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# Assessing the Impact of Climate Change Induced Floods on School Education in Pakistan: A Case Study of South Punjab

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## ABSTRACT

Climate change is related to long term variations in the earth temperatures and weather pattern. These variations can be due to natural and anthropogenic activities. Floods are the major events of climate change. Therefore, climate change has been posing risks to the global peace and socio-economic development indiscriminately. Pakistan has also been facing this issue continuously. It has been witnessing massive floods whereas 2010 and 2022 floods were the most devastating in its history. None of the sector is immune from it. Qualitative research along with interpretive and explanatory research techniques is used in this study. Secondary sources such as published books, journals, newspaper, etc are used in it. As far as findings are concerned, school education especially in South Punjab is the most vulnerable floods. Educational activities remained suspended for long time because of destruction of school buildings, infrastructure, mass migration and relief camps in the premises of schools. Enrolment decreased whereas dropout ratio increased. Disaster risk reduction strategies and flood resilient schools' building are necessary for carrying smoothly school educational activities.

**Keywords:** *Climate Change, Vulnerability, Floods, Education, Resilience.*

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## Introduction

Climate change has been posing existing threats to peace, socio-economic development and security of the world community. It has been increasing existing vulnerabilities and also posing new challenges across the global. It's induced events such as high temperature and global warming poses existential threats to mankind in future. It does not have physical repercussions but also have repercussions on socio, economic and political fabrics (Wright, C. et al; 2013). Aslam and Rana (2022) investigate natural processes such as variability in tectonic plates, solar and volcanic activities and anthropogenic activities like massive burning of fossil fuels and excessive emission of greenhouse gases are the contributing factors of climate change. Further, more employment opportunities in the cities have increased migration of the public towards cities and hence raise the issue of urbanization. This urbanization is further increasing the issue of climate change. Heat waves, irregular rain falls and flooding and fluctuating temperatures have become common phenomena. Wang, Z. M., et al; (2024) explore the effect of anthropogenic factors on the duration of extreme temperatures such as cold and warm temperature especially in South Asia and Asia generally. They say that human induced anthropogenic activities lead to variations in extreme temperatures in Asia. Anthropogenic activities such as emission of greenhouse gases enhance duration of extreme warms and decreases extreme cold period. These variations in duration of extreme weathers are more observed in South Asian and Asia. These weather variations have negative impacts on public health, agriculture and environmental sustainability.

Owing to the sensitive strategic location in South Asia, Pakistan is the most vulnerable country to the adverse impacts of climate change in South Asia. It has been facing formidable threats of climate change. In term of exposure to climate change, Pakistan has been ranked as the 8th most climate change affected country across the world (Global Climate Risk Index, 2020). Maplecroft report (2010) ranks Pakistan at 16 out of 170 states on the vulnerability index to climate change. According to German Watch Global Climate Risk Index report of 2012, Pakistan is at 8 among 180 sates expose to climate change. South Punjab in Pakistan is the most vulnerable region to climate change. Climate change has been impacting all the areas of sustainable development such as economic, social and environment.

Pakistan's economy is very sensitive. Ali et al. (2019) say that the severity of climate change is also affecting Pakistan in every walk of life including health, education, food, and water security. Flooding, droughts and extreme weathers are badly affecting Pakistan. Frequent floods are damaging the infrastructure and causing huge economic loses. Weather becomes unbearable due to extreme cold in winter seasons and extreme hot during the summer seasons. Moreover, the duration of seasons is decreasing and increasing unpredictability. Some region in Pakistan has to suffer from droughts.

The key parameter of the economy of Pakistan is agriculture. The changes in climate are highly influencing the agriculture sector. The climate change induced extreme events such as heat waves, high temperature, variation in precipitation, cyclones, heavy rainfall, melting of glaciers and floods undermine the production of agriculture and the economic growth of Paksitan (IPCC, 2014). The worst event of climate change is the emanation of floods. Floods have been playing havoc to all the sectors indiscriminately. Both riverine and flash floods are caused by climate change. Floods have been impacting school education since the independence of Pakistan. Pakistan which has already poor state of education and struggling to enhance literacy rate but floods have further deteriorated the education sector. Only 2010 flood affected nearly 1.6 million children's education either by direct damages by flood or schools being used for temporary shelters (AAJ, 2010). The 2014 floods destroyed 750 schools and hindered schooling of children and fifty percent roads were also destroyed (NDMA, 2014). Manzoor et al;(2022) say that 2022 flood played havoc to the public sector educational institutions. It is estimated that around 17205 educational institutions including primary schools to higher secondary schools, colleges, vocational and technical, special education institutes, training centers and universities were affected by it. Nearly 10980 educational institutions were partially destroyed and around 6225 educational institutions were fully destroyed by it.

Aslam and Rana (2022) propose to establish Local Climate Zones (LCZs) at different places and to watch the behavior of the public living in various places. They come to know that climate change depends on the built up density in various built up zones. They suggest to enhance climate risk perceptions and to reduce psychological distance through adequate risk communication strategies. Moreover, people are to be vigilant and educate to know about climate change and its repercussions and to employ precautionary measures and to mitigate the damages of it. The finding of their study gives a complete sketch to the policy makers to assess the impacts of climate change and to devise strategies and formulate policies to mitigate the issue of climate change induced floods. Moreover, Shah, A. A. et al; (2018) say that educational institutions are disproportionately and badly affected by repeated floods disasters. Schools preparedness and safety are challenge for authorities. It is the responsibility of the school authorities to escape students from the scourge of floods. Only safe and strong educational atmosphere can enhance emotional and physical growth of the students. Children dropout ratio increase if educational institutions' continuity is halted by repeated floods.

## Literature Review

Khan, R. S., and Zahidi, F. (2024) in," Pakistan: On the Frontline of Climate Change" give a holistic overview about climate change and its impacts on Pakistan. They also mention the vulnerability of Pakistan to climate change and numerous remedial measures to hinder these climate change challenges. They say that Pakistan falls among the top most climate affected countries in the world. Pakistan has been suffering from acute events of climate change such as extreme temperature, heat waves, droughts, variations in rainfall and severe floods. However, Pakistan has also started several mitigation measures such as clean and green initiatives to address the challenges of climate change. They focused on the incorporating of clean and green initiative into developmental agenda for effective implementation. At international forum, Pakistan has also suggested for collective efforts to set up global agreement to reduce the emission of greenhouse gases. Pakistan also suggested to develop global funds mechanism for the financial assistance to help the climate change affected communities and to empower them financially to tackle climate change induced events effectively. In short, this article suggested Pakistan to establish climate resilience by holistic policies, strategies, sustainable development activities and encouraging global cooperation.

Hamid et al. (2024) explore that educating the teachers about climate change is crucial for addressing the issue of climate change and its impacts. Environmental education is necessary for the public in order to be secured from the environmental hazards. It enables citizen to refrain from those activities which cause the environmental calamities. The aim of this study is to equip the secondary school teachers with the awareness and education regarding the importance of climate change. It is because educating teachers means educating the whole coming generations to know about climate change and hence to combat it effectively. It further brings behavioral changes among the people to take this issue seriously. Informed citizen can play effective role in it. Writer followed quantitative research design with descriptive study and stratified sampling techniques to assess the education and awareness of the secondary school teachers about the significance of climate change. He came to know that secondary school teachers in Punjab, Pakistan are not properly educated about climate change and its diverse impacts. But he finds certain challenges in teachers' education about climate change. The main challenges are the inadequate resources, lack of training, lack of administrative support and proper curriculum. The finding of the study is that it requires enhancing the capacity of the teachers through targeted support such as provision of resources, proper training of teachers, administrative support and curriculum integration

Akanksha Bapna et al; (2024) explore that there is close relationship between climate change and education as climate change effects both formal and informal educational system in terms of access, infrastructure and quality. It is because climate change induced events such as floods, droughts and heat waves disrupt the performance of education system. They also damage the infrastructure and paraphernalia of the schools. These disruptions lead towards high dropout ratio and less enrollment in schools particularly in girls' education. Moreover, they also create health

issues as these events develop severe diseases which hinder the learning capacity of the students. It also affects psychological well-being of the students as students face the issue of anxiety, depression, sleep disorder and phobias. The already marginalized communities are more victims to it. In Pakistan as well as in Punjab, South Punjab region is the most vulnerable to climate change and its repercussion on the education system.

Hashmi, R. S. (2023) in her article," Climate Change and Climate Induced Migration in Pakistan: A Threat to Human Security (The Study of RajanPur and Taunsa Sharif after Flood 2022)" explores the impacts of climate change on the human security. The main focus of this article is about the human migration from the region of South Punjab particularly the areas of Rajanpur, and Taunsa Sharif post 2022 flood. It also develops link between climate change, human security and policies for disaster preparedness. Author says that approximately 7.9 million people migrated across Pakistan during this flood. Rural population was the most effected community. They migrated to urban centers for their settlement. This migration towards urban centers overcrowded the urban areas and created several challenges to the urban administration such as the issues of provision of social services, employment competition, health and education. This climate change emanated migration further put pressure on the already fragile urban infrastructure and resources. Urban administration is too weak to equip with the capacity of disaster preparedness and rehabilitation. This will further create the issue of human security due to food insecurity, inadequate shelters, and high health issues. It will lead towards social instability and consequently disturbs the political order and stability. So, climate change is a big challenge for Pakistan and that is why Pakistan should formulate a comprehensive approach to coup this disaster. It needs preparedness in disaster management, enhancing the capacity of urban infrastructure to accommodate the displaced rural and flood affected population and to provide the migrants employment opportunities to meet their basic necessities.

Zachariah et al. (2023) investigate the early spring heat waves in India and Pakistan due to climate change during the year of 2022. They say that North Indian Plains and the southern region in Pakistan had to confront the heat waves that started in March and continued till May. It was extreme due to the continuation of the upper atmospheric high pressure system. It was extreme dry weather. It has compelled people and human systems more susceptible to the hazards induced by climate change. They consider climate change as silent hazards that are difficult to assess its impacts on human beings. It has posed threats to the public health, livelihood and agriculture. In Pakistan, heat waves were on the rise during the month of Ramadhan and it was difficult for the people to survive who were fasting in this month. It was the hottest season and broken the record of many previous years. Many deaths were recorded due to heat waves as during the heat waves of 2015, 1200 deaths were recorded in different parts of Pakistan. The major segment of the society affected by heat waves was the labour and working class who worked in days for their livelihood. Children who went to school were the most effected part of the society. Despite of direct impact of heat waves on public health and other socio-economic domains, heat waves also have some compounding challenges such as cascading hazards and energy availability. In cascading hazards, increase in temperature and evaporation result in shortage of water on the one hand and floods due to melting of glaciers on the other hand. During heat waves, the demand of energy increases and hence it faces shortages. They find if such unpredictable and untimely heat waves will continue in future, it ceases the survivability of the human beings on the planet of earth. However, without delay, mitigation strategies are inevitable to safe public from the scourge of heat waves. Heat actions plan may be effective to reduce the effects of heat waves.

Rana et al. (2020) in 'Characterizing flood risk perception in urban communities of Pakistan' take analyses through the methods of survey, logistic regression model and empirical research to explore the floods in urban communities and their impacts on the public. According to them, increasing urbanization and climate change have resulted in the emergence of floods risk in Pakistan. Flooding has psycho-social risk perceptions in flood affected areas of Punjab, Pakistan. Climate change, rise in sea level and heavy rainfall increase the flood risk.

Muzaffargarh is the most flood affected area in Punjab due to its location between Indus and Chenab rivers during the 2010 floods and in the following years. Pakistan has weak system of disaster management and preparedness system. They suggest that proper disaster risk reduction strategies like multi-disciplinary approach can mitigate the risks and threats perception of floods. It is because risk perceptions strategies are the major tool of disaster risk science to enable the affected communities to take precautionary measures against the natural calamities. It strengthens communities' capacity and resilience to adopt adaptation strategies to climate change and preparedness to natural disasters. They find that communities having more education are well prepared to the climate change and disaster risk perception

Hussain et al (2019) find through mixed method the impact of climate change at local, divisional and national level. They also explore local perceptions, vulnerabilities, policy implications and disparities in adaptation and mitigation of the impacts of climate change at divisional level in province Punjab, Pakistan. They say that climate change is effecting the whole world but the developing countries are more vulnerable to it. Pakistan is also fall on the crossroad of the repercussions of climate change.These repurcusions are seen in the shape of heatwaves, droughts, health issues, floods and so on and so fore. Proper understanding, knowledge, information and spread of awareness are paramount to mitigation and adaptation measures against climate change. Adaptation is a set of actions to address the repurcusions of climate change and mitigation means actions and measures to reverse the repurcusions of climate change. In Pakistan, anthropogenic causes like rapid urbanization, pollutions, burning of fossil fuel, deforestation, wastages and other emitter of carbon dioxide and greenhouse gases are the major cause of climate change in Pakistan. They find that transportation is the most source of greenhouse gases. If Pakistan carry emition of GHG likewise, it will fall in the list of most GHG emitter countries by 2030.

Setiadi et al (2010) say that climate change is human driven factor and globally recognized phenomena. It is rapidly spreading. It increases extreme weathers and results in disaster risks. Climate change and its induced hazards are effecting the several components of human security and inhibiting many sustainable developments in many areas such as politics, health, food security, livelihood, personal security, etc. It is necessary to adopt the frame work of Disaster Risk Reduction and Climate Change Adaptation to address the issue of climate change such as its impacts on human beings and to increase resilience and reduce vulnerability. Moreover, sustainable adaptation to climate change is important for making substantial changes in the Disaster Risk Reduction and Climate Change Adaptation. It is because impacts of climate change induced flood can be reduced by using proper disaster management tools. The government of Pakistan has set up several arrangements such as policy, legal and institutional arrangements, and strategies to minimize the risk of climate induced calamities. That is why; National Disaster Management Ordinance has been promulgated in 2006 and National Disaster Management Commission was made in order to carry the activities of it. Similarly, National Disaster Management Authority was also set up to combat all kinds of natural and human induced hazards.

## Research Methodology

Qualitative method is used in this study. Both interpretative and explanatory techniques are also used in it. Interpretative technique explores climate change and its induced events especially floods. Explanatory research technique highlights the impact of floods on the school education especially in South Punjab. For data collection, secondary sources such as published books, journals, articles, newspapers, reports, etc are used. Moreover, flood is the independent variable whereas school education is dependent variable.

### Floods in Pakistan

Floods are the major sign of natural disaster and they affect the whole world. From 1998 to 2017, floods had affected around 2 billion people across the world (WHO, 2025). Only in 2021, world flood disaster was 48% greater than the floods occur during 1991-2020 and impacted 28% population across the world besides with massive death toll. Floods had been consistently hitting Pakistan since 1973 to 2014 with annual frequency of 1.8 (EM DAT, 2015). These floods

are the riverine floods, flash floods tropical cyclones and glacial lake outburst floods. Riverine floods are the major cause of floods in Pakistan. Indus, Chenab and Jhelum Rivers are the major source of riverine floods. Climate change is the major driver behind all kinds of floods as it brings changes in the pattern of monsoon rainfall and melts glaciers which further pour water in the Indus River and its tributaries. So, climate change poses major threats to those communities in Pakistan especially the South Punjab which is living in the flood plain areas (Shahid & Piracha, 2010).

The World Bank of Climate Change Knowledge Portal (CCKP) report of 2010 said that expected rise in temperature in Pakistan was higher than the global increase in temperature (World Bank, 2018). Pakistan's northern areas are witnessing the gradual increase in temperature. Pakistan's major water reservoirs are the glaciers and snow. The rise in temperature results in melting of glaciers and snow. The Hindo Kush, Karakoram and Himalayan glaciers are receding rapidly and thus posing risks of massive water flows into the Indus River and its tributary (Ministry of Climate Change, 2012). Pakistan National Climate Change Policy of 2012 envisaged that the major country wide climate change emanated risks to Pakistan were the bourgeoning intensity and frequency of extreme water events especially floods (Federal Flood Commission, 2015). They are caused by heavy rainfall in the upper catchment area and melting of glaciers in the mountainous areas. Floods in Pakistan happen due to the upper catchment areas of the rivers lying in the Indian held Kashmir. Monsoon rainfall is originated from the Bay of Bengal and causes heavy rainfall in the Himalayan foothills. The amalgamation of monsoon rainfall with the Arabian sea weather systems and western waves from Mediterranean Sea further cause massive floods in Indus River (Ali, G., Hasson, S., & Khan, A. M. 2009). Pakistan is a low riparian state and hence more vulnerable to the floods.

Floods impact approximately half of millions of the population of Pakistan annually (Baqir et al; 2012). Khan, R. S., and Zahidi, F. (2024) say that Pakistan is located on floodplain which is called The Indus Basin. Floods have been coming on this soil before the Indus Civilization dates back to 5000 years. So, since the independence, floods are not new things for Pakistan as it has been witnessing continuously. From 1950 to up till now Pakistan faced 29 major floods (Federal Flood Commission, 2021). These floods affected approximately one third area of Pakistan, affected 33 million people, 1700 deaths, one million livestock losses and displaced millions of population (NDMA, 2022). Further, Pakistan has faced sixteen major floods and suffered from cumulative financial losses around RS 385 billion and 7800 deaths of people (FFC Annual Report, 2007). According to EM-DAT, floods from 1980 to 2008, resulted into 136 deaths. From 1950 to 2015, there were 23 major floods that caused massive damages to the provincial infrastructure, lives and property ( Yaqoob, 2015). Hashmi, H. N., et al; (2012) say that eighteen major floods came in the history of Pakistan whereas the 2010 and 2022 floods were the most devastating in the history of Pakistan. Nearly ten thousand human lives were lost and cumulative economic loss was estimated US $30 billion in these floods. Approximately 127,375 villages were affected.

Memon (2010) says that only 2010 flood affected more than 20 million people which are 10% of total population of Pakistan, and 75% are from the province Punjab and Sindh. It destroyed 160,000 square kilometers of area of Pakistan, it devastated 2 million hectares of crops, it damaged 1.9 million of homes, and about 10 million people became out of shelter and killed approximately more than 1700 people. The 2022 floods were the worst flood among these floods. It submerged one-third of the entire country of Pakistan, affected 33 million population of Pakistan (Aleha, A., et al; 2024). National Disaster Management Authority (NDMA) of Pakistan estimated that 2022 flood affected one in seven individuals which could be approximately 33 million people and dislocated 8 million people (NDMA, 2022). Moreover, it damaged more than 2 million houses among them 1.2 million houses were partially damaged and 0.8 percent houses were damaged completely (UNICEF, 2023). It affected severely 33 million people, displaced 8 million people and killed 1700 people among them 30 percent were children. It impacted 33 million people, dislocated 8 million people, human fatalities were 1700, increased poverty line to 9.1 percent and total damages estimated cost was $ 15.2 billion (World Bank, 2022).

South Punjab has been suffering from floods for many years. From 1980-2000, floods affected more than Ten million people in the rural regions of the Punjab province, destroyed more than 18691 villages and 1162 casualties were reported. Muzaffargarh, Rajanpur and D.G.Khan are the most high level flood prone districts in South Punjab whereas the contiguous districts like Layya, Bahawalpur, Bhakar and Lodhran are the medium level flood prone districts (Aslam, A. Q., et al; 2017). Both Chenab and Indus Rivers flooded these districts of the South Punjab (PDMA, Punjab, 2020). Fourteen provinces of Punjab are the most flood vulnerable districs but Muzafafrgarh, Rajanpur and D.G.Khan are the most vulnerable districts in the Punjab province (PBS, 2021). They resulted in huge economic losses and losses lives. Acumulative economic losses of all these floods to the national economy is around RS 400 billion since 1950 (Ullah, W., & Takaaki, N;2016).

**Floods Induced Educational Disruptions**

The United Nation Convention on the Right of the Child (1990) recognizes that every child has the right to life enshrined in Article 6 and right to education enshrined in Article 28 and climate change has been hindering the both rights (Chang, M. S., et al ;2013). In the Millennium Development Goal, it is envisaged universal primary "Education for All" by 2015 and to provide safe school to children is the global commitment of all the member countries. Pakistan was also the signatory of it and the 2010 flood slowed down the process of Millennium Development Goals (Chang, M. S., et al; 2013). The 25(A) Article of the 1973 constitution of Pakistan guarantees free and compulsory education to all the children till the age of 16 years. But the educational status of Pakistan is fragile and needs much more efforts to raise it at the level of peripheral countries such as India, Srilanka, Bangladesh, etc.

There has been already fragile status of education in Pakistan. The repeated flooding, earthquakes, heat waves, cyclones, etc have been deteriorating the education sector. The 2005 earthquake destroyed a large number of schools in the Azad Jammu and Kashmir and in KPK (Khan, A. N., & Ali, A. 2014). It destroyed 5857 educational institutions including 4604 primary schools, 717 middle schools, 479 high and higher secondary schools and 57 higher educational institutions (Khan, A. N., & Ali, A. 2014). Likewise, many educational institutions were damaged during heavy rains and cyclones in Sindh and Baluchistan in 2007. Education Disruptions due to Mass Dislocation

Climate induced migration is a major issue confronting the humanity. It affects human security due to losses of houses, foods, health and economic development. Continuity in climate events results in permanent migration (Foresight, 2011). If changes in climate events are temporary, then people migrate temporarily and return to their native places. The frequent changes in climate pattern lead to climate crises in Pakistan. Pakistan is badly affected by climate change and hence it direct relation with migration in Pakistan. The 2010 flood in Pakistan also resulted in 20 million people's migration. Similarly, mighty monsoon came in Pakistan in 2012 and impacted 4.5 million people in only Baluchistan and Sindh (Hashmi, R. S. 2023). Likewise, climate induced flood of 2022 in South Punjab also resulted massive mass migration. Majority of population migrated permanently. The 2022 flood resulted into a massive mass migration. This catastrophic displaced 664,000 people and forced them to reside into relief camps. Moreover, it compelled 5.4 million people including 2.5 million children to migration either temporary or permanent (UNDP, 2023). It is estimated that 18 million people were forced to migrate to the safe places (Hashmi, R. S. 2023). Nearly 6, 35,000 people were taking shelter in the relief camps till the 7th September 2022. Only in district Muzaffargarh, 71% of its population displaced for more than two months.

Mass migration is the major factor in declining of educational activities in South Punjab. It decreased children's enrollment. The indirect repercussions of 2010 flood were food crises, sense of insecurity, mass migration and poverty and hence affected more the schooling and wellbeing of the children. Likewise, Hussain, M., et al; (2020) explains that climate change induced flood had long term effects on the children's education. These events develop the issue of absenteeism and dropout ratio of students in schools. Migration also impacted children parents' livelihood and physical well-being. They sent

their children for labor in order to earn something and to support family in this quagmire. This further undermined the education of children. These events developed issues such as child labor, early marriages and physical violence to children. So, the mass migration disturbed the school performance due to maximum absenteeism of students. Teachers were also forced to migrate. They observed stress and mental disorder when they return to schools after receded flood. Floods also destroy their homes, school infrastructure, and buildings. These things developed traumatic situation among teachers and children and consequently academic activities were discouraged. Moreover, affected families migrated to the safer places that increased the ratio of children absenteeism. The shortage of teachers was also observed due to either migration or no access to schools due to disruption in infrastructure and roads. In this way, students lost their academic time. Examinations were delayed due to hurdles in result compilation. Enrolment was also declined due to the displacement of population and flood induced sufferings. Girls' education was more affected due to displacement and family hardships. Their shifting to other places resulted in discontinuation of children's education.

Direct and Indirect Disruptions to Schools

Pakistan has been confronting various minor and major floods from the River Indus and its tributaries such as Chenab, Jhelum, and Ravi etc. Breaching of embankment and monsoon rainfall were the major reason of it. They have been affecting the whole of south Punjab and affected all the sectors including the education sector. Floods washed away the weak structure of schools. Furniture, blackboard, books and other related material were also spoiled in flood. Schools were also remained closed due to inundated water and cleaning and repairing process. Rural schools and educational activities were more prone to flood. Mostly the rural areas schools were washed away. Educational activities were remained suspended for a long period. Further, these floods disrupted school infrastructure and classes were shifted in Temporary Learning Centers (TLCs) and other makeshift arrangements.

2010 flood further played havoc to these schools. The 2010 flood damages to schools were estimated US $311.3 million. This flood destroyed 10,348 educational institutions across the country. 6,666 educational institutions were partially damages and 3741 were fully damaged. Punjab and Sindh provinces were the most affected provinces. Flood affected 18.5% educational institutions in Sindh, 8.8% in Punjab, 12.9% in Baluchistan and 5.6% in KPK (ADB and WB, 2010). Moreover, 2010 flood affected nearly 1.6 million children's education either by direct damages by flood or schools being used for temporary shelters (AAJ, 2010). The total cost required for schools' recovery and reconstruction was estimated around US $504.8 million (ADB and WB, 2010). Several humanitarian organizations came forward to contribute in the reinstatement of educational activities. The destruction of female educational institutions was 25 % across the country. The girls' education was already fragile but the 2010 flood further deteriorated the female education. 5655 educational institutions including 811 schools for girls were affected in Sindh, 2817 including 12222 schools for girls were affected in Punjab, 915 including 626 schools for girls were affected in KPK, 557 in Baluchistan, 194 in AJK, 176 including 95 for girl’s school in FATA and 81 schools were affected in Gilgit Baltistan (Khan, A. N., & Ali, A. 2014). Available data showed that primary schools were more affected. From10348 damaged education institutions, 9368 were primary schools which were 90% of the total damaged institutions. The total damaged cost of the educational institutions was 26464.3 million rupees. Jamshed, A. (2015)

says that 2010 flood in Muzaffargarh resulted in dropout ratio as 2.8 children out of 5.5 children came after floods.

In 2014 flood, attendance of children further reduced to 39%. Further, floods deteriorated the financial condition of the marginalized communities.

Only 2014 floods destroyed 750 schools and hindered schooling of children and fifty percent roads were also destroyed (NDMA, 2014). The 2022 flood caused two million children unable to go to schools. Owing to it, millions of children lost their homes, family members, access to schools and underwent into traumatic situation. Their

future educational career became uncertain as they did not come back to schools (Ahmad, N. (2024). This further deteriorated the already fragile educational standard of Pakistan where 22.8 million children were already out of schools and hence it was ranked 2nd in the world in out of school children (UNICEEF, 2024). As this flood displaced 8 million population of Pakistan, children were the most affected part of the affected communities. One third children were suffered from flood and 1700 were died during it (Aleha, A., et al; 2024). Moreover, Save the Children (2022) claimed that it also destroyed 18590 schools whereas UNICEFF (2022) expressed that it destroyed 27000 schools across the country. Only in Muzaffargarh, the 2022 flood resulted in collapsed of schools' buildings and also injured 14 children of primary school.

Disruptions in Provision of Services in schools

The major indirect loss to the educational activities was that majority of schools' building were utilized as relief shelter for the flood affected people. In Punjab province, 2169 schools wrer used as shelter camps and 2372 schools were used for shelter (Khan, A. N., & Ali, A. 2014). Moreover, students and teachers belonged to the flood affected areas suffered from the issues of psychological and emotional traumas. The disruptions in educational facilities due t flood further increased anxiety among the students and teachers. Moreover, interruptions in educational activities due to establishment of floods camps in schools also distruced them mentally.

Salik, K. M., (2020) say that floods also affected children and their education. Floods destroyed their homes, livelihoods and schools building. The destruction of school buildings and roads halted all the educational activities. Schools were shutdown. Children were forced to migrate to the upper areas which were less prone to floods. They did not take admission there as they did not have any proof and necessary documents for enrollment in new schools where they shifted. They had left their parents' CNIC, their result cards and their B-Form in their native residence. Even they were uncertain whether they would settle there either permanent or temporarily. As they lost their belongings and livelihoods during floods, their parents were unable to send them to schools for education rather they sent them for earning in order to meet all the necessities and financial burdens. So, children education was affected as their parents were unable to pay their school fees and expenditure of textbooks and uniforms. They were also harassed, abused and abducted. Schools were situated at far away areas. These areas were unknown for them. Owing to security concerns especially for girls, parents were reluctant to send them in schools. There was lack of public transportation. Though there was private transportation such as vans, they did not have enough money to pay the fair of the vans. So, this uncertain and fearful atmosphere compelled parents not to allow their children to go to schools (Abbasi, M. S., et al; 2021).

The floods caused shortage of teachers, destruction of school infrastructures and roads suppressed the children's wish to get education (Abbasi, M. S., et al; 2021). Wang, et al; (2023) explores that 2022 flood induced by monsoon rainfall and flash and torrent floods destroyed 3115 km of roads and 439 bridges. These disruptions to road networks and infrastructures created difficulties for the students to reach schools. This resulted in their absenteeism and hence increased their dropout ratio. It further brought health issues such as vector and water borne diseases, and severe respiratory problems. Around 8 million flood affected people needed health services. The stagnant water, damages of infrastructure and inadequate sanitation facilities further undermined their education. Ahmad, D., and Afzal, M. (2024) say that 2010 flood in Muzaffargarh destroyed schools, roads, railway tracks, homes, agriculture, livestock and also caused millions of migration and human fatalities which halted children's education.

Further, the utilization of school buildings for flood affected people also undermined educational activities. Schools building used for relief camps for a long time and the educational activites were suspended. According to OCHA (2010), 7820 schools were affected across Pakistan and 4935 schools were used as relief camps. In 2022 flood, 7062 schools were taken for temporary shelter for the displaced people (Rose, S. 2023).

**Conclusion and Recommendations**

Educational institutions are disproportionately and badly affected by repeated climate change

induced floods disasters. Schools preparedness and safety are challenge for authorities. It is the responsibility of the school authorities to escape students from the scourge of floods. Only safe and strong educational atmosphere can enhance emotional and physical growth of the students. Children dropout ratio increases if educational institutions' continuity is halted by repeated floods. The assessment of the World Health Organization is that children are the 30-50 percent of the total fatalities induced by floods. Floods vulnerable children suffer from depression, emotional stress and behavioral issues. Moreover, floods also destroy infrastructure and buildings of schools which further halt students' access to education. The 2010 floods only destroyed 10,348 educational institutions across Pakistan including the destruction of 9368 primary schools (Khan and Ali, 2014). Educational continuity further hindered when several educational institutions were declared as emergency shelters. Floods also developed the issue of lack of coordination among the teachers and students due to inadequate arrangement of evacuation. Further, nearly, 1.6 million children suffer from food insecurity, malnutrition and acute diseases in this flood. It hindered children growth and hence undermined their educational performance. It also caused 1.8 million people with several acute vector borne diseases.

During 2022 flood, 7000 schools were converted into relief camps which halted education of 3.5 million children (Springer, A., 2023). Destruction of school infrastructure and building further made children vulnerable and stooped their education. It also forced 33 million people including the larger part of children for migration.It resulted in death toll of children lives approximately 27,148 and affected 33 million students at all level across the country (Sujaya, K. et al; 2023). According to Pakistan Education Sector Working Group, it destroyed nearly 18,590 schools including 15,842 in Sind, 544 in Baluchistan, 1180 in Punjab and 1024 in KPK (World Bank Group, 2022). Moreover, according to Save the Children International, approximately 670,000 children in Pakistan affected during 2022 flood (Arooj, 2022). Nearly 400 children death and 550 injuries were occurred due to building collapse. It also resulted in the killing of 3800 adults (Arooj, 2022). The then foreign minister of Pakistan, Bilawal Bhutto Zardari said that children were the most vulnerable part of the society as every third died during flood was the children. It destroyed educational system as third of children either boys or girls were out of schools. Temporary learning centers were established to carry on educational activities. Moreover, large number of children left schools and that is why dropout ratio increased massively. South Punjab region is the victim of frequent floods and educational institutions have want of resilient structure in terms of school buildings, poor infrastructure, insufficient technical facilities, untrained staff and inadequate rescue operation (Shah, A. A. et al; 2018).

### Findings of the Study

Climate change causes floods in Pakistan. These floods played havoc to all the sectors including the sector of education. They washed away school's buildings, class rooms and walls. Roads and railways tracks were also damaged. Houses were destroyed. People were forced to migrate to safe areas. Many schools were used for temporary shelters. Hence educational activities were suspended. Drop out ratio increased and enrollment decreased. Syllabus was not covered due to closure of schools for months. Temporary Learning Centers were established to continue educational activities but these were inadequate. Government did its best but recovery process was slow due to financial, governance and technical restraints. Majority of affected schools were either repaired or reconstructed and educational activities continue without any hindrance.

## Recommendations

1. Disaster Risk Reduction and management strategies are to be developed. They can reduce the risks of climate change induced events such as floods.
2. Effective implementation of climate change adaptation and mitigation policies should be executed in order to decrease greenhouse gasses which are the core cause of climate change.
3. Policy makers are to be educated enough to formulate pragmatic and realistic policies to mitigate the impact of flood on school education disruptions and to build resilience in the society.
4. To invest in climate change resilient

infrastructure of schools.

5. Early warning system and precautionary measures are mandatory to save schools from the scourge of floods.

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