

ABSTRACT

In recent years, there has been a growing concern that increasing numbers of the world's population are vulnerable to the adverse impacts of disasters resulting from natural hazards. Disasters, which follow when institutional bulwarks, including social and physical capital are inadequate, or simply overwhelmed, cause destruction to livelihoods, uproot communities and jeopardize development through their impact on human development, including their potential impact on children's schooling outcomes. These concerns are particularly relevant for Sub-Saharan Africa, where a larger proportion of the population is younger than anywhere else, and where the frequency and intensity of natural hazards are expected to increase, among others due to the possible consequences of global climate change.

One of the most frequent disasters in Sub-Saharan Africa is flooding. Flooding occurs when there is an overflow of a large amount of water beyond its normal confines. Large populations live in the coastal areas where they are exposed to flooding (Jongman *et al.*, 2012). Exposure to floods is increasing because human occupation of flood plains and flood prone coastal zones intensifies (Genovese *et al.*, 2007). In the developing world, flood defenses are less developed and the exposed populations are more often subject to flooding with consequent disruption, economic loss, and in the worst cases loss of life (UNEP, 2002).

To understand how flooding affects primary education, this study focuses on the case of primary school education in the Zambezi River Basin of Zambia. In the Zambezi river basin, flooding occurs annually in different magnitudes. Moreover there are fears that the intensity of floods may be increasing. For instance in 2009, Zambia experienced one of the heaviest floods in nearly 40 years. A rapid inter-agency assessment led by the Disaster Management and Mitigation Unit (DMMU) estimated that about 500,000 people were directly affected in various forms. Thousands of people were displaced, crops were submerged, fishing boats lost, and water schemes polluted. Children's education in particular was severely set back not only due to schools being flooded, access roads blocked and homes being destroyed, but also due to flood-associated health problems that subsequently affected children's health.

More than 30,000 school-going children were displaced and at least 10,000 deprived of education as a result of the 2009 flooding (ZVAC, 2009). Similar patterns of flood induced disruption of children's education have been reported in 2010, 2011 and 2012. Potential climate changes are expected to cause a rise in the frequency as well as the intensity of rainfall, which may lead to more widespread and severe floods in Zambia. Approximately 30 per cent of the three million people who live in the flood plains in Zambia are primary school aged children. The future of these children is at stake, and the long-run development of the entire community is at risk if flooding continues to disrupt their education. Children in Zambia's flood plains face disruptions in education as a result of displacements and damage to school infrastructure, school resources (and records) and a lack of teachers caused by annual floods. To understand better why and how floods disrupt primary education in Zambia, and how the resilience of households and communities in the affected areas can be strengthened, this study was undertaken. Its findings may assist local and national government and community structures in Zambia, as well as development agencies such as UNICEF and others to help households living in the country's flood plains to establish and maintain appropriate bulwarks that will not only protect livelihoods but also meet the education needs of their children.

Data was collected from flood affected areas in Zambia in order to evaluate the impact of floods on the state of primary school education in flood prone areas in Zambia over a 5 years period (2008 to 2012). Next to the in-depth interviews and observations, one of the key elements of this empirical investigation was to assess the state of school infrastructure, enrolment rates, and rates of repeating, dropout rates, and length of stay in school, the quality of teachers and the performance of pupils in national primary school examinations. Ten schools and communities in flood prone areas were compared with ten schools and communities in areas not affected by floods but having similar socio-economic characteristics.

It was found that school enrolment rates for children in the flood plains are much lower compared to regions not affected by floods. The enrolment rates for primary school children in schools not affected by floods were found to be significantly higher than in the flood plains, where the occurrence of floods affects various factors determining the enrolment patterns.

Likewise, more pupils repeat classes in flood-affected primary schools than in non-flood affected schools. Unlike the non-flood affected schools where the average annual repeating rate is only 3 per cent, flood affected schools experienced a 9 per cent repeating rate annually during the period under scrutiny. Also, dropout rates are higher in flood affected primary schools, where the average annual dropout rate was 3.5 per cent over the period as compared to an average 0.46 per cent dropout rate in non-flood affected schools.

Higher primary school dropout rates in the flood plains were found to be partly due to higher frequencies of child labor, for example when children are expected to work and support the up-keep (or replacement) of the home. Children in Zambia's flood plains generally start schooling later than those in the non-flood plains, often only after the age of 7, while school starting age in Zambia is on average 6 years.

Floods may also contribute to a deterioration of the quality of primary education in the flood plains; for instance children from schools located in the flood plains perform on average less well than children elsewhere. This study found that over the period 2008 to 2012, only 4 per cent of children in the flood plains who took the national examinations achieved division 1 (highest division) compared to 13 per cent of children in the non-flood area. About 53 per cent of children in the flood plains achieved division 4 (lowest division) as compared to 38 per cent who achieved a division 4 outcome in the non-flood affected schools.

One channel through which perennial flooding may adversely affect the quality of primary school education in Zambia's flood plains is by reducing not only the quality of school infrastructure, but also the availability of adequately qualified and experienced teachers. This study found that teachers in the flood plains are on average much less experienced than those in non-flooded areas and that there are relatively fewer teachers in the flood plains. The pupil: teacher ratio in the flood plains is 45:1 as compared to 28:1 in non-flood affected areas.

This study recognizes that flooding has a diverse impact on a range of factors including education. Flooding also affects levels of vulnerability, employment and income, livelihoods, incidence of poverty, investments and capacity to invest in human capital by families as well as

government. Through those factors the initial impact on children's education is exacerbated and confounded. One could therefore state that flooding has both direct and indirect impacts on children's education.

Having documented and analyzed the impact of flooding on primary education, this study also investigated why households and communities in the affected areas remain vulnerable to floods. It was investigated why households continue to live in flood-affected areas. Migrating to other, less affected areas, may seem like a first obvious response to lower a household's exposure.

It was found that households are reluctant to relocate away from the flood plains due to their land ownership rights, traditional livelihood practices and the culture of living in the flood plains. In other words, households' institutional environment limits their mobility and keeps them (and their children) exposed to flooding. Moreover, the communities are poor and cannot afford the standard of life in the upper land and cannot send children to another school due to high costs.

To the extent that households and communities in the flood plains are not mobile enough to reduce their exposure to floods, the challenge they face is to reduce their exposure through various coping strategies, including becoming more resilient to floods. It was found that the difficulties households face in rising to this challenge are due to their relative poverty, neglect in terms of provision of public infrastructure by the government, and weak political structures wherein households affected do not have much of a voice. The poverty of households in the flood plains and their lack of voice are partly due to, and compounded by the fact that most people in the flood plains are not highly educated; that basic social services are not readily accessible; and that early warning systems are not functioning. As a result, many communities in the Zambian flood plains may be caught in a vicious low education-low resilience circle, or poverty trap, necessitating a concerted and coordinated push to escape from.

Despite these constraints, households and communities in the flood plains are not helpless, nor do they sit by passively in the face of the risks of flooding. Hence, the coordinated efforts and assistance that they need, should take into account and build upon their own initiatives, where these are instances of positive coping, to reduce their vulnerability to floods. In this regard, this

study explored the various coping strategies that households and communities take in the face of flooding.

Often, coping strategies have adverse consequences for schooling of children. It was found that some communities build their houses on top of mounds to place them out of reach of flood water. They have also learned to effectively use boats during floods. Some community members have resorted to the practice of establishing makeshift second homes in higher-lying land for short stays during floods. Social networks within affected communities play an important role including provision of moral and financial support (community-based micro-lending schemes are an example). Inevitably however, households do also resort at times to adverse coping mechanisms, such as reducing meals and sending their children to work. These adverse coping responses are particularly detrimental for primary education.

The intensity of floods, the inadequate household and community bulwarks, and the resorting to adverse coping strategies during floods are the main reasons why households and communities require outside assistance, particularly from the Zambian government, but also humanitarian agencies, the private sector, individual well-wishers, friends and families. In order to understand what more can be done or what can be done differently to make sure that primary education is less affected than it seems to be the case at present, this study also considered the current and past responses such as outside assistance initiatives.

The first action that is usually taken when a flood occurs is for the household to move out of the way of the water, so as to save lives and some assets. Usually, the disaster management unit of the government organizes an inter-stakeholder rapid assessment to determine the level of damage, so that actual needs can be better defined. Once needs are identified, appeals are then made to donors and the government for disaster relief. This includes appeals for temporary shelters, food, medicines, enrolment of displaced children in unaffected schools, or erection of temporary learning centers. Through remittances some households with members abroad or other places in the country receive financial support.

This study established however that external assistance is very short-term, aiming at immediate disaster relief and saving of lives, and not so much on medium to longer term recovery or

protection. Support by the government and humanitarian organizations for recovery and rehabilitation to the affected communities, including school children once the flood waters recede is inadequate. This general lack of recovery assistance makes it very difficult for households to get their children back to school and to promote better quality of schooling.

In order to improve the resilience of households and children's schooling to flooding, and to address the gaps identified in external support in this regard, this study engaged with the community and stakeholders to identify how they envisage the ways and means that primary education could be made resilient in the flood prone areas. Discussions with these stakeholders are documented in this study. It reflects that communities generally prefer to live in the flood plains and reduce their vulnerability to floods through investments in certain key areas.

One of the most direct ways to limit exposure to flooding would be better general water management systems and practices, including investments in infrastructure to facilitate better water management. If dams are constructed in the plains to control water, the incidence of homes been flooded will be considerably reduced; livelihoods and infrastructure and therefore children's education will not be as much affected. This is however, given the many fiscal challenges facing the Zambian government, not a short-term solution. Over the shorter term therefore, improved resilience would require more affordable and immediate actions. In this regard, the stakeholders have raised the provision of improved boats with powered engines as important, as it will facilitate the movement of children from their homes to school even during the flood period (if their homes are not flooded). The availability of 'flood proof' boarding school facilities can also be important, as these may limit the daily (risky) travel of children from schools to their homes, and reduce the risk of drowning. Furthermore, school feeding programmes can motivate parents to send their children to school and children are equally motivated to attend school and get back to learning, particularly in the period after a flood. Stakeholders also pointed out that if teachers could be better paid, perhaps more qualified and experienced teachers could be attracted to the flood plains.

In addition to these specific requirements, the basic development level in the Zambian flood plains is perhaps the most salient and deep-rooted cause of the region's continued vulnerability

to floods. This general insight derived from the broader disaster studies literature also applies to the Zambian case. In this regard, general socio-economic development will make the surest longer-term contribution to reduce the impact of flooding on children's schooling. Fostering such socio-economic development will require better provision of basic social services such as roads, hospitals, water schemes, and sanitary facilities. Poverty levels are very high among this community and therefore the financial inability to send children to school or support their schooling is obvious. Microcredit facilities that will enable the communities to expand their livelihood activities and engage in business will help generate funds that could enable families to continue supporting children's schooling, even under adverse conditions such as flooding.

