Integrating ICT on Adaptation Knowledge About Early Warning System for Disaster Managing in Emergency Response Among Different Class

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Abstract— Geographically Bangladesh is a disaster prone area. Every year many disasters occur in this country and causes a great damage of people's lives and property. For the betterment of the country, the losses must be reduced but it is the fact that we cannot stop disaster rather than try to reduce the damage by means of some effective steps. This paper is conducted about disaster among people. For reduce this devastating situation our country follows some traditional warning system and this system are not preferable to reach all class people such as disable, children, old people and this traditional warning system are failed to fulfilling the local need assessment during the disaster situation. Modern rea is totally technology bases. By using the tools and techniques of ICT, the system of early warning can be developed more and reach to the people of every sector..

Keywords— Adaptation, Knowledge, Early Warning System, Emergency Response, Different Class.

I. INTRODUCTION

In Bangladesh, ambivalent impacts of the natural disaster, meanwhile, hit tremendously creating almost panicky situation all over. The southern part of Bangladesh; particularly faced many natural disasters that already vividly exposed. In Barishal visibly, there are some challenges due to climate change including nonstop river erosion, flood, cyclone, drought, earthquake etc. And nonstop river erosion, congestion for increasing water level in the confluence with the rise of sea level, frequent storms and floods with prolong draught like situation, scarcity of fresh water due to high evaporation and transpiration in dry season, increasing salinity in the surface water and crop fields in the coastal region. An event of this nature overwhelms the local resources and threatens the functions of the community. But these areas lack of access early warning system, lack of proper mapping system to reduce the vulnerability. Traditional warning system are using for people awareness that not effective the local people. Lack of education, lack of communication, lack of electricity, community chaos, climate refugee burden, lack of proper guideline, training about early warning system knowledge due to vulnerable people failed to quick act during disaster period.

Background: The United Nations Office for Disaster Risk Reduction (UNISDR) defines disaster as:

A genuine interruption of the working of a network or a general public including across the board human, material, monetary or natural misfortunes and effects, which surpasses the capacity of the influenced network or society to adapt utilizing its very own assets.

According to a United Nations report, countries in Asia and the Pacific are more prone to disasters than those in other parts of the world, the region experiencing over 40 per cent of the 3,979 disasters that occurred globally between 2005 and 2014, resulting in almost 60 per cent of the total global deaths related to disasters and severe economic damage (45 per cent of global total damages). The Asia and Pacific region is also home to 80 per cent of those affected by disasters globally. The past and current trends of disaster events do validate the above statement.

The United Nations Development Programme (UNDP) has provided a definition for ICTs in 2003: ICTs are basically information handling tools—a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include the "old" ICTS of radio, television and telephone, and the "new" ICTs of computers, satellites and wireless technology and the Internet. These different tools are now able to work together, and combine to form our "networked world", a massive infrastructure of interconnected telephone services, standardized computer hardware, the Internet, radio and television, which reaches into every corner of the globe. [16] Early warning is "The arrangement of auspicious and successful data, through recognized organizations, that permits people presented to danger

to make a move to stay away from or diminish their hazard and get ready for powerful reaction."18 The target of early cautioning frameworks is to enable individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner to reduce the plausibility of individual damage, death toll and harm to property and the earth. It enables people in general and crisis responders to make pre-emptive and defensive move to stay away from damage. An early warning system is described as end-to-end if it connects the technical and societal components of warning through identified institutions. The adequacy of an early cautioning framework will rely upon the identification innovation, just as financial variables that direct the way wherein individuals at the local level can understand and react to disasters. [16]

Bangladesh a Short Description Location and features: "Stretches out from 20°45'N to 26°40'N and from 88°05'E to 92°40'E."Having the Himalayas to the north and Bay of Bengal to the south It has fringes with India to west to east through north and with Myanmar to southeast Bangladesh is a delta of around 144,000 sq. Km Of zone most piece of which is low-lying plain land made up of alluvial soil with slopes in the southeastern and northeastern parts, 230 streams stream over the nation into the Bay of Bengal 57 of which begin from outside (India, Myanmar). The main rivers are the Ganges (Padma), the Brahmaputra and the Meghna. The coastline of Bangladesh is about 710 km long along the continental shelf which has a shallow bathymetry. [14]

Bangladesh thus we are remaining under the constant threat of the havoc result of natural disaster. As a result remarkable changes in weather are visible in various ways mostly in the country's southern region where millions of people live with many ups and downs and natural calamities. Over ten million people particularly of six southern districts under Barishal division remained neglected for several reasons and became the victims of disparity, piracy, river erosion, and also of terrible natural disasters for years after years. [15]

Objectives:

1. To measure the knowledge about early warning system among different classes.
2. To measure the perceptions of different class about ICT technical tools and warning services for managing disaster emergency situations.
3. To explore communication of warning system device to reach pattern among different class people
4. To identify response capability among different class people for disaster preparedness to act.

II. RESEARCH METHODOLOGY AND MATERIALS

This paper was initiated with reviewing previous research paper, disaster affected people, observing the problems, faced by challenges of early warning system among different classes and used seven recognized members to collect data from fields who have been mentioned in acknowledgement section. This paper has included mixed method approach to identifying problems and way of mitigation of those problems and identify affected people attitude in early warning culture adaptation.

A. Research approach: The author has used mixed method research methodology which includes both quantitative and qualitative approach. Quantitative data show numerical presentation of data and qualitative data show the descriptive presentation.

B. Data collection and analysis: Both primary and secondary data are used in this study and findings have made on the basis of collected data. Primary data are collected by four ways, including interview by using semi-structured questionnaire, FGDs, case study and Likert scale. Quantitative data have been gathered via Likert scale which has been used on 200 different classes to know current attitude of disaster affected people on ICT integration of early warning culture by using non-probability sampling (Quota sampling and purposive sampling). Quantitative data have been analyzed statistically and MS Excel has used to make chart. Qualitative data have been gathered by informal semi structured questionnaire interview which has been conducted on 200 respondents, early warning procedure, four FGDs, and three case studies. Qualitative data have been analyzed thematically and used independently. Secondary data are collected via journals, newspapers, reports of GOs and NGOs in order to discuss ICT and early warning adaptation culture, current state existing early warning procedure culture, to format study design and to formulate semi-structured questionnaire, way of FGDs and case study method.

C. Ethical issues: This study has conducted to clarify different class' problems and prospects with attitude on adaptation ICT and early warning system culture. Findings are not presupposed in the research, rather by analyzing data, collected from fields these findings have been shown in the Result and Discussion section. On the other hand, ethics has been maintained in

conducting interviews, case study and FGDs. All questions have been made in English language and translated in Bangla language by author and participants to ensure efficient communication with respondents. Each of the people has got a brief introduction on the nature and purpose of the study before giving answers. Then asking questions and recording answers were started in sequence.

A total of four FGDs were conducted with community leader, senior citizen, and school going students who have faced many disasters and observed the early warning system for emergency preparedness since many years. Research participants took data at the beginning of the study with building rapport, speaking fluently and observing different classes' facial condition. Thus, different classes have given data verbally and participants have recorded data exactly.

D. Study area and Timing period of the study: April 1, 2019 to September 5, 2019, this time is used to review previous research, identify gap, select title, make methodology, select study areas, and make questionnaire. The author and the team member are divided into eight parts and went to collect data on this topic and conducted interviews and collected data on scale. Besides conducting interviews, the author has conducted case study interviews and FGDs.

Areas of the study: In Barishal visibly, there are some challenges due to climate change including nonstop river erosion, congestion for increasing water level in the confluence with the rise of sea level, frequent storms and floods with prolong draught like situation, scarcity of fresh water due to high evaporation and transpiration in dry season, increasing salinity in the surface water and crop fields in the coastal region, Flood, Cyclone, Drought, Earthquake are also common here. Alimabad, Sreepur, Laharhat major three unions are near the river side that why more people is vulnerable because of poor knowledge about early warning system. So, the author has conducted this study in these three Unions.

E. Instruments: This study has followed those data which are- updating data on adaptation and earning system knowledge among disable, senior citizen, women, children, and climate refuges etc., problems with early warning services for managing disaster risk situation and attitude on technical warning services culture. Based on these preliminary research and data, specific research questions were developed, including

F. Interview questions are made of these ways

Four key issues of farmers have been focused, including-

1. Knowledge about Early warning system among different classes
2. Technical tools and warning services for managing disaster emergency situation among different classes
3. Communication of warning device to reach pattern among different classes
4. Response capability among different class's people for preparedness to act

a) On the basis of focusing title and objectives, questionnaire has been made

b) Questions on biographical state, including- name. age, location,

c) Questions on type of disaster and early warning system, including- the technical device services pattern, perceptions about this system, response capability by dent of warning system, Different classes (male, female, children, senior citizen, disable people) adaptation

d) Questions on knowledge, monitoring, managing, reaching pattern, information gaps, adaptation problems and way of mitigation.

e) Questions on helping body, including- foreign aids, training, governmental subsidy, NGOs' help, making association, attending seminar and relief supply.

G. Likert scale: Liker scale has focused on five knowledge of different class including- strongly knowledgeable, knowledgeable, no knowledge or no idea, poor knowledge, and strongly poor knowledge.

H. Case study: Case study interview has focused on

Knowledge about disaster early warning system

Problems which have been observed to monitoring warning service for using in emergency,

Solutions of those problems in their opinions,

Way of rising this response capability for well preparedness during disaster in coastal areas.

I. Focus Group Discussion Focused Group Discussions have focused "Early warning system Adaptation gap among different classes". Besides community leader, experts, inhabitants of those areas who are faced many disasters since many years were

present. They have expressed their opinions on early warning devices information over the previous years and current years.

J. Limitations of these study The quantitative findings from this study can be biased for using non-probability sampling. As this study is no use of high-quality statistical representation at the national or international level, findings shouldn't be generalized to the entire disaster prone areas where only three unions of Barishal district in Bangladesh. Furthermore, there are some limitations, including-

- Only 200 respondents, four FGDs and three case studies have been used to collect data,
- Comparatively less time has been used to analyze,
- Respondents feel nervous, hesitation and fear to give data,

Only eight participants or members have collected data.

LITERATURE REVIEW

Early Warning System is a method wherein system risk learning is picked up and scattered to the in peril systems going before the catastrophes strike. All things considered, "the course of action of limits expected to deliver and disperse perfect and critical forewarning information, to engage those undermined by a threat to prepare and act appropriately what's more, to lessen the likelihood of insidiousness or hardship Practical activity thick Early Warning System as "the arrangement of data on a rising hazardous peril that empowers advance activity to decrease the related dangers. Early warning structures join a chain of worries, to be explicit: appreciation and mapping the hazard; checking and assessing moving toward events; planning and spreading legitimate cautions to political pros and the Early cautioning frameworks incorporate a chain of concerns, in particular: comprehension and mapping the danger, observing and gauging approaching occasions; handling and scattering reasonable alerts to political specialists and the populace, and undertaking fitting and opportune activities because of the admonitions.

A definitive objective of early cautioning frameworks is to secure lives and property, and they in this way establish one of the key components of any fiasco decrease methodology. Early warning system is about the arrangement of data to people, family units, gatherings or a network about:

The presence of peril or danger

What should be possible to avert, maintain a strategic distance from or limit the threat?

Receiving the early warnings, investigating the messages,

Spreading the alerts and reacting them are the key strides of the early warning framework [1].

Native science and publicly supporting can give profitable help to this undertaking, since they offer open doors for joint effort, and can connect the holes between government divisions, and along these lines help to look after EWS. They can likewise give chances to institutional reflexivity—policymakers can examine what exercises can be realized with partners, and adjust EWS to numerous spectators and settings for hazard counteractive action and the board. [2]

Citizen science and crowd sourcing can be shaped as points of contact through which policy challenges, research questions, and findings can be communicated between the different agents involved in Disaster Risk Reduction efforts. They can also ameliorate some institutional vulnerability related to the communication of warnings, poor data management, and limited data access Be that as it may, native science can likewise be utilized for improving responsibility and the assessment of the notice frameworks. This can be achieved by paving the way for institutional reflexivity, not only to evaluate EWS failures, but also to learn how to adapt EWS to different audiences, contexts, and sectors by determining what is best for people on the ground. Perhaps, in the near future there will be a strong science-policy interface to address the challenges arising from anthropogenic climate change In any case, we can likewise build up a native science-arrangement interface, where future age can play an active role in informing the SFDRR and other frameworks about the implementation and performance of EWS, as well as the effectiveness of activities and strategies of DRR. [2]

A total and viable, individuals focused early warning framework – EWS – involves four between related components, spreading over information of dangers and vulnerabilities through to readiness and ability to react. A shortcoming or disappointment in any of these components could bring about disappointment of the entire framework. Best practice EWS additionally have solid between linkages between all components in the chain. While great administration and proper institutional game plans are not explicitly spoken to on the «four element diagram», they are basic to the

advancement of successful early cautioning frameworks. Great administration is empowered by hearty legitimate and administrative systems and bolstered by long haul political responsibility and coordinated institutional courses of action. Real players worried about the various components should meet routinely to guarantee that they see the majority of different segments and what different gatherings need from them.

Risk Knowledge: Dangers emerge from both the perils and the vulnerabilities that are present. What are the examples and patterns in these components? Hazard evaluation and mapping will set needs among early cautioning framework needs and to manage arrangements for reaction and calamity anticipation exercises. Hazard appraisal could be founded on memorable experience and human, social, financial and ecological vulnerabilities.

Warning Service: A sound logical reason for foreseeing possibly disastrous occasions is required. Steady checking of conceivable catastrophe antecedents is important to create precise admonitions on schedule. Methodologies that address numerous perils and include different checking organizations are best.

Communication and Dissemination: Clear justifiable admonitions must come to those at risk. For individuals to comprehend the alerts they should contain clear, helpful data that enables legitimate responses. Regional, national and network level correspondence diverts must be recognized ahead of time and one definitive voice built up.

Response Capability: It is fundamental that networks comprehend their dangers; they should regard the notice administration and should know how to react.Building up a readied network requires the investment of formal and casual instruction areas, tending to the more extensive concept of hazard and defenselessness.[3]

Advancement of Guidelines and Standards: a. the advancement of value norms and operational aides on standard working techniques that connection early cautioning frameworks and danger observing procedures to the reaction organizations and to those powerless against a specific peril and that energizes transboundary data sharing. b. Guarantee readiness and alternate courses of action are reliably evaluated, refreshed and connected to notice frameworks.

Improved exactness and correspondence: a. Utilization of science and innovation, including remote detecting and geographic data frameworks (GIS) applications and the use of hazard and effect models to improve the precision, practicality and adequacy of caution data. b. Use of creative Information Communication Technology so early cautioning messages are customized to arrive at approach producers and people in general in fitting, straightforward configurations. [4]

•Developing early warning systems that can be overseen by neighborhood networks and have long haul maintainability incorporated with their plan and activity

•Working with District Authorities and different partners to advance strategy and practice which needs network ways to deal with DRR and the allotment of assets dependent on hazard and capacity to adapt

•Demonstrating and advancing network oversaw calamity alleviation, including preparing and mindfulness raising on cataclysmic events and hazard

•Building the limit of networks to profit by early warning frameworks, and to incorporate this learning into their occupations and prosperity to lessen risk [5]

In growing early warning frameworks, it is basic to perceive that various gatherings have various vulnerabilities as indicated by culture, sexual orientation or different qualities that impact their ability to viably get ready for, counteract and react to debacles. Ladies and men frequently assume various jobs in the public arena and have diverse access to data in calamity circumstances. Likewise, the old, crippled and socio-monetarily distraught are regularly increasingly powerless. Data, institutional courses of action and cautioning correspondence frameworks ought to be custom fitted to address the issues of each gathering in each helpless network. [6]

Where conceivable, early warning frameworks should interface all danger based frameworks. Economies of scale, manageability and productivity can be upgraded if frameworks and operational exercises are built up and kept up inside a multipurpose structure that considers all risks and end client needs.

Multi-peril early warning systems will likewise be initiated more frequently than a solitary risk cautioning framework, and thusly ought to give better usefulness and unwavering quality to risky high force occasions,

for example, tidal waves, that happen inconsistently. Multi-danger frameworks likewise help the open better comprehend the scope of dangers they face and strengthen wanted readiness activities and cautioning reaction practices. [6] [7]

A people-focused multi-peril early warning framework enables people and networks compromised by dangers to act in adequate time and in a fitting way to diminish the plausibility of individual damage and disease, death toll and harm to property, resources and the earth. [7]

Calamity chance administration and coordination crosswise over pertinent organizations and segments and the full and important interest of significant partners at suitable levels; putting resources into the monetary, social, wellbeing, social and instructive strength of people, networks and nations and in the earth, additionally through innovation and research; upgrading multi-peril EWS, readiness, reaction, recuperation, recovery and reproduction"

There must be a more extensive and an additional people-focused preventive way to deal with fiasco hazard. Calamity chance decrease practices should be multi-peril and multi-sectoral based, comprehensive and available so as to be proficient and powerful. While perceiving their driving, administrative and coordination job, Governments ought to draw in with applicable partners, including ladies, youngsters and youth, people with inabilities, destitute individuals, vagrants, indigenous people groups, volunteers, the network of experts and more established people in the structure and execution of arrangements, plans and measures"

That adjustment to environmental change-affected perils, for example, floods, dry seasons, and warmth waves, is maybe the most significant component creating social orders need to adequately react to climatic changes. Financial and political frameworks must react at numerous administration levels, from the individual family unit to the national, territorial, and global. [8]

Nonetheless, improving the viability of early warning systems doesn't, in itself, lead to diminished hazard for catastrophe inclined networks — early cautioning does minimal great except if it is trailed by (ahead of schedule) activity.

Alerts are as yet not successfully conveyed, and not adequately followed up on, even as offices in created and creating nations are presently progressively mindful of the nature, recurrence, areas and force of different risk types, and have propelled specialized abilities for observing, for example, atmosphere models and remote detecting. [9]

Bangladesh being world's eighth-most crowded nation is profoundly helpless against intermittent normal dangers because of its area and geography. It normally encounters floods, dry spells, tornadoes and violent winds. Being situated in a structurally dynamic zone, Bangladesh has a long history of seismic tremors also. ICT can possibly assume a vital job in DRR. Adjacent to the conventional ICT media (radio, TV, and so on); fast headway in ICT as Internet, GIS, Remote Sensing and satellite-based correspondence can help a lot in arranging and usage of DRR. These advances are assuming a noteworthy job in structuring early warning systems, catalyzing the procedure of readiness, reaction and mitigation. Although a decent ICT foundation is set up in Bangladesh, yet extensions exist in differentiating ICT applications uses to improve coordinated data the executives for limiting peril explicit dangers in an opportune way. [10]

New rising media, (cell broadcasting, Internet, satellite radio, and so forth) all of which can assume a noteworthy job in limiting the dangers of a potential or approaching debacle. Before calamities strike, ICTs are utilized as a conductor for scattering data on a looming threat, along these lines making it conceivable to avoid potential risk to moderate the effect of these catastrophes. Henceforth, it is urgent that there is consistency in the use of ICT for atrisk regions in accomplishing viable DRR. [11]

The significance of convenient debacle cautioning in alleviating negative effects can never be under-evaluated. In spite of the fact that harm to property can't be maintained a strategic distance from, created nations have had the option to decrease death toll because of catastrophes substantially more viably than their partners in the creating scene. A key purpose behind this is the usage of compelling calamity cautioning frameworks and departure methods utilized by the created nations as opposed to nonattendance of such measures in the creating scene. [10]

The diverse computerized advances and their utilization to decrease fiasco dangers are quickly featured below. Terrestrial Radio and Television, Mobile Technology, Providing Emergency Communication Means, Use of Internet in the Aftermath of Disaster, Tracing Missing Persons, ICT

in Disaster Recovery Enhancement, Specific Disaster Management Software, Disaster Information Networks, GIS Application in Disaster Recovery, Availability of ICT Tools and Usage Pattern, Major Drawbacks of ICT in Disaster Scenario, Physical Damage of Communication Infrastructure, Limitations in Emergency Telecommunication Services, Power Failure Causing Non-usefulness of ICT Tools, Communication Difficulty Due to Oversubscription, ICT Capacity Deficits. [10]

The UDMC part has a slight data about the procedure. By far most of cases, the examiner found very few of them seen the plan. Most of them empower that they got some answers concerning it. The most captivating issue is that despite the way that they have a shallow idea with respect to calamity the board course of action anyway they unknowingly realize various parts the procedure. [11]

ICTs that have demonstrated vital to DRM incorporate yet are not restricted to: versatile innovation, the Internet and online web-based social networking devices, space-based advances, for example, remote detecting and satellite correspondences, and various kinds of radios, including novice radio and satellite radio. [12] Universal access to ICT administrations will require good approaches and guidelines, that may should be upheld with assets committed to arriving at clients situated in under-served zones. While extending the ICT framework, their versatility to catastrophes ought to likewise be considered, joining back up administrations, and different and excess correspondence channels. [12]The SMART Tunnel

Kuala Lumpur's Storm water Management and Road Tunnel (SMART) redirects potential floodwater away from the city's money related region through a 9.7 km long, USD 514 million passage.

The framework is a mix of weirs, conduits and holding lakes. The one of a kind part of this flood moderation undertaking is that it has a traffic sidestep burrow in the center third segment that has two traffic decks, each associated with conduits that control the measure of water entering the street burrow.

As the volume of water that necessities to go through the passage builds, the street passages are shut down each in turn, and water is permitted to enter. A complex Flood Detection System is introduced to give sufficient cautioning time to clear traffic, to limit traffic interruption, and work passage conduits.

It is made out of a system of programmed recording precipitation measures, waterway stream/level checking stations, constant telemetry and working framework, and a lot of hydrological and pressure driven figure models running on computers.

There are numerous ICTs, both conventional and current, that are accessible and an early warning system may utilize more than one ICT application in parallel.

In Bangladesh, the Disaster Management Information Center is guiding early warning system spread through CB in two regions—Sirajgonj (for floods) and Cox's Bazaar (for typhoons). Understandings were marked with two portable administrators—Grameenphone and state-claimed Teletalk—to send texts to their endorsers. In view of the aftereffect of the pilot, this innovation will be extended to other high chance regions of Bangladesh through the Comprehensive Disaster Management Programme.

Other ICT gadgets that are entrenched among calamity readiness and the executive's associations incorporate fixed-line telephones, satellite telephones, satellite radio, novice radio, network radio, Wireless Local Loop, Web administration (Internet/email), PCs, GPS and other Global Navigation Satellite Systems. [12]

Women and children are the most defenseless bunch in Bangladesh especially in the hazard prone seaside zones.

Their powerlessness to tornado peril has just been generally detailed. In Bangladesh, female will in general have increasingly constrained access to resources physical, money related, human, social and common capital, for example, land, credit, basic leadership bodies, farming data sources, innovation, augmentation and preparing administrations which would all upgrade their ability to embrace. In the coastal regions, the circumstance stays most exceedingly awful. [13]

IV. RESULT AND DISCUSSION

A. Measure disaster early warning knowledge:

- Young male: Moderate knowledge about disaster early warning system.
- Young female: Poor Knowledge about disaster early warning system.
- Senior citizen (male): Have Common-sense and experience about disaster but poor knowledge about modern early warning system.

- Senior citizen (female): No idea about early warning system.
- Teenager (boy): Have an idea about early warning system.
- Teenager (girl): Have an idea about early warning system
- Children (boy): Have some ideas about early warning system.
- Children (girl): Have some ideas about early warning system.
- Disable: No idea about early warning system.

However, Disaster prone areas people need to knowledge about early warning system that reduce the vulnerability. But class bases this knowledge difference.

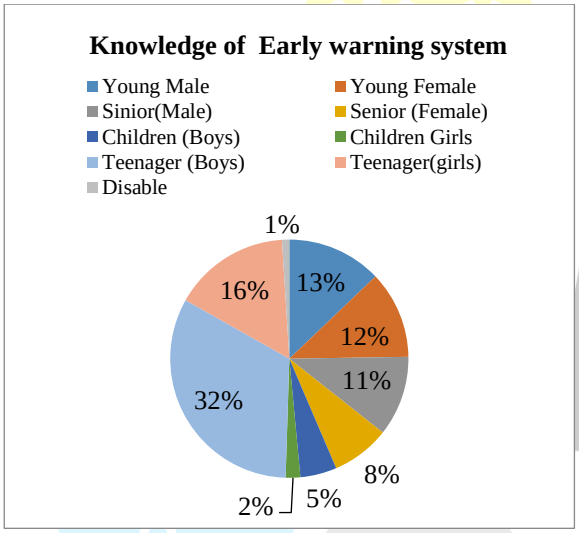

Figure: 01. Knowledge of early warning system (Field data, 2019)

B. ICT technical monitoring and warning services

- Young male: Mobile, TV, Radio, Warning center
- Young female: TV, Warning center.
- Senior citizen (male): Radio
- Senior citizen (female): Mick announcement
- Teenager (boy): Mick announcement, Internet, Mobile.
- Teenager (girl): Mick announcement, TV, Internet
- Children (boy): Mick announcement
- Children (girl): Mick announcement
- Disable: No idea

The ICT technical monitoring and warning service for using manage in disaster emergence situation but lack of adaptation on this early warning system that never works. And this situation senior citizen and disable people more vulnerable in disaster period.

C. Warning device to reach pattern among different class

- Young People: Electronic device, Oral announcement.
- Senior People: Oral announcement
- Teenagers: Social, Electronically devices
- Disable: No idea about it.

Perceptions about disaster about hazard, cyclone, drought, earthquake, river erosion, salinity among different class so poor. They no idea about Use of Internet in the Aftermath of Disaster, CT in Disaster Recovery Enhancement, Specific Disaster Management Software, Disaster Information Networks, GIS Application in Disaster Recovery, Availability of ICT Tools and Usage Pattern, Physical Damage of Communication Infrastructure, Limitations in Emergency Telecommunication Services, Power Failure Causing Non-functionality of ICT Tools, Communication Difficulty Due to Over subscription, ICT Capacity Deficit sect.

D, Response capability among different class

Risk knowledge, access easy warning service, dissemination and communication, responsibility knowledge for reduce disaster risk among different class different. Disable, female, old people and children faced many challenges during disaster because of poor knowledge about early warning system and practical practice use in disaster emergency.

V. CONCLUSION AND RECOMMENDATIONS

Now it needs to act quickly and develop new strategic concept for adaptation early warning system that why need to addresses structural, nonstructural, anticipatory and reactive adaptation options about disaster risk reduction that are accepted by the vulnerable people living nearer river in Barishal district. Establish of such early warning systems which will have accessibility among all class of people including disable, illiterate, less educated people, women above all unprivileged people. In this situation, disable people must be treated especially. Especial early warning system is needed to be provided for them. The subject “Early Warning System” is needed to include in academic courses as a distinct subject for more knowledge. More researches needed to be conducted for reaching the innovative ideas about early warning system among people both educated and non-educated. The involvement of school students in this work is needed to be increased. Active and spontaneous participation in the training of early warning system is needed among people who are

mostly affected by various kind of disasters. Select a particular sound (via mobile phone) provided by GO/NGO will determine the upcoming disaster will help the vulnerable people to shift in a safe place and reduce loss. Establishment of local information booth for providing information regarding disaster according to local need assessment.

ACKNOWLEDGEMENT

I would like to thank my parents who have given money and inspired to conduct this study. Then I want to acknowledge seven members, including- Md. Tanvirul Islam, Kazi Rakib, Mahafujur Rahanan, Tanzila Begum, Rana Abbas, Bablur Rahaman, and Khalid Saifullaha who have helped to collect data and conducted this study.

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