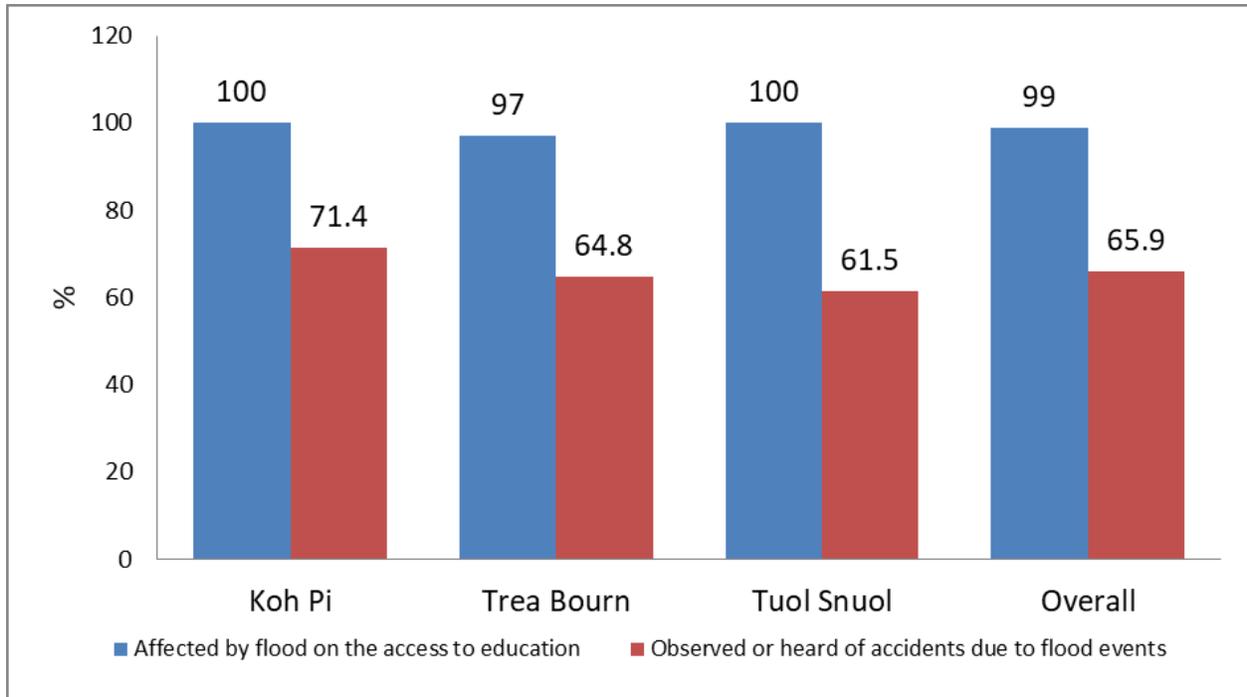
Each day, these students walk to school, however, during flood events they may need to travel by boat. Some parents do not allow their children to travel by boat as they are afraid their children may drown. Usually, children require around 11 minutes to travel to school, however, during flood events, they require more time. Students from *Koh Pi* spent more time on average than students from both *Trea Bourn* and *Toul Snuol* schools. Moreover, girls tend to take longer to travel to school (12 minutes) than boys (9.4 minutes). The location of each school was found to be an important factor in the decision of parents whether to send their children to school or not. In flood-prone areas, parents consider safety to be a priority and preference schools in with a higher elevation (School Principals and Teachers, pers. Comm., November 2016).

The number of members in a household member influences the likelihood of whether children are supported to study. A household with comprising more people was shown to be less likely to encourage the children of the household to complete schooling to Grade 9 (District Office of Education and School Principals, pers. comm., 2016). There between 4 and 10 people in the households of each student, with an average of 5.8 people. This figure was higher for *Toul Snuol*, where there were 7 or more people in the households of 23.1% of the students interviewed. Female students (6.1 members) tended to be from larger households than male students (5.5 members).

Almost all respondents (98.9%) suggested that flood events affected their access to education, which was true for all girls (100%). Within each household, girls were considered by their parents to be more vulnerable. Results were similar at each school (Figure 1). Closures during flood events could not be avoid for schools located along the Mekong River. All schools in

the study area required school infrastructure upgrades (District Office of Education, pers. comm., November 2016).

Figure 1. Experiences of students from flood on their schooling.



Both female and male students perceived their education to be important and demonstrated an equal willingness to attend when affected by flood events. However, on average, students from *Tuol Snuol* demonstrated lower levels of commitment. Some of the factors identified as affecting school attendance during flood events were the influence of parents and teachers, as well as the location of the school (Students, pers. comm., November 2016). The availability of a boat was found to be a significant factor in whether a student would attend school, with 79.1% of students travelling needing the cross water ways during flood events (Table 22). Around 45% of students still walked to school during lower level of flood but they could not do when flood levels increased to more dangerous levels, this was not the case. More than half of all students interviewed reported this problem. Students from *Koh Pi* reported a higher level of impact than students from other schools (District Office of Education and School Principals, pers. comm., November 2016).

Impacts of flood events on national exams

Students also responded to questions about their results each semester. Female students (55%) reported better than male students (40.5%), in terms of experiences, living conditions, learning problems or difficulties, family status, school management, learning during flooding and learning outcomes. Students from *Koh Pi* generally performed better than students from *Toul Snuol* and *Trea Bourn*. It was suggested that the level of attention demonstrated by each teacher and strong school attendance were factors that tended to improve school performance. Flood events were described as affecting all students in the community, as opposed causing differential impacts on individual students (District Office of Education, pers. comm., November 2016). However their schools have been affected by flood; both female and male students' similarly rated their high satisfaction of their performance at school and suggested they were happy with their results (Table 3). Students indicated that they like to attend school as they could meet friends, use facilities such as playgrounds, and learn new things (Principals and Teachers, pers. comm., November 2016).

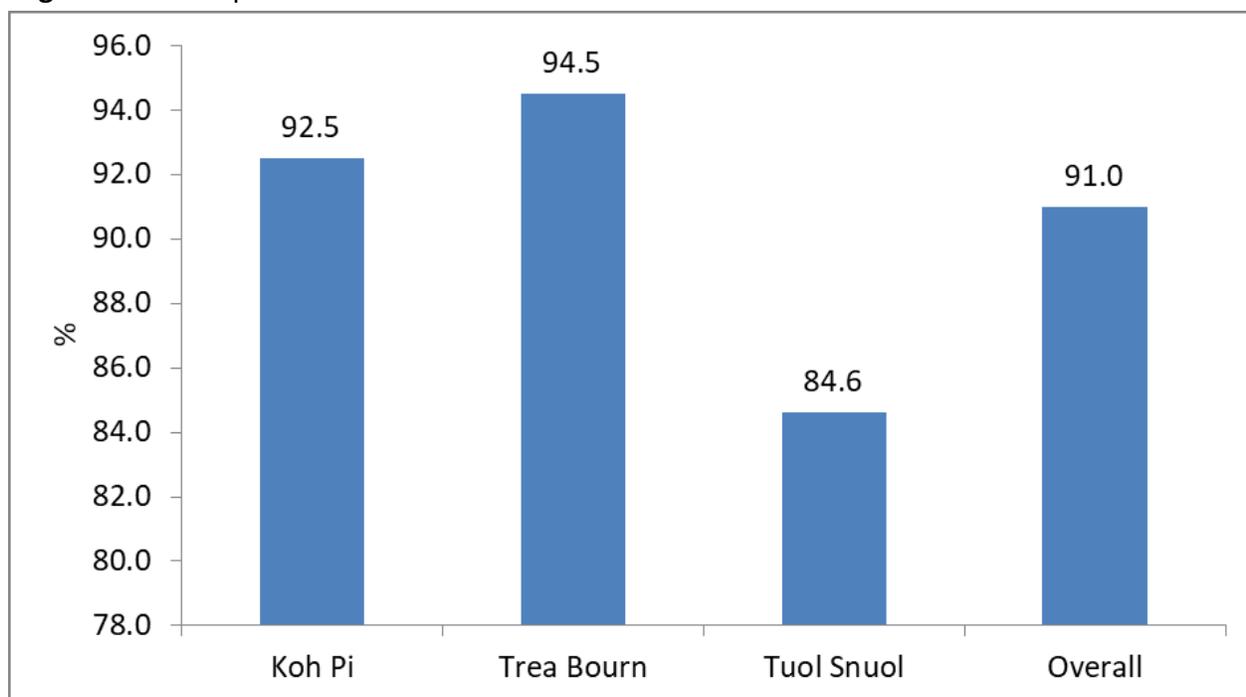
Table 3. Rating school performance of the students.

Indicator	Male		Female		Overall		P-value
	WAI	OA	WAI	OA	WAI	OA	
School performance	0.76	H	0.80	H	0.78	H	0.191

*Note: WAI= Weight Average Index measured on a five-point scale [Very low (VL) = 0.00-0.20, Low (L) = 0.21-0.40, Moderate (M) = 0.41-0.60, High (H) = 0.61-0.80, Very High (VH) = 0.81-1.00]; OA= Overall Assessment; *Significance at the 0.05 level; **Significance at the 0.01 level.*

Up to 91.0% of students interviewed indicated that flood events had impacted their performance in the national examination (Figure 2). Classes used to prepare the students for standard assessment based on the MoEYS curriculum are frequently disrupted due to flood events in the study area (Principals and Teachers, pers. comm., 2016). When this occurs the progression rate of students to the next grade is affected and this is worse in rural areas (Provincial and District Offices of Education, Chief of Primary Education, Principals, pers. comm., November 2016).

Figure 2. The impact of flood events on national exam results.



Association of flood risks and school attendance

A Chi-squared test was used to show that there is no significant association between the level of flood risk and school attendance (Table 4). In most cases, students are able to travel to school, either by walking or by boat and are still required to pay attention to their lessons. Most children in these schools are familiar with boats and regularly play in water, which acclimatizes them to the conditions experienced during floods (Principals and Teachers, pers. comm., 2016).

Table 4. The association between flood risk and school attendance.

Indicator		Still attend school			X ^{2a}	P-value
		N	Yes	No		
High flood risk	Yes	90	79	11	0.139	0.709
	No	1	1	0		
	Total	91	80	11		

However, another Chi-square test showed a significant association between flood impacts and the repetition of students (Table 5). When classes are postponed or cancelled during flood events, there is insufficient time to schedule new lessons and many students miss out. This

hinders the capacity of students to perform well in following years. Some students become anxious that they will repeat a year and drop out of school completely when flood events occur.

Table 5. Association between flood events and the repetition of students

Indicator		N	Flood occurrence		X ^{2a}	P-value
			Yes	No		
Repetition	Yes	20	19	1	3.589	0.048
	No	71	71	0		
	Total	91	91	1		

Student perceptions of flood Impacts

A weight averaged index was used to understand how the students perceive the impacts of flood events on school facilities and infrastructure by gender. Table 6 shows that students are mostly satisfied with the facilities and infrastructure available at each school. At all three schools, students indicated that a fairly good learning environment has been created. The school grounds are large enough for students to play football, volleyball and other sports. Moreover, all classrooms were equipped with chairs, tables and other facilities to enable students to study. However, damage to school facilities infrastructure during flood events was perceived to be upsetting, especially when it led to the suspension of classes (District Office of Education, pers. comm., November 2016). As students believe that study is very important, they still wished to participate in school, even when affected by flood events. Both girls and boys were found to demonstrate the same level of commitment. They both continue to go to school where possible. However, this level of commitment was found to be weaker in Tuol Snuol. It was found that parent and teacher attitudes the location of the school are factors that affect the motivation to attend school. The respondents assessed that flooding affect their annual schooling in term of learning hours, they get to school late in the morning or afternoon, they cannot arrive on time for the first hour of the lessons, and they miss some important firsts, also sometimes the teacher themselves summarize or shorten the set lessons for teaching hours because they have short time as well in flooding time, and also the new academic year must be delayed till the flood go down or the dry land.

Table 6. Perceived importance of school facilities of infrastructure to students, in terms of when they are impacted by flood events by gender.

Attribute	Male		Female		Overall		P-value
	WAI	OA	WAI	OA	WAI	OA	
School environment	0.83	VS	0.80	S	0.81	VS	0.361
Learning and teaching materials	0.62	S	0.68	S	0.66	S	0.168
Library books	0.61	S	0.67	S	0.65	S	0.106
Lesson materials	0.66	S	0.71	S	0.69	S	0.269
Playground	0.85	VS	0.80	S	0.82	VS	0.199
Latrines	0.69	S	0.70	S	0.69	S	0.859
School buildings	0.81	VS	0.80	S	0.80	S	0.768
Tables and chairs	0.61	S	0.64	S	0.63	S	0.543
Classroom decorations	0.88	VS	0.85	VS	0.86	VS	0.369
Gardens	0.87	VS	0.83	VS	0.85	VS	0.269
Walkaways	0.92	VS	0.87	VS	0.89	VS	0.139

Note: WAI= Weight Average Index measured on a five-point scale [Very Low (VL) = 0.00-0.20, Low (L) = 0.21-0.40, Moderate (M) = 0.41-0.60, Strong (S) = 0.61-0.80, Very Strong (VS) = 0.81-1.00]; OA= Overall Assessment; *Significance at the 0.05 level; **Significance at the 0.01 level.

Policy Implications

The Royal Government of Cambodia. The Integration of DRR into the curriculum is important for schools in the flood-prone areas, if they are to raise local awareness of flood risks and their potential impacts. The National Committee for Disaster Management (NCDM) should work closely with the MoEYS to adapt the existing curriculum in alignment with national standards. The NCDM should work with school principals and teachers to improve their knowledge about the needs for DRR in schools. While the NCDM has established branches across the country, there do not yet possess sufficient resources to conduct the activities required to reduce flood risks and mitigate their impacts on access the education.

The Provincial and District Offices of Education. As flood events occur regularly in specific locations in Cambodia, the Provincial and District Offices of Education prepared to support schools under their jurisdiction. This may include, establishing early warning systems to ensure that students are safe, when travelling to school. Additionally, these offices should work to build the capacity of school principals and teacher, equipping them with the resources required to

manage the impact of floods. Focusing on both physical infrastructure and human capacity is vital to this role.

School management teams. As there are already internal resources available to manage flood risks at the school level, there should be greater effort to integrate these activities with the relevant commune councils and NGOs, as well as the central government to better mobilize resources and build capacity of the teachers and students to respond to flood events. The management team of the school can play a vital role in providing on-time information about flood risks and provide leadership on assisting students to continue accessing an education

National and international NGOs. NGOs are very important sources of funds and human resources, which assist schools to mitigate the flood risks that have the potential to impact students. Projects implemented by NGOs can be useful in raising the awareness of local people, including students of these risks. It is recommended that NGOs establish self-help groups within student and teacher networks, which may be informed by NGO activities, in terms of reducing flood risks. In some case, NGOs may be able to help schools by providing mobile libraries or extra classes at alternative locations in community. The mitigation of flood risks should be embedded in affected school programs in high risk locations. This way child can access an education even when flood occur and meet national standards. This study recommends that mobile schools should be established to reduce the need for students to travel long distances in the event of a flood.

Conclusion

The study concludes that: (1) floods disrupt access to education when classes are suspended and schools are closed. This may occur for periods of two weeks to a month. The three schools in the study area were heavily impacts by floods and had to close for safety reasons. This seriously affects the performance of students at these schools in national examinations. Students in this context are not able to follow the national curriculum and thus perform poorly in standardized assessments (2) Girls are most vulnerable to flood events and their parents are more concerned for their safety than boys. However, both female and male students demonstrate the same commitment to their education. During flood events, the availability of boats is important if students are to be able to attend school, although some students are still

able to access school without them in the early stages. When floods become more dangerous, students are no longer able to walk to school. (3) There was no association between flood risks and school attendance, however, a significant relationship between flood impacts and the repetition of students was observed. Flood impacts negatively impact student performance in national examinations. (4) In general, students were found to be satisfied with the physical infrastructure, facilities and services at each school as they created a reasonably good learning environment. School grounds were generally large enough for students to play different sports and classrooms were well-equipped for learning.

References

ADB (2012) *Preliminary Damage and Loss Assessment*. Phnom Penh: Asian Development Bank.

Bubeck, P., Botzen, J., & Aerts, C. (2012) *A review of risk perceptions and other factors that influence flood mitigation behavior*. *Risk Analysis*, 32(9), 1481–1495.

Chea, S. and Sharp, A. (2015) *Flood Management in Cambodia: Case Studies in 2009 and 2011*. International Conference on Environment and Civil Engineering.

HRF (2013a). *Draft Minute of after-Action Review Workshop on Emergency Response to 2013 flood*. Phnom Penh: Humanitarian Response Forum.

HRF (2013b) *Flood Humanitarian Response Forum Final Report*. No 7, Phnom Penh: Humanitarian Response Forum.

Menne, B. and Murray, V. (2013) *Flood in WHO European Region: health effects and their prevention*. Geneva: World Health Organization.

MoEYS (2013) *Flood assessment report on impacts and damage on education Sector*. Phnom Penh: Ministry of Education Youth and Sport.

MoEYS (2013) *Flood Assessment Report on Impacts and Damages on Education Sector*. Phnom Penh: Ministry of Education Youth and Sport.

MoP (2008) *General Population Census of Cambodia 2008*. Phnom Penh: Ministry of Planning. Phnom Penh, Cambodia.

NCDM (2014) *Post-flood early recovery need assessment report*. Phnom Penh: the National Committee for Disaster Management.

Pahl-Wostl, C., Becker, G., Knieper, C., & Sendzimir, J. (2013) How multilevel societal learning processes facilitate transformative change: a comparative case study analysis on flood management. *Ecology and Society*, 18(4), no-58.

RGC (2010) *Ketsana Comprehensive Post Disaster Needs Assessment*. Phnom Penh: Royal Government of Cambodia.

Schelfaut, K. (2012) Risk perception—issues for flood management in Europe. *Natural Hazards and Earth System Science*, 12(7), 2299–2309.

UNDP (2014) *Cambodia Post-Flood Early Recovery Need Assessment Report*. Phnom Penh: United Nations Development Programme.