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EFFECT OF FLOOD DISASTER PREPAREDNESS ON THE LIVELIHOODS OF THE COMMUNITY LIVING ALONG RIVER NYANDO IN KISUMU COUNTY, KENYA

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Abstract.

The purpose of this study was to investigate the effect of flood disaster preparedness on the Livelihoods of Communities living along River Nyando in Nyando Sub County, Kisumu County, Kenya. The aim was to determine whether increased levels of disaster preparedness can be one of the major interventions to development in the region in terms of livelihood improvement. It sought to create the relationship between disaster preparedness strategies and community livelihood development among residents living along River Nyando. The target population for this study was 92 comprising of 80 households from Nyakongo and Ayweyo Sub-locations in Nyandosubcounty (2010 Kenya Red Cross Report), 2 sub-location administrators and 10 hospital staff. Descriptive research design was used to describe the characteristics of the situation on the ground in relation to the set objectives of the study. Systematic sampling method was applied whereby the n^{th} item of the study population was interviewed using questionnaires. Purposive sampling was employed to target the hospital staff and administrators. Data analysis was carried out using Chi-square tests to determine the association of variables as well as asses the significance of population variances using the Statistical Packages for Social Sciences together with other computing packages such as Microsoft excel. From the data obtained early warning systems were very effective in ensuring that communities were better prepared for disaster which in turn influenced their socio-economic livelihood. The level of education however did not influence disaster preparedness; however trainings played a major role in creating awareness on

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flood disaster preparedness. How equipped the hospitals are showed that they were better prepared for disasters and that the community had faith in them being able to handle flood disaster victims. Several challenges were raised that influence the preparedness of the community, ignorance and lack of resources being the major challenges. It was recommended that a county disaster management unit be established to cater for awareness creation and on early warning systems strategies.

***Key words: Flood disaster preparedness, Early warning systems, resilience, livelihood**

Introduction

Over the years the impact of disasters has been devastating. In the last 20 years, 4.4 billion people were affected, 1.3 million people killed and around 2 trillion US Dollars in economic losses. The last 10 years have seen some of the largest disasters on record; the Pakistan floods 2010 where 20% of the country went underwater and 20 million people affected, the Haiti earthquake 2010 that saw 200 thousand people killed in seconds and the East African Drought 2010-11 which was the worst in decades causing acute food crisis in 6 countries and up to 258,000 people killed in Somalia alone(International Federation of Red Cross and Red Crescent Societies, 2016).The extent to which families can recover from a disaster depends on the situation beforehand and how robust and resilient their resources are to be able to withstand the effects of the disaster. It is with this in mind that flood disaster preparedness needs to be incorporated as a pre-requisite measure for sustainable development to be achieved in flood prone areas. The ability to cope with disasters and adversities through learning from experience and applying this learning to the anticipation and rebuilding processes is one of the most important building blocks of resilient communities. Most governments have yet to find effective ways of reducing and managing natural and human induced disaster risks.By improvements in preparedness, many disasters have been reduced or even totally prevented, the latter being all but impossible to measure. Bangladesh which suffered the blow of between 300,000 and 500,000 killed in cyclone Bhola in 1970 witnessed reduced casualties through better preparedness to a little over 3,000 in cyclone Sidr in 2007 and 190 in cyclone Aila in 2009. The reduced death count was widely attributed to improvements in disaster preparedness (International Federation of Red Cross and Red Crescent Societies, 2016). In many parts of the world, building protection

structures is the immediate solution to preventing floods and building resilience. According to the Standard newspaper dated May 4th 2017, atleast 300 families were said to have been affected by floods in parts of Nyando sub-county following the heavy rains that hit the area. Several houses where completely destroyed and the locals left camping at Kogelo, Achuodho and Osembe primary school evacuation centers. Thousands of property was destroyed and waterborne diseases posed a serious risk of spreading. Communities in Kenya are predisposed to disasters by a combination of factors such as poverty, aridity, settlement in areas prone to perennial flooding or areas with poor housing, infrastructure and services such as the informal urban settlements. An increased risk of floods and persistent vulnerability of the poor is likely to have serious impacts on people centered development in areas prone to floods such as Nyando in Kisumu County, Kenya. Improving emergency and disaster response and preparedness requires increased and sustained resilience of vulnerable communities to hazards through diversification of livelihoods and coping strategies. Disaster preparedness requires a process of critical evaluation of current risks and hazards in conjunction with lessons learnt from past hazards in order to understand where additional support is most needed. The support ranges from training national staff to capacity build and enlighten the local communities on better ways to mitigate flood disasters in the region prior to occurrence (Nyakundi, Mogere, Mwanzo, & Yitembe, 2010). There is need for education to create awareness on disaster preparedness being incorporated as an intervention to sustainable development of an area (International Federation of Red Cross and Red Crescent Societies, 2016).

All disasters are termed as major and how communities handle them are similar in one way or the other. What differs however is the preparedness of the community which determines its ability to cope and prevent loss of lives and livelihoods during the event and immediately after. It would be expected that a community that has lived through disaster would learn from the experience and thus be better prepared if faced with a similar situation (Achoka & Maiyo, 2008).

Statement of the Problem

Disasters in developing countries can destroy gains built up over decades. Flood risk is one of the major natural disasters affecting Nyando Sub-county and the major hindrance to development in the area especially to the community living adjacent to River Nyando. The Government of

Kenya has recognized the growing threat of climate-related risks to the achievement of its development goals and in response is trying to improve its capacity to prevent, manage and recover from disasters and to adapt to the impacts of climate change. However, a lot of vital information is still missing regarding disaster preparedness. Kenya is still in the process of making technological advances in predicting floods and generating credible early warning information. The ability of local people to resist the impact of disasters has also not been given adequate attention. Inadequate disaster preparedness measures have remained one of Kenya's enduring development challenges for decades. The El Nino rains which flooded most parts of the country between 1997 and 1998 led to massive displacement of population, loss of lives, destruction of property, water and energy crisis and the collapse of vital infrastructure.Most of the disaster response initiatives in Kenya have tended to be ad hoc, uncoordinated and short-term measures mainly in the form of emergency relief services to the worst affected areas. However, disaster and environmental management ought to be integrated to disaster preparedness measures and recovery operations into ongoing development programs for sustainability.

Research Objectives

The main objective of this research was to determine the effect flood disaster preparedness has on the livelihoods of communities living along River Nyando in Kisumu County.

Specific Objective

To assess the level of education and awareness as a disaster preparedness strategy on the livelihoods of the community along River Nyando in Kisumu County

The Protection Motivation Theory

The Protection Motivation Theory founded by R.W. Rogers in 1975 proposes that people protect themselves based on four factors; the perceived severity of a threatening event, the perceived probability of the occurrence or vulnerability, the efficacy of the recommended preventive behavior and the perceived self-efficacy. Protection motivation stems from both the threat appraisal and the coping appraisal. The threat appraisal assess the severity of the situation and examines how serious the situation is while the coping appraisal is how one responds to the situation. An extended version of the Protection Motivation Theory (PMT) developed by

Grothmann and Reusswig in 2006 is used to assess the determinants of household flood protective behavior in terms of health risks and natural hazards and appears particularly suited to poor households in a developing country. It is used to better understand why some people prepare themselves and others do not before and during a flood(Grothmann & Reusswig, 2006). It provides a schematic representation of the extended PMT that has been adapted to the flood context. When people have experienced disasters before such as floods in this case, they tend to have some sort of fear within them following the severity of past damages. It is however how they are able to cope with such disasters that influence their future protective response. The threat appraisal process relies on the perceived probability and perceived consequences of floods. Fear plays an indirect role by affecting the estimate of the severity of floods. The coping appraisal process is used by a person for evaluating his or her ability to cope with and avert being harmed by a flood along with the costs of coping. In PMT, threat and coping appraisal processes combine to result in motivations to protect from a given risk such as floods. It was found out that including the benefits and costs of precautionary measures when communicating flood risk is more effective than simply stating the flood risks. This thus enables the community to be better prepared in the event of flood risks through evaluation of costs and benefits.

Whereas the interactive effects theory talks of the interaction of people with nature being the causal agents of disasters, it does not seek to elaborate how disasters can be prevented when communities are better prepared to handle them. It merely justifies the effect of disasters as being caused by the human system interference. The protection motivation comes in to justify that it is the interaction of the human system with disasters that causes the community to change their attitude and be better prepared for future disaster occurrence. It seeks to clarify that it is after one has experienced the disaster that they are able to align themselves with the disaster preparedness strategies thus evade the impact of disasters.

Education and awareness as a disaster preparedness strategy and community livelihood

Education is a societal demand. Science education has a duty to aid the development of persons able to integrate and gain skills to function within the society, e.g., science education in relation to cultural, environmental, political and societal understanding, awareness and values. Thus social groups and individuals should be helped to acquire a set of values and feelings of concern

for the environment, and the motivation for actively participating in environmental improvement and protection; readiness to respond whenever and wherever something happens; stock goods for natural disaster prevention; customs and manners for preparedness; active communication within families and stakeholders; respecting traditional values and ethics; valuing human diversity, inclusivity and participation; values with respect and acceptance of vulnerability (Gregario, 2010). Environmental education is another important tool for environmental advocacy with long-standing outreach programs in communities around the world(UNESCO, 2011).

All disaster preparedness activities must be based on knowledge about hazards, the likelihood of different types of disaster events and likely impacts on natural and built environment, households, organizations, community institutions and communities(Tierney & Sutton, 2006).
To ensure good communication and understanding of risk alerts, (Baudoin, Shepard, Nishara, Sitati, & Zommers, Dec 2014) proposes the inclusion of education as part of Early Warning Systems process. Educating the young can help raise awareness among vulnerable groups located in high risk areas as well as highlighting expected changes in risk location and frequency. This awareness provides opportunities for risk preparedness and allows for community level adoption. Through education, more knowledge is provided in terms of coping mechanisms for risk mitigation and facilitates risk anticipation through early identification of hazards.

According to(Hendrickx, Hoker, Michiels, & Sabbe, 2016), disaster education must pursue two goals; prevention and mitigation. These include an improved outcome for victims and enhanced safety for responders. Adequate disaster education must contain guidelines and a basic training format that includes an evaluation of its effectiveness. Well trained and equipped personnel are vital elements of disaster preparedness and response.

The Hyogo framework encourages promoting the inclusion of disaster risk reduction knowledge in relevant sections of school curricula at all levels and the use of other formal and informal channels to reach youth and children with information. It also puts emphasis on the promotion of community based training initiatives considering the role of volunteers to enhance local capacities to mitigate and cope with disasters.

RESEARCH DESIGN AND METHODOLOGY

Research Design

According to (Kothari, 2012), Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual or of a group. (Mugenda, 2009) Denotes Descriptive Research Design as a method used to identify disparities within a community and the type of inventions that one could design and implement to reduce such disparities. The researcher used descriptive research design to describe the characteristics of the situation in relation to the set objectives of the study. The study also analyzed the disaster preparedness measures that can be implemented to curb its effects on the livelihoods of the adjacent communities.

Sampling design and sampling procedures

Sampling is defined as the selection of some part of an aggregate or totality on the basis of which a judgement or inference about the aggregate or totality is made (Kothari 2004). It is the process of obtaining information about the entire population by examining only a part of it. The researcher used systematic sampling method to sample the community members living along River Nyando and purposive sampling method to sample the hospital staff and the administrative staff that work within the area. This enabled the researcher produce a stratified random sample by categorizing the three groups (community, hospital staff and administrative staff) into clusters. The sample produced through systematic sampling was free from bias and evenly distributed, where members from a larger population are selected according to a random starting point and a fixed periodic interval. This interval called the sampling interval was calculated by dividing the population size by the desired sample size. Therefore the n^{th} item was gotten by taking the total population divided by the sample population 92/76= 1.2 Thus every second person was issued with a questionnaire using the systematic sampling method for the community.

Data from the administration and hospitals was obtained through purposive sampling where the hospital staff and local authorities were selected and issued with questionnaires and interview guides respectively.Purposive sampling technique was appropriate because it helped to identify

relevant individual from who detailed and concise information were drawn on education and awareness of disaster preparedness methods as a strategy.

To assess whether the education level affects the awareness of the community on disaster preparedness

A Chi square test was run to show the relationship between level of education and awareness. Two variables, "Level of education" and "Awareness", were compared. The test obtained the p-value to be 0.706 which is greater than 0.05 meaning that the two variables were not related. From the cross-tabulation table below, we see that the education level did not influence the awareness of the residents. Regardless of the level of education they had, they were equally aware of flood disaster preparedness as per the chi-square tests. The tests showed that the level of education and the awareness were independent.

Table showing Chi square results

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.781[a]	6	.706
Likelihood Ratio	4.667	6	.587
Linear-by-Linear Association	1.869	1	.172
N of Valid Cases	62		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .13.

To assess the relationship between community training on disaster preparedness and flood disaster preparedness level

A Chi square test was run to show the relationship between training attendance and preparedness after the training. Two variables, "Attended training" and "Got prepared after training", were

compared. The test obtained the p-value to be 0.000 which is less than 0.05 meaning that the two variables were related. This indicates that the residents who receive trainings on flood disaster preparedness are able to be better prepared for flood occurrence. The test results are as shown in the table below.

Table showing Chi square test results

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	56.786[a]	16	.000
Likelihood Ratio	61.048	16	.000
Linear-by-Linear Association	26.900	1	.000
N of Valid Cases	39		

a. 25 cells (100.0%) have expected count less than 5. The minimum expected count is .21.

The Hyogo Framework puts emphasis on the promotion of community based training initiatives that will enable awareness creation on disaster preparedness initiatives. From the study, it is evident that trainings play a major role in increasing the preparedness level as those community members that attend trainings seem to be better prepared for disasters. It is through trainings that awareness is created on better preparedness initiatives. Also any new knowledge on better flood preparedness procedures that have worked before can be shared through such platforms to enlighten the community.Adequate disaster education must contain guidelines and a basic training format that includes an evaluation of its effectiveness. Well trained and equipped personnel are vital elements of disaster preparedness and response (Hendrickx, Hoker, Michiels, & Sabbe, 2016). The trainings that are carried out should be done by trained personnel that have vast knowledge on matters regarding flood disaster preparedness to ensure the effectiveness of the trainings.

On the role of education, (Baudoin, Shepard, Nishara, Sitati, & Zommers, Dec 2014) propose the inclusion of education as part of the Early Warning Systems process. It talks of how educating

the young can help raise awareness among vulnerable groups. However, from the study it is evident that the level of education does not really influence the level of awareness of the community. Most of the educated in such societies would rather relocate than enlighten others on how best to prepare for flood disasters. The younger generation who are more educated on such matters would rather develop elsewhere leaving the older generation and the vulnerable groups to cater for themselves. The level of education thus doesn't have any influence on awareness unless awareness creation is done through trainings carried out that enable both the younger generation present and the older generation to interact.

The Sub-county administrators agreed that they get information from the meteorological department through the Kenya Regional administrative structure. They then form disaster committees and come up with agendas to be discussed in barazas that they hold regularly. They also get reports regularly from the national level on matters concerning flood disaster preparedness, awareness and mitigation. They are also taken for regular trainings conducted by the government training institute. It is mandatory that any information received must be shared by involving various stakeholders including the health department, media departments, Red Cross and relevant ministries who chip in to give assistance to victims and advise them on how to construct their buildings. The meteorological department is also in the process of building a digital sensitive radio station just near Ahero that will be used to transmit any information regarding disasters.

The administrators insisted that if there had been better strategies put in place to help in disaster preparedness, then houses would not be taken down by the floods, harvest would increase both from farms and doubling of fish and food and water provision would not become a problem. Businesses in the area would also flourish if the infrastructure is improved.

The major challenge to flood disaster preparedness was said to be a boundary dispute between Ayweyo and Nyakach over the building of dykes in the area which causes backflow from River Nyando leading to floods. Other barriers to being prepared as stated by the local administrators include:

- Ignorance whereby people are aware of when floods are normally expected but still choose to wait till the last minute to build trenches and secure their property. Others insist on building their houses in swampy areas during the dry season and when the rains come they still complain of floods.
- There is also the issue of scarcity of resources to enable them build better structures and have water storage facilities.
- Neighborhood conflicts that prevent people from seeking for help when relocating to higher ground encompassed by cultural and ethnic beliefs.
- Poor infrastructure encompassed by blocked culverts that would otherwise be draining water back to the river.

However the administrators insisted that preparedness measure that had been put in place earlier have had positive response in that death caused by floods in the area has significantly reduced. The dykes that had been built around schools have reduced the effects of the flooding and they consider the floods to be friendlier.

Conclusion

Flood disaster has diverse effects on the livelihoods of the residents. It causes destruction in all aspects that affect community livelihood including;destruction of crops in the farms, destruction of house floors, walls of houses and even the entire housing structures, Led to death of livestock during the disaster, Destruction of the agricultural land in the area due to soil erosion.A behavior shift is needed from a rather reactive approach to managing climate risks to a more proactive approach that involves preparedness measures, the dissemination of early warning information and advising communities accordingly. A growing number of studies have shown that for preparedness to occur, the effective communication of uncertainty and risk is important in helping people respond to impending disasters and eventually to climate change.

It is of essence to note that most of the community members are able to receive Early Warning Systems through radios and barazas but are not able to better prepare themselves when floods do occur. This might be attributed to ignorance, lack of financial capability to make more permanent livelihood preparedness changes as they have all the information at their disposal or even on the effectiveness of the EWS. An effective EWS should provide information on impending climatic

hazards early enough to enable actors to take action to prevent injury and loss of life as well as to reduce socio-economic impacts (Chinwe, 2010).

Flood disaster preparedness has positive impact on the livelihoods of the community but can only be realized once the community embraces it positively and work towards building back better. The county government also needs to be more involved especially in "building back better" campaigns to help the community be better prepared.According to the Sendai Framework for Disaster Risk Reduction 2015- 2030, one of the major priorities is enhancing disaster preparedness for effective response and to "Build Back Better"in recovery, rehabilitation and reconstruction. The steady growth of disaster risk, including the increase of people and assets exposure, combined with the lessons learned from past disasters, indicates the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to "Build Back Better", including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters(UNISDR, 2016).

There is need for the County government to set up a disaster management unit to be run locally in accordance with the national government. The administrators complained of flood control management being run by the national government making coordination of disaster preparedness strategies tasking. The county disaster management unit will be responsible for carrying out education and awareness on flood disaster preparedness in the area and in turn give feedback on preparedness strategies best adopted.Early warning systems as a strategy for flood disaster preparedness needs to be incorporated as the core mandate under the county disaster management unit. Under the vision 2030's social pillar on environment, water and sanitation, there was need for the government to undertake rehabilitation and reclamation of 50,000 hectares in the counties prone to landslides, floods, heavy soil loss that lead to gullies formation and loss of landscape. This can be exploited as a EWS strategy by the county disaster management unit.

- Bibliography

- International Federation of Red Cross and Red Crescent Societies. (2016). *World Disasters Report. Resilience: Saving lives today, investing for tomorrow*. Lyon, France: Imprimerie Chirat.
- Ministry of Devolution & Planning. (2013). *Second Medium Term Plan (2013-2017)-Transforming Kenya: Pathway to devolution, socio-economic development, equity and national unity.* Nairobi, Kenya: Government of the Republic of Kenya.
- United Nations Development Programme. (n.d.). *REDUCING DISASTER RISK; a challenge for development.*
- Achoka, J. S., & Maiyo, J. (2008). Horifying Disasters in Kenya; Impact on Education and National Development. *Educational Research and Review*, 154-161.
- Baudoin, M.-A., Shepard, S. H., Nishara, F., Sitati, A., & Zommers, Z. (Dec 2014). *Early warning systems and livelihood resilience: Exploring opportunities for community participation.* United Nations University Institute of Environment and Human Security (UNU-EHS).
- Carr, L. (1932). disasters and the sequence pattern concept of social change. *american journal of sociology*.
- Chinwe, S. I. (2010). *Resilient Adaptation to Climate Change in African Agriculture.* Bonn, Germany: German Development Institute.
- Collins, S., Corsellis, T., & Vitale, A. (2005). *Transitional shelter: understanding shelter from the emergency through reconstruction and beyond.*
- Food and Agriculture Organization of the United Nations, FAO. (2012). *Building Reslience for Adaptation to Climate Change in the Agricultural Sector*. Rome.
- Gregario, L. (2010). *Scientific Literacy and Natural Disaster Preparedness.* UNESCO Bangkok.
- Grothmann, T., & Reusswig, F. (2006). People at risk of flooding: why some residents take precautionary action while others do not. *hazards and flood related articles*, 101-120.
- Hendrickx, C., Hoker, S. D., Michiels, G., & Sabbe, M. B. (2016). Principles of hospital disaster management: an intergrated and multidisciplinary approach. *Research Gate*, 139-148.

- *Institute of Digital Research and Education*. (2018, august tuesday). Retrieved from Institute of Digital Research and Education: http://googleweblight.com
- (2013). *Kenya Shelter Cluster Factsheet.*
- KenyaRedCross. (2010). *Nyando flash floods and intervention report No.2.*
- Kothari, C. R. (2004). *Research Methodology, Methods and Techniques (SECOND REVISED EDITION).* Delhi: New Age International (P) Ltd Publishers.
- Kothari, C. R. (2012). *Research Methodology; Methods and Techniques.* Delhi: New Age International Publishers.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for reasearch activities. *Educational and psychological measurement*, 607- 610.
- Lindell, M. K., Prater, C. S., & Perry, R. W. (2006). *Fundamentals of emergency management.* Hoboken: John Wiley & Sons, Inc.
- Maingi, S. G., & Mutugi, M. W. (2010). *Disasters in Kenya: A major public health concern.*
- Maingi, S. G., & Mutugi, M. W. (2010). Disasters in Kenya; A Major Public Health Concern. *Journal of Public Health and Epidemiology*, 38- 42.
- Masese, F. O., Raburu, P. O., & Kwena, F. (2012). *Community Based Approach to the Management of Nyando Wetland, Lake Victoria Basin, Kenya.* Nairobi: Mcpowl Media Ltd.
- McEntire, D. A. (2004). *The Status of Emergency Management Theory: Issues, Barriers, and Recommendations for Improved Scholarship.*
- Ministry of State for Special Programmes, O. o. (2009). *Natinal Policy for Disaster Management in Kenya.*
- Mugenda. (2009). *Research Methods: Quantitative and Qualitative Approaches.* Nairobi: Acts Press.
- Mugenda, & Mugenda, O. (1999). *Research Methods: Quantitative and Qualitative Approaches.* Nairobi: Acts Press.
- Mugenda, O., & Mugenda. (2003). *Research Methods: Quantitative and Qualitative Approaches.* Nairobi: African Centre for Technology Studies, Acts Press.

- National Research Council. (2010). *Adapting to the Impacts of Climate Change.* Washington, D.C: National Academies Press.
- Nawaz, F., & Shah, N. N. (2011). Mechanisms and Challenges for Managing Disaster in Bangladesh. *African Journal of History and Culture*, 104-112.
- Njuguna. (2002). Reversing Environmental and Agricultural decline in Nyando River basin., (pp. 50-54). Kisumu.
- Nyakundi, H., Mogere, S., Mwanzo, I., & Yitembe, A. (2010). *Community perceptions and response to flood risks in Nyando District Western Kenya.*
- Ozor, N., Umunakwe, P. C., Ani, A. O., & Nnadi, F. N. (2015). Perceived Impacts of Climate Change among Rural Farmers in Imo State, Nigeria. *African Journal of Agricultural Research*, 1756- 1764.
- Raburu, P. O., Okeyo-Owuor, J. B., & Kwena, F. (2012). *Community Based Approach to the Management of Nyando Wetland, Lake Victoria Basin, Kenya.* Nairobi.
- Samsuddin, N. M., Takin, R., Hawawi, A. H., Aina, S. N., & Alwee, S. (2017). Disaster Preparedness Attributes and Hospital's Resilience in Malasia. *7th International Conference on Building Resilience: Using Scientific knowledge to inform policy and practice in disaster risk reduction* (pp. 371-378). Bangkok, Thailand: Elsevier ltd.
- Solaimani, K. (2009). Flood Forecasting based on Geographical Information System. *African Journal of Agricultural Research*, 950- 956.
- SUDA, C. A. (July 2000). *NATURAL DISASTER PREPAREDNESS, ENVIRONMENTAL DEGRADATION AND SUSTAINABLE DEVELOPMENT IN.* African Study Monographs.
- Tierney, K., & Sutton, J. (2006). *Disaster preparedness: Concepts, Guidance and Research.* California: Fitz institute.
- UN Office for Disaster Risk Reduction. (October 2015). *DISASTER RISK REDUCTION AND RESILIENCE IN THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT.*
- UNDP. (2004). *Reducing Disaster Risk, A Challenge for Development.* New York: One United Nations Plaza.
- UNDP. (n.d.). *Disaster risk reduction makes development sustainable.*
- UNEP. (n.d.). *Opportunities in Environmental Management for Disaster Risk Reduction: Recent Progress.*

- UNEP; ISDR;. (2007). *Environment and Vulnerability: Emerging Perspectives.*
- UNESCO. (2011). *Education for Sustainable Development Country Guidelines for Changing the Climate of Teacher Education to Address Sustainability.*
- UNISDR. (2005). Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters. *World conference on disaster reduction* (pp. 1-23). Hyogo, Japan: UNISDR United Nations International Strategy for Disaster Reduction.
- UNISDR. (2016). *Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030.*
- United Nations. (2015). *Sendai Framework for Disaster Risk Reduction (2015-2030).*
- United Nations. (2015). *Sendai Framework for Disaster Risk Reduction 2015- 2030.*
- United Nations Develppment Programme. (2004). *REDUCING DISASTER RISK; A Challenge for Development.*