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Citizen's Engagement Habit and Use of ICT tools in Disaster Emergency Management: an account of flooding in Nigeria

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Abstract— Disaster which may come as common or man-made has claimed immeasurable damages to lives and properties. Seismic tremor, Flood, Volcanic Eruption, Tornado, Tsunami, Wildfire, Drought, Hailstorm, Heat Wave, Hurricane, Epidemic, Famine, Limnic Eruption, Mudflow, Solar Flare and distinctive different kind of disasters. Flooding which is the most frequent in Nigeria had throughout the most recent two decades killed more than 1.5 billion citizens while more than 81 million other became homeless. It has been perceived in the latest two decades that, while regular disaster can't be completely maintained a planned distance from the impacts can be achieved through positive sharing of disaster notifications and awareness among the vulnerable citizens. Information and communication technology ought to be seen as basic groundwork and given attention in disaster emergency and management.

This paper presents a plan of the present state of information and communication technology base in Nigeria as it relates to flooding management. It further highlights issues for thought in it like manner as it contains suggestions on how to ensure that the capability of Information and communication technology (ICT) in flooding management is completely figured out. Segment 1 is the introduction part segment 2 is the objective, portion 3 presents related literatures, 4 presents issues on information and communication technology applications for disaster management in Nigeria, 5 shows the significance of this paper, 6 proposes suggestions while the conclusion is presented in part 7.

Keywords- Citizens engagement, Information and communication technology, disaster management

I. INTRODUCTION

The beginning of disaster goes back to the beginning of mankind and that elucidates why at whatever point the issues of disaster and disaster management can't be overlooked. Consistently, there have been shocking occasions of different types of disasters on the planet [3].

Disaster happens everywhere, the Indian Ocean Tsunamis in Sri Lanka 2004 and Pakistan tremor 2005, the northern Japan shudder 2014, Malaysian seismic tremor 2015, Tohoku quake and downpour 2011, Nigerian flooding 2014, Boko-haram Bomb sway in Nigeria, Indian Heat wave 2015 etcetera [1]. It may be natural or man-made, when it strikes; it sees no distinction between developed and underdeveloped nations. From America to Europe, from Africa to Asia, there is no a bit of the world that has not experienced one sort of disaster or the other [3]. Environment and citizen's security are the responsibilities of the Government and disaster management officers; they are bounded with the responsibility of providing framework for effective disaster control and disaster warning system that must be well placed up [3].

Previously, disasters management had been focused on areas which are, power, water, sanitation and etc. shockingly, there are various cases in which communication are not measured as a need when there is absence of access to these crucial services. Whatever the case may be, it is a frequent access to exact information that supports the quick recovery of the services and calm societal turmoil after a disaster [1]. In flooding management planning, information and communication systems may not appear, all in all, to be

as fundamental as access to clean water, support and sanctuary; however, access to relevant and promising information and communication technologies bring about more productive disaster response [1]. Therefore, for disaster management, thought must be given to uniting critical infrastructure components and making arrangements for danger systemically. In order for information to be imparted, supporting facilities like institutions and policies must be accessible, open, and dependable [1].

Flooding is the most rehashing disaster in Nigeria and is by and large brought on by either climatic or non-climatic variables, in this way prompting up river floods, flash floods, urban floods, sewage floods, glacial lake outburst floods and coastal floods[2]. In the verifiable scenery of flooding in Nigeria, the most exceedingly terrible experience was recorded around July and October 2012 when 363 citizens lost their lives, 2.1million citizens across states were dislodged and 18, 282 were injured [3]. The yearly rehash of flooding in Nigeria with frightful results serves to plot the nation's ill-preparedness and lack of efficient disaster management plan by the government and the appropriate authorities. Particularly, communication which is an imperative bit of disaster management procedures has been seen to be inefficient [3].

II. OBJECTIVES

The goals of this paper is to introduce the use of information and communication technology to build up a viable communication framework through Social network sites and the development of citizens in general as an extra means/sensor in conveying disasters information in Nigeria

III. RELATED WORKS

A. Information and Communication technology (ICT)

For the most part, communication is a key gadget in the ordinary interactions among citizens and it has particularly been seen as one of the necessities in passing on disaster and emergency situation to all partners in disaster management procedure while promoting timely understanding of the issues in question among the vulnerable masses.

This clears up why, in this paper, communication will be seen as the gathering, preparing, storage, recovery and transmitting of flooding related information to individuals and vulnerable citizens who need them to make fast move so as to pre-empt and mitigate a potential disastrous situation [4]. As showed in [5], the approach of technologies, cameras and cell phones with camera offers the likelihood of making photographs more open by sharing them online or distributing those using social networks and applications. Social network sites like Facebook grants its users to store, sort, follow and offer photos and pictures by means of the Internet. This gives support to information sharing in disaster management.

The coordination of the communication technologies has conveyed huge conceivable outcomes to users. Through the Laptop, Palmtop, and Cell phones, messages can be passed on all around throughout the world, particularly to persons in disaster areas for safety [6]. The 21st century has ended up being spaceless, with the utilization of GPS. Anybody could be reached at wherever and at whatever time. They can in like manner be profitable, valuable and reliable friends in solving fuzzy or not clearly defined problems and issues [6].

In the overall world contest and particularly in Nigeria, the media of communicating information have seen massive changes identified with development, innovation, scope, work force and administrative capacity. The satellite evolution technology has further expanded the open entryways and interoperability of both information and communication technologies accordingly, making gathering, handling, storage, recovery and dispersal of mass information from sender to recipient snappier and more dependable than it was ever before [8]

B. Disaster management

The term disaster management can't be truly simplified without first clarifying "disaster" for proper understanding. [7]clarifies that disaster is a sudden natural or man-made circumstance competent of infuriating the widespread of human, material, financial and environmental destruction far past what the affected communities can adapt to.

Completely, the human and economic losses occurring from calamities are regularly perplexing and unpredictable as it hardly spears any section. As shown in [2], around 1971 and 1995, flood which is the most repetitive of all disaster had affected more than 1.5 billion citizens or 100 million with 318,000 put to death and 81 million destitute. While commenting on the overwhelming impacts of natural disaster, [8] notes that flood alone add to around 39 percent of worldwide casualty within the period of 2010-2014. It has been noticed that disaster impede and has extraordinarily damage on the safety and health condition of the citizens and extend worldwide neediness level as an aftereffect consequence of damages to organizations and rural items.

C. Role of ICT in disaster management: The Nigeria challenge

In minimizing disaster impacts on defenseless citizens, communication is seen as the nexus that secure the

connections among the four system of disaster management, to be precise these are: relief, readiness, response and recovery. As demonstrated by [9] and [10], there are 152 radio stations, 116 TV, 116 TV channels, 40 brilliant TV channels, 143 daily papers and 25 magazines in Nigeria. Beside the daily papers radio and TV, the satellite advancement has furthermore delivered web, cell phones, fax, email and other recently rising social networking sites all of which have exhibited adequacy in information disseminating and prompt feedback mechanism.

Furthermore, eloquent ladies, charismatic opinion pioneers, capable religious leaders, theatre groups and mobile cinema, theater have been used and should continue being used effectively in rural communities and other part of the nation as information channels [11] and [12]. [6] agreed with this line of thought alluding to the instance of print media which they contended might not have as much effect among the country masses who are basically illiterate and ignorant individuals; the same insufficiency is found in Television broadcast which may not be convincing as best message transporter to the grassroots where more than 70% of the citizens live without access to electricity

D. *Disaster* management, *Response and Recovery*

Disaster response and recovery are the general speedy moves made by government, organizations and disaster management specialists to meet the major needs of disaster casualties until more permanent, sustainable and supportable courses of action are worked out [13]. The targets, as demonstrated by [14] are to guarantee the survival of huge number of citizens, restore key services as quick as could sensibly be expected, repair and replace damaged infrastructure, reactivate the financial and economic activities keeping in mind the end goal of minimizing reoccurrence. Response and recovery activities involves giving early advise to the citizens around the disaster prone areas, evacuation of casualties, request and safeguard, evaluation, logistics, relief and help distribution, securing the affected zone and individuals, restoration and reconstruction [15]

E. *Disaster management individuals as sensor for imparting event in Nigeria*

It is astonishing that there were under 20 million fixed telephone lines across Nigeria in 2000, however by 2012; there were presently about 650 million cell phones subscriptions (the world-bank group). Disaster community is depended upon to educate native, alert individuals, and advise the entire community to bolster stakeholders attempt in the disaster management systems in order to make speedy moves to secure lives and property from natural and man-made threats [3].

It is of immense significance to repeat here that the accomplishment of the four phases of disaster management is dependent on efficient, clear and quick spread of disaster information distribution between disaster managers as well as to be spreadth to all the critical disaster vulnerable individuals.

As seen in [14] disaster communication can be grouped into two sectors, the first is the part which combines technologies and advancements that empowers free stream of information on radio and TV, telephones (fixed and mobile), short message services, messages, online networking site (face book, twitter, online journal) and their satellites candidly supportive network is to a great degree helpful part of conveying event. For a nation like Nigeria that witness repeated frequencies of flooding, disaster forewarning incorporates telling the occupants of disaster inclined areas of the approaching disaster, the assessed cost to lives and property and the essential prerequisite for them to take precautionary measure in the occasion so it could be avoided.

There must be constant information sharing between emergency operation agencies, emergency broadcast frameworks and progressive emergency responders and the communities [16] principally, the information supervisors must perceive and pass on to general society past measures that wasn't productive in attempting to moderate the effect of natural disaster.

It ought to highlight the urgency of moving from the hazardous domain and safeguard lives and property. Easing measures must be shown, such as, economic enhancement. In the supposition of [15], the disaster information must have the ability to sharpen the management to the requirement for political and official intercession where required, advised and getting awareness across to assist societies and the vulnerable citizens of vital urgent actions.

In Nigeria, unique stations are open for passing on and imparting disaster messages, the customary electronic media, (radio and TV) and the print media (daily papers and magazines) are outstandingly effective in imparting disaster advise to a distinctive various group regardless, this is not without a couple of barriers[12]. Daily papers and magazines can't have much impact at the grassroots level where more than 56% of the masses are uneducated, they can neither read nor make. Shouldn't something be said about communication in the day or night when the radio and TVs are off, when no one knows what’s going on?, The amount of citizens will determine what media directs must be used in order to accomplish the expected individuals to

convey mass effect [17]. In [11] and [12], aside from the customary mass communication organs and the present day satellite--supported media said above, there are other very much orchestrated indigenous communication means which are used to disseminate information to the mass routine and urban people in times of emergency. These are women pioneers, party pioneers, religious pioneers, trade union pioneers etc

In this modern days of advanced information and communication technologies when there are steady cellular telephones that are consistently used by all citizens as dependable and proficient communication means like cell phones, speedy alerts messages can be dispatched by making calls and sending pre- decided short message services (SMS) to more than a miniature numbers of citizens.

IV. DISCUSSIONS

A. Social network Sites and citizen's engagement for disaster management in Nigeria

With rapidly expanding usage rates, social network sites have accomplished a central role in the online experience of users around the globe. From various perspectives, users' engagement has moved from surfing of the website pages to surfing applications which are revolved around permitting citizens to communicate with each other and give ongoing information on their area. In that capability, these advancements address various key vectors for information better dissemination. In times of crisis in Nigeria social online networking can remain as a capable and persuasive broadcasting sector and furthermore serve as impetus for native responses in form of actions.

As of late in Japan the flood disaster that happen covering a wide scale, brought about wide usage of text based social application, for example, Twitter. Also, in Japan, after a tremor called earthquake, another application (Line) was presented which makes further use of package exchange systems.

The application experienced snappy uptake, giving emphasis on the estimation of social media applications and their transformative effect on communication. Since these frameworks are less resource devouring than other different technologies, they offer a persuading choice which should be extensively considered in managing disaster [1]. Propelled availability and arrangement is crucial and essential in a country like Nigeria in order to exploit these equipments, making social networking communication a key bit of e-versatility planning and disaster management [1]

Furthermore, various disaster management organizations have sought after the invention of applications for phones and mobile devices so as to give a sensible and secure communication component for coordination with the overall public. These arrangements impact the portability and adaptability of convenient devices. While more costly to create than using the existing mechanism, these methods offer a persuading choice which should be purposely considered. [1]

With this, disaster planning should sanction a systemic response that incorporates preparing and educating citizens to build up for key times of emergency, for instance, ICT controllers, policymakers, lawmakers and security experts in charge of guaranteeing protection nationwide ought to dependably be at alert. Furthermore, joint effort of government and the private sectors is imperative, keeping in mind the objective to really administer the management of ICT infrastructure with the inclusion of resilience building, mechanical control structures, personality management, Internet root name server administration and regulation of spam. Trainings activities ought to similarly address non-State characters like non- governmental associations, the educated community and the specialized technical groups [4]

Diverse disaster happens in diverse nations of the world at distinctive events beyond national and worldwide borders regardless of the weather it's a developed, developing or under developed nation. Neither man nor man technology could keep them from happening however their impact can be controlled and minimized through the ICT [18]. ICT accepts an imperative part of forecasting disaster, expecting, communicating and spreading disaster information to inhabitants and citizens, and ensuring them a quick communication system to both government and non-governmental agencies for help materials. Through ICT, practical flooding hazard reduction measures can be executed [19].

V. CONCEPTUAL FRAMEWORK FOR CITIZEN'S ENGAGEMENT AND ICT TOOLS FOR DISASTER MANAGEMENT

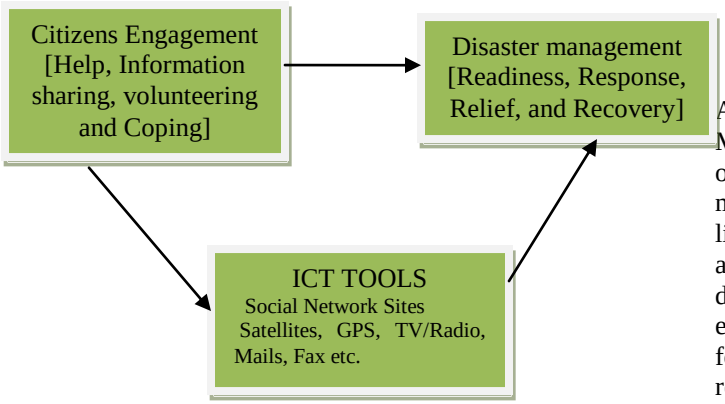

Figure1: The conceptual framework

VI. SIGNIFICANCE OF THE STUDY

This study has made some unpretentious commitments to knowledge, which are deserving of note: (As Nigeria is Currently known as the speediest developing telecoms nation on the planet with around 76 million connected lines, which is around half of the whole populace of the nation [6])

That one, Nigeria as a multi-ethnic and multilingual society with more than 250 tongues and 173m or more populace [6] requires more than print and electronic media to suitably pass on disaster messages to the rural communities of large portions of people which are the most vulnerable in times of calamities and emergency. As needs be, in contemporary time of satellite development and a broad variety of information and communication organs, disaster communication could only be viable by using other media of information which are social network sites (face book, You tube, Internet, twitter, blog, PC mixed media and CD-ROMS), and indigenous media which are gong, town herald, pioneers, places of worship and so forth

Two, this study has focused on the use of information communication frameworks for emergency awareness as it serves as instruments to empower disaster authorities' utilization of "social sensors" for emergency awareness.

In addition, this study suggest that two or three individuals in Nigeria can create a dynamic "information center points," serving as information representatives and serving as information broker as the wellsprings of information falls [20] Dynamic users with chronicled progressive commitments can serve as trusted source of information in times of crisis events where accuracy is a need

VII. RECCOMENDATIONS

As Nigeria has established the National Emergency Management Agency (NEMA) with her essential obligations as coordinating and facilitating disaster management efforts, with a perspective of reducing loss of lives and property and to safeguard lives from dangers [21] and some other obligations as: preparing and moderation of disaster; creating the awareness, mobilizing and deploying emergency worker and putting in all the necessary facilities for response; assessing and estimating disaster damage and requests; Managing Disaster Management funds; Publication of important Information to the press and citizens to their enlightenment; and arrangement/rules details for citizens in the nation, it is therefore in the opinion of this paper :

That an extended use of ICT instruments in the country and its environ by the experts and disaster management associations are significantly prescribed for the improvement of an effective communication framework to help in the time of disaster management and preparedness [22] [23].

That intensifying the ICT infrastructural usage for disaster management, Coordination between national PC information base, emergency response groups and disaster management organizations should incorporate forecast ,disaster cautions, and responses in the system so as not to underestimate another form of disruptive event. [1]

That Information sharing among the government parastatals, disaster management offices, non-government associations, the private sectors, groups of community people and the media hence need emerges for regular routine to pre-determine disaster and rebroadcast among concerned people and communities keeping in mind the end goal for making them take necessary and common comprehension of each other's duties in saving lives

NGOs (Non-governmental organisations) and worldwide organizations should give strong guidance of retraining the overall population and masses in the area which disaster has been forecasted, making them see reason to pass on the information to others through their social media and applications

That there is the desperate pressing prerequisite for specific retraining of environment and safety journalists on the latest pattern in covering the coming occasion. There should be procurement for information sharing among the government, general society and private sectors in the midst of times of crisis as a feature of disaster management arrangements.

That the worldwide standard recorded beneath as characterized by The International Telecommunication Union (ITU) [24] ought to be considered before and after disaster occurrence i.e.

- Standard I : Following the International Emergency Preference Scheme (IEPS), which ensures that calls made by those incorporated into coordinating and arranging HELP and RELIEF OPERATIONS get special treatment on public network
- Standard II: ITU considers it urgent to ensure that women are furthermore engaged with disaster response programs, in light of the fact that in various societies, women habitually are the key communicators and key protector and are more prone to adhere to warnings and regulations for disasters.[24]

It is essential hence that the Nigerian Governments and disaster help organizations render some support that will involve women in their disaster readiness programs [1]

That the Public and Private Partnership (PPP) movement is proposed for perfect result to avert disasters

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VIII. CONCLUSIONS

From the above, we can conclude two vital realities. One is that the recurrence of danger does not consequently prompt disaster and loss of live, and that although natural disaster can't be evaded their social and economic impacts on lives and property can be astonishingly minimized.

The new technology developments has made it possible and helpful to altogether distinguish any form of disaster, recognition of disaster-prone zones and conveying successful cautioning message about the danger to vulnerable communities in suitable time so that the inhabitants could take crucial measures to prevent or dodge the negative impacts. While so many developed countries have recorded noteworthy achievement in disaster management, the underdeveloped ones like Nigeria have not gained much accomplishment

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