Original Research Article

ASSESSMENT OF THE IMPACT OF EPISODIC RAINSTORM EVENT OF 18TH APRIL AND 5TH MAY, 2018 IN TARABA STATE: WEATHER PATTERNS, HUMAN HEALTH IMPACT AND THE COST OF FINANCING INFRASTRUCTURES DESTROYED IN JALINGO AND WUKARI, NIGERIA.

ABSTRACT:

The study assessed the two days episodic rainstorm event that destroyed buildings and led to loss of life in April and May 2018 in Taraba State, northeast Nigeria. Data were from primary and secondary sources. A total of 60 copies of research questionnaires and interviews were used, complimented by data from the meteorological observatory of the Department of Geography, Taraba State University and expert eye witness accounts. The results of the study show that the 2-day rainstorm extreme event with high wind speed of over 600 knots (327 m/s) caused devastating damages to building infrastructures in the state and the roofs of buildings and damage to Globacom Telecommunication mast was profound and five people lost their lives with several others sustaining diverse injuries in 17 communities in Jalingo and Wukari. It led to about 62% of the affected to take refuge outside their homes for over three days while other spent more than 10days. The schools were more affected with an estimated cost of ₦30,000,000 to fix the damaged infrastructures, followed by government buildings which needs about 24,000, 000 and residential building with estimated cost of ₦ 6,275,000. The cost for fixing the infrastructures damaged in Wukari in comparison to Jalingo was ₦ 9,000,000 for residential buildings, ₦ 6,000,000 for government buildings and ₦ 9,275,000 for schools respectively. Prices of roofing sheets increased with about $6 during the period. It was suggested that wind breakers should be encouraged and the cutting down of trees should be discouraged while creating awareness and encouraging afforestation.

Keywords: Episodic, Rainstorm Event, Loss of Lives, Taraba State.

INTRODUCTION

In the current twist of climate change events, it is becoming clearer that nature has drawn the battle line with man on the planet earth about 200 years after the industrial revolution. The forms of challenge on every living thing on this planet will be two; while some changes may be positive, many others will have negative impacts. The negative natural weapons of war are being shot on man and his environment, namely, the earth warms, continental and sea ice melts, rainfall intensity and amount increases in some areas with wind storms, sea levels rise, drought are becoming more severe. According to McLamb [1], the present changing climate patterns,

global warming, environmental degradation, food production challenges and state of the human condition can be credited straightforwardly to the transitioning of man's creativity: the Industrial Revolution.

Human society is particularly vulnerable to severe weather and climate events that cause damage to property and infrastructure, injury, and even loss of life. Albeit generally rare, at any particular location, such extreme weather occurrences cause a disproportionate amount of loss [1]. Outrageous climate and weather events are a noteworthy wellspring of hazard for every single human society. There is a squeezing requirement on such events. Different societal changes, for example, expanded populaces in waterfront and urban zones and progressively complex infrastructure, have made us possibly more helpless and vulnerable against such events than we were previously.

In addition, the properties of extreme weather and climate events are likely to change in the twenty-first century inferable from anthropogenic environmental change. As the world has warmed; that warming has activated many other changes to the earth's climate [1]. Changes in extreme weather and climate events, such as heat waves and dry spells, are the essential way that the vast majority experience climate change.

Human-induced environmental change has officially expanded the number and quality of a portion of these extreme weather events. Extreme climate incorporates unforeseen, strange, flighty, serious or unseasonal weather; weather at the boundaries of the authentic dissemination—the range that has been seen in the past. Regularly, extreme events depend on an area's recorded climate history and characterized as lying in the most unordinary 10%. As of late some extreme weather events have been credited to human-actuated an earth-wide temperature boost (global warming), with studies showing an expanding danger from extreme weather in the future.

Historical Evolution of Extreme Weather Events

Merely two and a half centuries ago, human civilization began to tap into a seemingly inexhaustible energy source in fossil fuels– initially coal – to usher in the age of industrialization [1]. As the utilization of this new energy source spread over the globe – including the utilization

of petroleum gas and oil – people started to grow progressively vigorous lives with improved medicinal services, better and increasingly inexhaustible nourishment supplies and quickly improved lodging and transportation. It was the start of major innovative changes from the utilization of hand apparatuses to control devices and eventually high innovation empowering creation on exceptionally extensive scales and hearty financial improvement. This according to Mclamb [1] was the continuing legacy of the Industrial Revolution.

The key impact of the Industrial Revolution on the planet that keeps on reverberating today with expanding impact is irrefutably human population growth. Food production, agriculture, housing, land use, air pollution, energy production and consumption, sanitation, potable water issues and all other basic needs of human existence are directly correlated to the demands and usage of the resources available to us [1]

The Industrial Revolution utilized petroleum products as the way to propel the conditions for human life, and that is the point from which the present society advanced. The difference now as indicated by UNISDR [2] is that global temperatures have risen surprisingly quickly over the recent couple of decades. There is solid proof of increments in normal global air and sea temperatures, across the board liquefying of snow and ice, and rising normal global sea levels. The IPCC Fourth Assessment Report (AR4) concluded that global warming is "unequivocal". Atmosphere and ocean temperatures are higher than they have been at any other time during at least the past five centuries, and probably for more than a millennium [3]. This is leading to extreme weather events which can be called climate-related hazards.

Kislov and Krenke [4] indicated that climate-related risks and temporal deviation of weather characteristics from the standard in a particular region and in a particular season are hazardous to life and economic activity. Such anomalies may be considered as the normal parameters for other regions (for example, 50-100 mm of precipitation per day can be a catastrophic event in the temperate zone but a normal one during the wet season in the tropics). However, anomalous hydrometeorological events, which greatly deviate from the norm and which are widely regarded as natural hazards [4]. Extreme events are now having a toll on populations and cities. Thus, urban communities in the developing world are confronted with increased risk of disasters and weather related calamities, and the potential of economic and human losses from natural

hazards is being exacerbated by the rate of unplanned urban expansion and influenced by the quality of urban management.

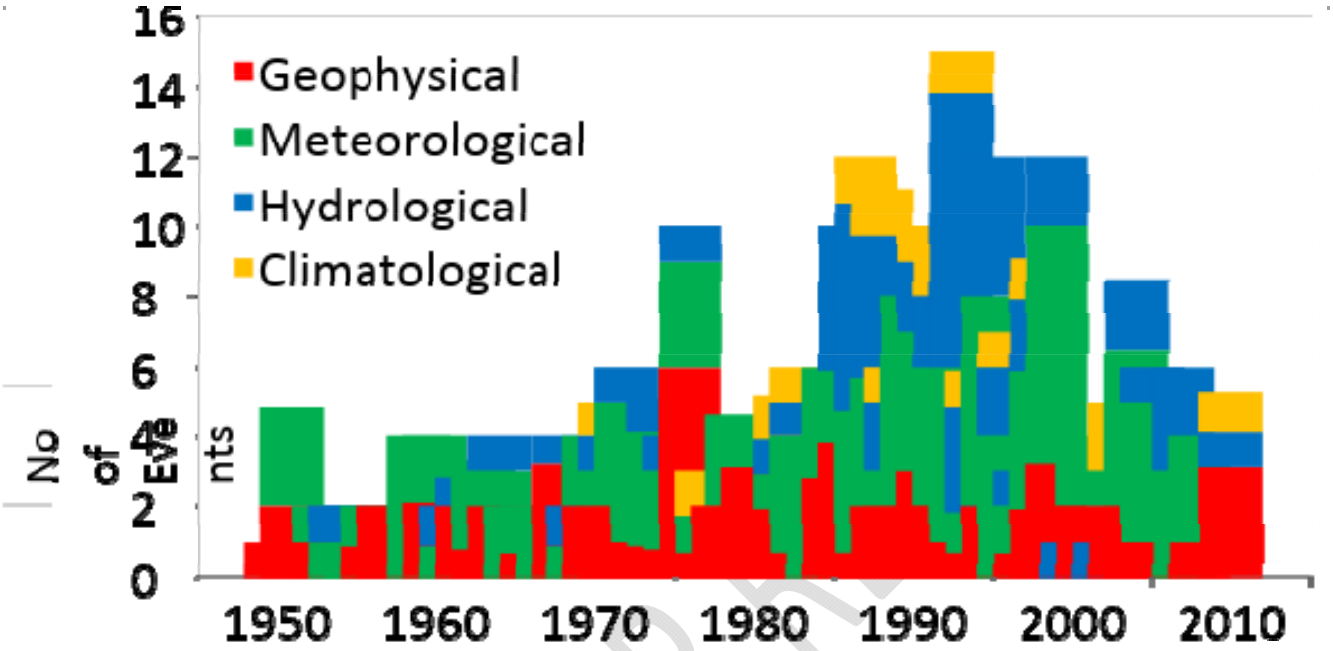

Fig 1: Great natural catastrophes worldwide 1950-2010: Number of events

Source: Odjugo [5]

From Fig 1, it is evident that with the exception of three years (1952, 1958 and 2009) all other years have one form of great natural disaster or the other. Of the four catastrophes recoded, meteorological (34%) topped the list followed by geophysical (32%), hydrological (23%) and climatological (11%). Climate and water related 68%, while geophysical (32%). Geophysical, meteorological and hydrological are major occurrence since the 1950s while climatological became a major feature in 1971 and since then it has been re-occurring [5]

Table 1: Decadal analysis of number of events of great natural catastrophes worldwide between 1950 and 2010

Decade	Geophysical	Meteorological	Hydrological	Climatological	Total

1950-1959	6.9	10.9	2.0	0.0	20.8
1960-1969	10.8	11.5	4.8	0.0	27.6
1970-1979	**19.4**	21	5.0	2.3	46.3
1980-1989	18	21.2	18.1	6.0	63.4
1990-1999	16.5	**42.2**	**25.8**	**6.8**	**91.0**
2000-2010	12.1	17.5	9.0	3.2	44.2

Source: Odjugo [5]

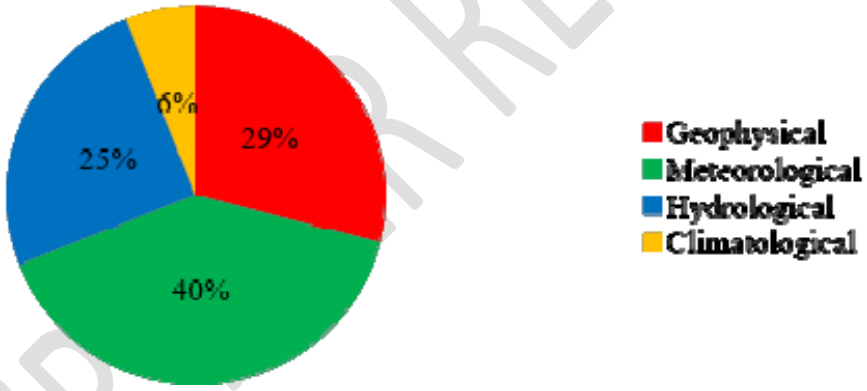

Fig 2: Great natural catastrophes worldwide 1950-2010: Percentage distribution per financial loss per event group

Source: Odjugo [5]

Between 1950-2010 as indicated in figure 2, great natural disasters destroyed property worth US$2.1tri (N315tri) globally, i.e. average of US$35m (N5.2bn) annually. Of this amount, 40% was lost to meteorological disasters while 29% (geophysical), 25% (hydrological) and 6% (climatological). Two groups: climate-water related disasters accounted for 71% of the total destruction cost while geophysical events were 29%. Total number of deaths recorded within the study period was 2,360,000 [5]. Out of these deaths as indicated in figure 3, geophysical

disasters accounted for 56%, while meteorological (33%), hydrological (6%) and climatological (5%). The climate-water related disasters caused 44% of the deaths while geophysical was 56%. It is important to note that while the meteorological disasters destroyed more property, geophysical disasters claimed more lives [5]

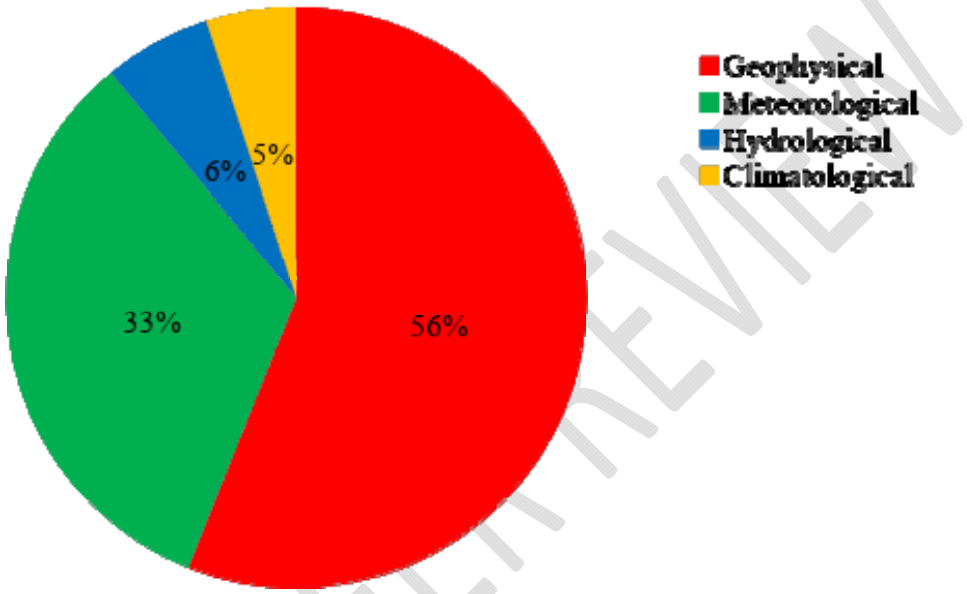

Fig 3: Great natural catastrophes worldwide 1950-2010: Percentage distribution per deaths per event group.

It has been noted that natural disasters and the effects of climate change pose a serious threat to the sustainable development of many economies of the world [6]. As reported by Thomas et al., [7] and Asian Development Bank [8], in Asia and the Pacific region for example somewhere in the range of 2007 and 2016, natural disaster in the area executed in excess of 300,000 individuals and affected 1.7 billion more. Direct physical losses are evaluated at $487 billion [8]

Catastrophic misfortunes are expanding and may even surpass economic development except if nations make a prompt move to stop dangerous climate change. In recent time in Africa, OCHA 18 March [9] reported that in Zimbabwe, flooding brought about by the Tropical Cyclone Idai climate framework keeps on causing monstrous obliteration, with substantial downpours revealed in Manicaland and Masvingo areas of the country. The OCHA [9] report indicated that

82 deaths have been recorded with 200 people reported injured and over 200 reported missing in Manicaland and Masvingo provinces. Chimanimani and Chipinge remain the hardest-hit districts and crops and livestock have been destroyed including power supply and communication which was disrupted in affected areas [9].

In March 2019 in Malawi, in excess of 922,900 individuals had been affected by a similar violent wind Idai as the Government has reported 56 deaths and 577 injured. In excess of 82,700 individuals are evaluated to be dislodged, while quick needs appraisals continues in the hardest-hit regions to recheck initial assessments and decide the quantity of individuals needing prompt philanthropic help. Satellite imagery shows Chikawa district as particularly affected [10].

Similarly, in March 2019 in Mozambique, the official loss of life rose to 468 individuals on 26 March, according to the Government and about 91,000 houses were distinguished as destroyed, harmed or overflowed up from 72,260 announced by the experts on 25 March. On 27 March, the Government affirmed five instances of cholera outbreak at the Munhava health centre in the city of Beira and around 2,500 instances of intense watery diarrhoea in Beira region as a result. A humanitarian evaluation group recognized almost 1,500 individuals unreached individuals needing support in Matarara in Chimoio area. Besides, in excess of 92,000 houses were recognized as completely pulverized (50,772), somewhat demolished (25,769) or overwhelmed (15,784) starting at 27 March; an expansion of more than 1,300 from the earlier day [9]. In table 2 deaths due to natural catastrophes globally is presented.

Table 2: Annual global number of deaths from natural catastrophes per decade, 1900-2015

Yearly average global annual deaths from natural disasters, by decade	Drought	Earthquake	Extreme Temperature	Flood	Storm	Volcanic Activity	Wildfire	Landslide	Mass movement (dry)
1900s	130000	17302	0	63	1801	4494	0	5	13
1910s	8500	6280	0	10138	5995	648	107	0	12

1920s	472400	54935	0	428	11999	514	10	43	0
1930s	0	23770	169	436147	9384	318	7	103	4
1940s	345000	16187	0	10103	12712	213	25	1753	0
1950s	0	2093	150	205830	3126	510	1	215	0
1960s	150865	5236	113	3239	13393	324	7	504	218
1970s	119908	44022	155	5078	35734	53	1	738	7
1980s	55727	6015	534	5155	4667	2400	40	623	127
1990s	311	10359	932	9549	21115	97	86	833	87
2000s	115	45364	9106	5401	17213	24	63	772	28
2010s	3339	43302	11644	5811	3177	71	52	1069	13

Source: The OFDA/CRED International Disaster Database by [11].

In Nigeria, Nkeki et al., [12] reported a far reaching obliterating flood catastrophe that hit the nation in 2012 cutting crosswise over significant urban communities in around 14 expresses that fringes the Niger-Benue River. The most noticeably badly influenced states are Adamawa, Taraba, Benue, Kogi and Anambra in the east-focal piece of the nation. This flood episode has been portrayed as the most destroying since the most recent 40 years [13]. According to the study, the flood submerged houses, disjoined transportation courses all through the influenced regions. Generally speaking, an expected 1.3 million individuals were dislodged and around 431 individuals lost their lives. In addition, more than 1525 square kilometers of farmland were decimated [13]

In 2018, two days of episodic rainstorm occurred on 18 April, and 5 May, 2018 and left a trail of sorrow in Taraba State. In Taraba State University, over 40% of the buildings were destroyed including the Vice Chancellors office in addition to 10 electric poles and two high tension poles. In Jalingo town, a woman, Mrs. Henrietta Anthony reported that three of her cousins were killed when a mast belonging to a telecommunications company fell on them during the rainstorm [14]. In the wake of the rains which was accompanied by heavy eastern winds, were fallen trees, damaged roofs and fallen poles in Jalingo and Wukari. Dr Dashe Dasogot, Chairman Medical Advisory Committee of the Taraba Specialist Hospital, Jalingo, confirming the report as indicated by Viashima [15] in Sunnewspaper of the 5 May, said that five corpses were brought into the hospital morgue after the rainstorm. *"Four of the dead were from a GLO mast that fell opposite the gate of our hospital"*. This study therefore is aimed at assessing the weather pattern of the rainstorm, the health and infrastructural damages incurred and the cost implication of the

rainstorm. It is also important to know the perceived human-related factors that are aggravating the effects of natural disaster in the region in a bid to make suggestions to the policy makers that can help them make laws that will protect the environment and make future occurrences of this type of episodic event to have less effect if possible as resilience and coping with the vagaries of weather is based on timely information and sustainable green infrastructures.

Materials and Methodology

Study Area:

Jalingo is roughly located between latitudes 8°47' to 9°01'N and longitudes 11°09' to 11°30'E. It is bounded to the North by Lau Local Government Area, toward the East by Yorro Local Government Area, toward the south and West by Ardo Kola Local Government Area. It has a complete land territory of around 195 km^2. Jalingo LGA has a populace of 139,845 individuals according to the 2006 populace enumeration, with a growth rate of 3% [16]. However, it has a projected population of 205,367 in 2019. The relief of Jalingo LGA comprises of undulating plain scattered with mountain ranges. Between Kwaji-Mika toward the east and Kona toward the west, extending to Kassa-Gongon toward the south exist this reduced massif of shake outcrops. The mountain ranges keep undulating from Kona territory through the fringe between Jalingo and Lau LGAs down to Yorro and Ardo Kola LGAs in a round structure to Gongon region, in this manner given periscope semi-circle shape that is practically similar to a shield to Jalingo town. Valleys of the waterways are dabbed with bull bow lakes which are as consequences of depositional exercises.

Jalingo LGA has a tropical climate characterized by all around stamped wet and dry season. The wet season as a rule starts around April and finishes in October. The dry season starts in November and finishes in March. The dry season is described by the pervasiveness of the upper east exchange twists famously known as the harmattan wind which is typically dry and dusty. Jalingo has a mean yearly precipitation of about1, 200mm and yearly mean temperature of about 29°C. Relative humidity runs between 60-70percent amid the wet season to around 35 – 45 percent in the dry season.

Wukari is the central command of Wukari Local Government Area of Taraba State. It is situated between scope 7°51'N to 7°85'N and longitude 9°46'E to 9°78'E of the Greenwich meridian.

Wukari Local Government territory is arranged in the southern piece of Taraba State. It is around two hundred kilometers from Jalingo, the state capital. The Local Government is limited by Plateau State in the North, Benue State in the Southwest, Northeast by Karim Lamido, Bali, and Takum Local Government Area (LGA). It has a territory of around 4308 km2 (1663 sq mi).As indicated by Oyatayo et al. [17] Wukari LGA covers a region of around 6500 sq. Km.

Wukari is portrayed by a tropical mainland atmosphere. As indicated by Koppen's atmosphere arrangement plot, the atmosphere of the examination zone compares to the Aw sort of atmosphere which is portrayed by stamped particular wet and dry season. The mean yearly precipitation esteem ranges from 1000 - 1500 mm. The disconnected of the sprinkling season is as a rule around April while the balance time frame is October. This implies the stormy season ordinarily goes on for seven months and around five months of dryness from November to March [17]

The mean most extreme temperature is being experienced around April at about 40˚C while the mean least temperature happens between the time of December and February at about 20˚C. Relative moistness additionally displays transient fluctuation. It is higher amid the night hours in the blustery season than amid the day hours in the dry season individually. By area, the atmosphere of the territory is being impacted by the commonness of two restricting air masses, the tropical sea air mass (MT, south westerly's exchange) and the tropical mainland air mass (CT, north easterlies exchange). The tropical mainland air mass (CT) is a dry air that blows over the Sahara desert toward the West African district. This air mass is usually connected with cool, dry, and dusty condition. The tropical sea air mass (MT) is described with warm, sodden air from the 22 Atlantic Ocean south of Nigeria. This air mass is in charge of the Intertropical convergence zone (ITCZ).

Methods: The data for the study was collected from primary and secondary sources. The primary source was through questionnaires and interviews while the secondary data was collected from different sources. The weather records for the two days were obtained from the Meteorological Observatory of the Department of Geography, Taraba State University. Others were from published news in some Nigerian media companies that covered the event as well as the Governmental Hospitals in the area. A total of 60 copies of well-structured open and close ended questionnaires was administered, 30 in Jalingo and 30 in Wukari. The sample population

comprised those who had been affected directly or indirectly by the rainstorm events. The interview method employed for victims who could not read, speak and write in English language and were assisted in Hausa language. Collected data were analyzed using simple descriptive statistics and presented in tables and cartographic charts.

RESULTS AND DISCUSSION

Weather Pattern on 18 April and 5 May, 2018.

Table 3 shows the weather pattern on the days the storms occurred. The sunshine duration of 11 hours was sufficient enough to give rise to the high temperature of 39°C and 37°C in Jalingo on these days. The high temperature gave rise to the high evaporation. Moderate to high relative humidity of 62% and 89% was recorded. The recorded rainfall of 29mm and 28mm in Jalingo on 18 April and 5May show that very little amount was captured. This is due to the strong wind that accompanied the rains. The wind direction was South South-Westerly was moisture laden with the wind speed of 327 m/s (635.64 knots) and 281 m/s (546.22 knots) in Jalingo indicated the presence of a strong wind which resulted in the damages experienced in the two locations. As indicated by Areola et al., [18] wind having 6 knots is a strong breeze which makes large branches to be in motion with whistling heard in telegraph wire. The high wind speed was responsible for the damage of roofs of buildings and the rain shows evidence of a torrential storm, a characteristic of the tropical regions of the world.

Table 3: The weather Elements in Jalingo LGA on the 18th April and 5th May, 2018.

s/no	Weather variables	Value on 18th April	Value on the 5th may
1	Temperature (Max/Min)	39°C/23°C	37°C/22°C
2	Sunshine hours	11.0 hours	11.0 hours
3	Relative humidity	62%	89%
4	Wind direction	SSW	SW

5	Wind speed	327 m/s	281 m/s
6	Rainfall	29mm	28mm

Source: Department of Geography Weather observatory.

Table 4: The localities affected by rainstorm of 18 April and 5 May, 2018 in Jalingo

S/no	Name of locality	No. of Human Lives Lost	Items destroyed
1	Angwan Specialist Hospital	5 deaths were recorded.	Glo mask and structure of a building.
2	Taraba State University Jalingo.	Nil	40 percent of the structures of the building roofs were blown off.
3	TTV/NTA	Nil	Roofs blown off, Furniture and electronics affected.
4	Kasuwan kofai	Nil	1 Church structure and the roof.
5	Government model Sec. School Jalingo	Nil	3 Roofs blown off
6	Angwan kassa	Nil	8 Roofs partially blown off
7	Angwan Nasarawo	Nil	7 roofs blown off
8	Tecnobat Quarters	Nil	8 roofs blown off
9	University Gate 4	Nil	2 roofs blown off
10	Abuja phase 1	Nil	Fence fell off
11	NYSC Camp.	Nil	4 roofs blown off

Source: Field survey, 2018.

Table 4 shows the locations (angwan in Hausa), numbers of lives lost and the damages to buildings and infrastructures (Fig 4-10) which corroborates the newspaper reports and that of the medical director of the Taraba State Government Specialist Hospital.

Fig. 4: Nigeria Television Authority (NTA) Jalingo Office affected by the 5th May, 2018 Rain Storm.

Fig. 5: National Youth Service Corps Camp Jalingo affected by the 5th May, 2018 Rain Storm.

Fig. 6: Government Model Day Secondary School Jalingo Class Room affected by the 5th May, 2018 Rainstorm.

Fig. 7: Government Science Secondary School Jalingo ICT laboratory affected by the 18th May, 2018 rainstorm.

Fig. 8: Havoc caused by windstorm at NCCF Family House Donga Road Jalingo

Fig. 9: Lecture Hall at Taraba State University (TSU); The Vice Chancellor shows the extent of Damage to the Visitor of the University, the Governor of the state.

Fig. 10: Damages done in Wukari

Table 5: The localities affected by Rainstorm of 18 April and 5 May, 2018 in Wukari

S/no	Name of locality	No. of Human Lives Lost	Items destroyed
1	Old BB Bread	Nil	5 roofs blown off
2	Angwan Puje	Nil	7 roofs blown off
3	Agwan Hospital	Nil	14 roofs blown off
4	Angwan yakasin	13persons were injured	17 roofs blown off
5	Best Albino junction	Nil	4 roofs partially blown off
6	Angwan sarki	Nil	12 blown off

Source: Field survey, 2018

Table 5 shows the major affected locations in Wukari and the extent of damages. Several building roofs were badly damaged while 13 people sustained injuries from the episodic rainstorm event. According to the assessment conducted on the negative impacts of extreme weather events on human health in Wukari, the result shows that about 5 people were carried to the general hospital in Wukari to undertake different treatments ranging from cold and external injuries. However, several other people numbering about eight (8) especially young children, the aged and disabled persons were affected by the horrible weather events and were treated at home because their injuries were not very severe.

In both Jalingo and Wukari, a total of seventeen (17) communities were seriously affected by a very strong rainstorm on 18th April and 5th May, 2018 alone. Jalingo town was worse hit with five (5) live lost as victims, while Wukari recorded four injuries on the 18th April besides the nine (9) recorded on the 5th May 2018. In the affected communities, roofs of the affected houses

were either completely or partially blown off with several household items destroyed such as mattresses, pillows, clothes, electronics, handsets, wall clocks, carpets/rugs, electrical gadgets, foodstuffs, crops, domestic animals, documents and so on (table 4 and 5). [19] reiterated that rainstorms and flooding in Jalingo have made the area one of the most vulnerable cities in Nigeria in the recent past not only because the number of such incidents has increased in the last few years, but also because the severity has translated into extensive damage to properties and livelihoods of the people. Electronics, mattresses and rugs were destroyed. To buttress further, on the 4th of August 2018, 22 youth corps members serving in the Taraba state were on a picnic in the River Mayo-Selbe, in the Gashaka LGA and while they were swimming in the river, there was a sudden upsurge in the volume of water which swept them away. "Nine of them drowned while others managed to escape [20]

Ejiofor [21] stated that windstorms occur all over Nigeria especially in the North periodically causing ecological disasters of catastrophic proportion as buildings are usually destroyed, lives lost, farmlands and produce damaged and many people rendered homeless. Other localities affected by the rainstorm on the said day are rural with few houses and very low population. This made the number of victims to be very low. This scenario eventually turned the victims into environmental refugees as some of them had to squat with relations and neighbors' for days or weeks (table 6).

Table 6: Days spent outside their homes by victims of rainstorm of 18th April and 5th May, 2018

Days	Frequency	% of frequency
1-3	62	62.0
4-10	25	25.0
11-15	3	3.0
16-20	6	6.0
21-30	4	4.0
31-35	Nil	0
	100	**100**

Source: Field survey, 2018

Whenever roofs of houses are blown off, the victims are vulnerable to physical injuries and other health issues such as cold, catarrh, pneumonia and malaria fever due to exposure and other environmental problems. Also, the socio – economic life of the victims are affected as the victims and / or their relations rally round to see that the blown – off roofs are put in place

thereby increasing their economic hardship. In most cases, the roofing materials (zincs, nails and planks) were badly damaged that they had to be completely replaced thereby leading to high cost of re – roofing. At the same time, because of the rush to buy the roofing sheets, the price was increased with about ₦2000.00 (~ 6 US Dollars)

Cost of Financing Infrastructure Destroyed 18th April and 5th May, 2018 in Jalingo.

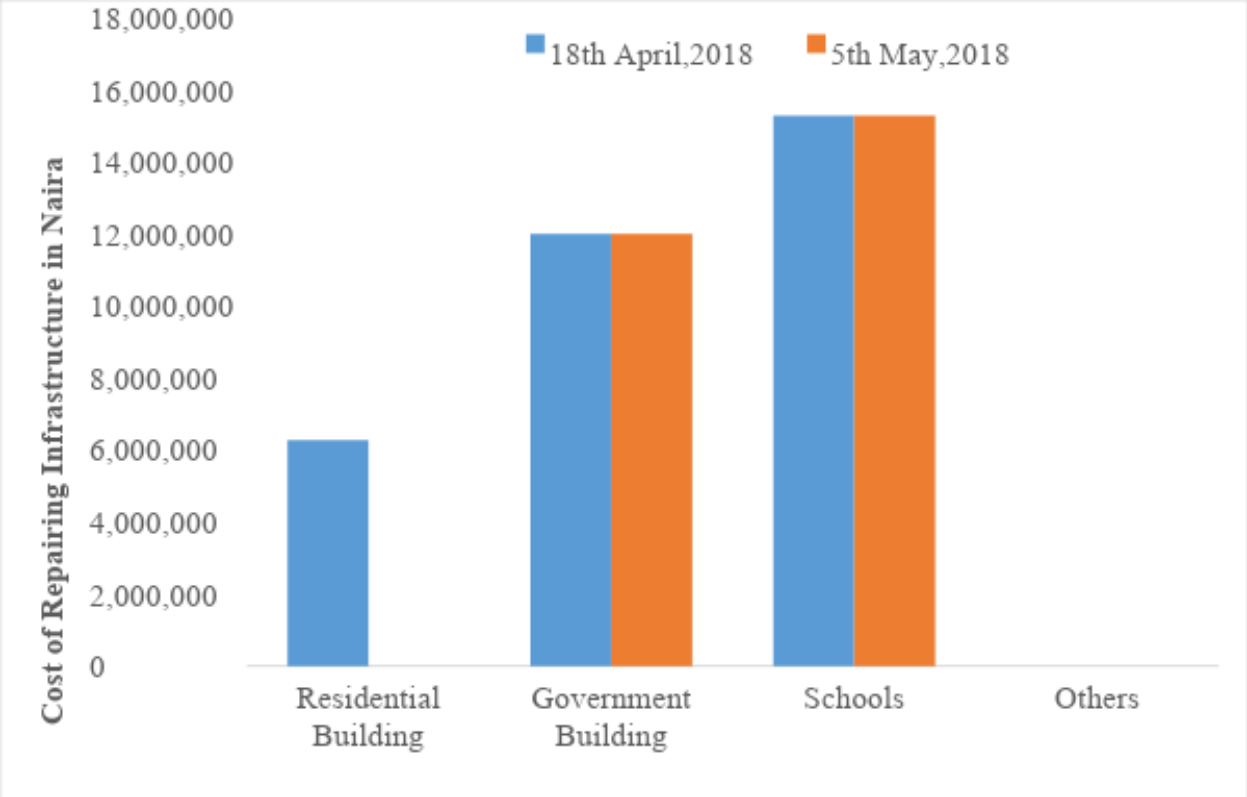

Fig. 11: The cost of financing the infrastructure destroyed on the 18th April/5th May in Jalingo.

Source: Author's Analysis 2018

The cost of replacing the blown off roofs varied due to the location either urban or rural, severity, type of materials to be used and size of building among others. The cost of fixing the affected infrastructures range from ₦6,275,000 for private buildings, ₦12,000,000 for Government owned establishments (buildings) and ₦15,275,000 for School buildings each in Jalingo. These stated amounts are also needed for fix the second storm destruction on the 5th May

thereby doubling the cost. This is apart from the lives that were lost and amount paid for treatment for those who sustained one form of injuries and the other.

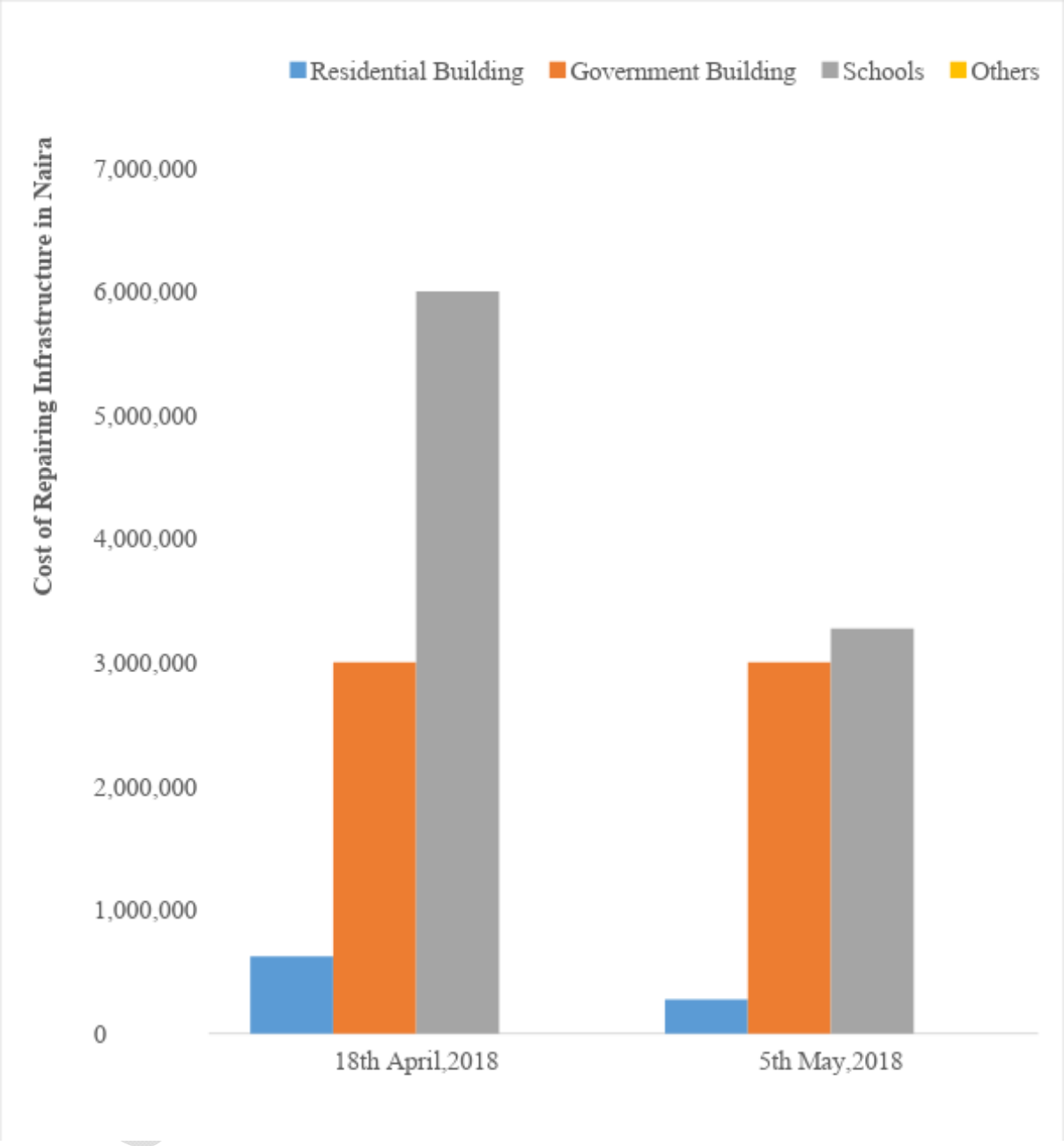

Fig. 12: The cost of financing the infrastructure destroyed on 18th April and 5th May in Wukari.

Source: Author's Analysis 2018

Fig 12 shows the cost of fixing damaged infrastructures in Wukari. The figure 12 indicated ₦6,250,000, ₦3,000,000, and ₦6,000,000 respectively are needed for repairs in residential buildings, government buildings and schools destroyed on the day of the first rainstorm, 18th April, 2018 while ₦270,000, ₦3,000,000 and ₦3,275,000 respectively are needed for repairs in residential buildings, government buildings and schools destroyed on the day of the first rainstorm, 5th May, 2018. On a comparative basis, the total amount of money needed to fix the destroyed infrastructures is presented in Table 7.

Table 7: Comparison Between Amount to Fix Infrastructure in Jalingo and Wakari

S/N	Towns	Residential Building (₦)	Govt. Building (₦)	Schools (₦)
1	Jalingo	6,275,000	24,000,000	30,000,000
2	Wukari	9,000,000	6,000,000	9,275,000

Source: Author's Analysis 2018

The storm affected Jalingo more than Wukari as shown by the graph above and schools were much more affected with the estimated cost of ₦30,000,000 followed by government buildings which needs about 24,000, 000 and residential building with estimated cost of ₦ 6,275,000. The cost for fixing the infrastructures damaged in Wukari in comparison to Jalingo are ₦ 9,000,000 for residential buildings, ₦ 6,000,000 for government buildings and ₦ 9,275,000 for schools respectively. Since infrastructure plays a key role development; the above mention infrastructures are critical to the economy of state, thus, money that would have been channeled to build new and modern critical infrastructures would be diverted to rebuild the old ones there having negative impact on socio-economic progress.

Perceived Activities Enhancing extreme Weather Events in Taraba State.

According to reports from hospitals in Jalingo, Taraba State Environmental Protection Agency and those in Wukari environs, the recent episodic weather event of 18th April, and 5th May, 2018 were linked to the following factors; Massive deforestation in some parts of the state, especially the indiscriminate felling of trees (Madrid) for export in Bali and Gashaka local government areas, High exploitation of forest resources for firewood, charcoal and other domestic use such as fencing, roofing, furniture, Lack of wind brackets, rising temperatures as a result of high rate of emission of carbon dioxide from human activities. The argument is that trees which serves as wind breakers are being cut down indiscriminately without replacement.

Conclusion

The study examined the nature and effects of episodic rainstorm of 18th April and 5th May 2018 in Jalingo and Wukari both in Taraba state. The study shows that the events were characterized by high wind speed of over 600 knots and had devastating effects life and properties. The effects was more in the state capital, Jalingo were 5 lives was lost added to damages to several buildings both individual and institutional than in Wukari that recorded about 13 injured persons in addition to the havoc on infrastructures. The estimated cost of fixing damaged infrastructures ranges from ₦ 6,000,000 to ₦30,000,000.

Recommendation

It is clear that rainstorm is a hazard and it's risky. In order to mitigate the effect of rainstorm in Jalingo and Wukari, which has the greatest imprint of human population and environmental degradation there should be building code should be strictly adhered to, likewise regular maintenance of buildings. However, governments and individuals should engage in tree planting which should be encouraged at all levels. It was observed that most buildings that had trees located close to them were saved from the effects of the 18th April and 5th May episodic rainstorm event in Taraba State. Similarly, indigenes and non-indigenes should ensure the enforcement of the law guiding indiscriminate cutting down of trees across the state especially in Bali and Gashaka where there is high exploitation of madrid trees for exportation by Chinese nationals. At least two trees should be planted at the location where a tree is to be cut down. There should be a policy aimed at replanting of trees in all households to replenish the massive ongoing deforestation in the state. Awareness among the citizens should be raised on the need for yearly routine check on the roofs of their buildings by building experts to repair/nail loosed parts

that the windstorms can easily affect before the beginning of the rainfall onset which begins in March/April each year.

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