

THE IMPACT OF THE EPISODIC RAINSTORM EVENT OF 18TH APRIL AND 5TH MAY, 2018 IN TARABA STATE, 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

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.

However, anomalous hydrometeorological events, which greatly deviate from the norm are widely regarded as natural hazards [2]. 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

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

38 According to [3] with the exception of three years (1952, 1958 and 2009) all other years have
39 one form of great natural disaster or the other. Of the four catastrophes recoded, meteorological
40 (34%) topped the list followed by geophysical (32%), hydrological (23%) and climatological
41 (11%). Climate and water related 68%, while geophysical (32%). Geophysical, meteorological
42 and hydrological disasters are major occurrence since the 1950s while climatological disasters
43 became a major feature in 1971 and since then it has been re-occurring [3]

44 However, [3] reported that between 1950-2010, great natural disasters destroyed property worth
45 US\$2.1tri (N315tri) globally, i.e. average of US\$35m (N5.2bn) annually. Of this amount, 40%
46 was lost to meteorological disasters while 29% (geophysical), 25% (hydrological) and 6%
47 (climatological). Two groups: climate-water related disasters accounted for 71% of the total
48 destruction cost while geophysical events were 29%. Total number of deaths recorded within the
49 study period was 2,360,000 [3]. Out of these deaths, geophysical disasters accounted for 56%,
50 while meteorological (33%), hydrological (6%) and climatological (5%). The climate-water
51 related disasters caused 44% of the deaths while geophysical was 56%. It is important to note
52 that while the meteorological disasters destroyed more property, geophysical disasters claimed
53 more lives [3]

54 It has been noted that natural disasters and the effects of climate change pose a serious threat to
55 the sustainable development of many economies of the world [4]. As reported by Thomas et al.,
56 [5] and Asian Development Bank [8], in Asia and the Pacific region for example somewhere in
57 the range of 2007 and 2016, natural disaster in the area executed in excess of 300,000 individuals
58 and affected 1.7 billion more. Direct physical losses are evaluated at \$487 billion [6]

59 Catastrophic misfortunes are expanding and may even surpass economic development except if
60 nations make a prompt move to stop dangerous climate change. In recent time in Africa, [7]
61 reported that in Zimbabwe, flooding brought about by the Tropical Cyclone Idai climate
62 framework keeps on causing monstrous obliteration, with substantial downpours revealed in
63 Manicaland and Masvingo areas of the country. [7] indicated that 82 deaths have been recorded
64 with 200 people reported injured and over 200 reported missing in Manicaland and Masvingo
65 provinces. Chimanimani and Chipinge remain the hardest-hit districts and crops and livestock

66 have been destroyed including power supply and communication which was disrupted in affected
67 areas [7].

68 **In the month of March 2019 in Malawi**, in excess of 922,900 individuals had been affected by a
69 similar violent wind Idai as the Government has reported 56 deaths and 577 injured. In excess of
70 82,700 individuals are evaluated to be dislodged, while quick needs appraisals continues in the
71 hardest-hit regions to recheck initial assessments and decide the quantity of individuals needing
72 prompt philanthropic help. Satellite imagery shows Chikawa district as particularly affected [8].

73 **Similarly, in the month of March 2019 in Mozambique**, the official loss of life rose to 468
74 individuals on 26 March, according to the Government and about 91,000 houses were
75 distinguished as destroyed, harmed or overflowed up from 72,260 announced by the experts on
76 25 March. On 27 March, the Government affirmed five instances of cholera outbreak at the
77 Munhava health centre in the city of Beira and around 2,500 instances of intense watery
78 diarrhoea in Beira region as a result. A humanitarian evaluation group recognized almost 1,500
79 individuals unreached individuals needing support in Matarara in Chimoio area. Besides, in
80 excess of 92,000 houses were recognized as completely pulverized (50,772), somewhat
81 demolished (25,769) or overwhelmed (15,784) starting at 27 March; an expansion of more than
82 1,300 from the earlier day [7]. Deaths due to natural catastrophes globally are increasing [9].

83 In Nigeria, [10] reported a far reaching obliterating flood catastrophe that hit the nation in 2012
84 cutting crosswise over significant urban communities in around 14 expresses that fringes the
85 Niger-Benue River. The most noticeably badly influenced states are Adamawa, Taraba, Benue,
86 Kogi and Anambra in the east-focal piece of the nation. This flood episode has been portrayed as
87 the most destroying since the most recent 40 years [11]. According to the study, the flood
88 submerged houses, disjoined transportation courses all through the influenced regions. Generally
89 speaking, an expected 1.3 million individuals were dislodged and around 431 individuals lost
90 their lives. In addition, more than 1525 square kilometers of farmland were decimated [11]

91 In 2018, two days of episodic rainstorm occurred on 18 April, and 5 May, 2018 and left a trail of
92 sorrow in Taraba State. In Taraba State University, over 40% of the buildings were destroyed
93 including the Vice Chancellors office in addition to 10 electric poles and two high tension poles.
94 In Jalingo town, a woman, Mrs. Henrietta Anthony reported that three of her cousins were killed
95 when a mast belonging to a telecommunications company fell on them during the rainstorm [12].

96 In the wake of the rains which was accompanied by heavy eastern winds, were fallen trees,
97 damaged roofs and fallen poles in Jalingo and Wukari. Dr Dashe Dasogot, Chairman Medical
98 Advisory Committee of the Taraba Specialist Hospital, Jalingo, confirming the report as
99 indicated by [13] on the 5 May, said that five corpses were brought into the hospital morgue after
100 the rainstorm. “*Four of the dead were from a GLO mast that fell opposite the gate of our*
101 *hospital*”. This study therefore is aimed at assessing the weather pattern of the rainstorm, the
102 health and infrastructural damages incurred and the cost implication of the rainstorm. It is also
103 important to know the perceived human-related factors that are aggravating the effects of natural
104 disaster in the region in a bid to make suggestions to the policy makers that can help them make
105 laws that will protect the environment and make future occurrences of this type of episodic event
106 to have less effect if possible as resilience and coping with the vagaries of weather is based on
107 timely information and sustainable green infrastructures.

108 **Materials and Methodology**

109 **Study Area:**

110 Jalingo is roughly located between latitudes 8°47’ to 9°01’N and longitudes
111 11°09’ to 11°30’E. It is bounded to the North by Lau Local Government Area, toward the East
112 by Yorro Local Government Area, toward the south and West by Ardo Kola Local Government
113 Area. It has a complete land territory of around 195 km². Jalingo LGA has a populace of 139,845
114 individuals according to the 2006 populace enumeration, with a growth rate of 3% [14].
115 However, it has a projected population of 205,367 in 2019. The relief of Jalingo LGA comprises
116 of undulating plain scattered with mountain ranges. Between Kwaji-Mika toward the east and
117 Kona toward the west, extending to Kassa-Gongon toward the south exist this reduced massif of
118 shake outcrops. The mountain ranges keep undulating from Kona territory through the fringe
119 between Jalingo and Lau LGAs down to Yorro and Ardo Kola LGAs in a round structure to
120 Gongon region, in this manner given periscope semi-circle shape that is practically similar to a
121 shield to Jalingo town. Valleys of the waterways are dabbled with bull bow lakes which are as
122 consequences of depositional exercises.

123 Jalingo LGA has a tropical climate characterized by all around stamped wet and dry season. The
124 wet season as a rule starts around April and finishes in October. The dry season starts in
125 November and finishes in March. The dry season is described by the pervasiveness of the upper

126 east exchange twists famously known as the harmattan wind which is typically dry and dusty.
127 Jalingo has a mean yearly precipitation of about 1, 200mm and yearly mean temperature of about
128 29°C. Relative humidity runs between 60-70percent amid the wet season to around 35 – 45
129 percent in the dry season.

130 Wukari is the central command of Wukari Local Government Area of Taraba State. It is situated
131 between scope 7°51'N to 7°85'N and longitude 9°46'E to 9°78'E of the Greenwich meridian.
132 Wukari Local Government territory is arranged in the southern piece of Taraba State. It is around
133 two hundred kilometers from Jalingo, the state capital. The Local Government is limited by
134 Plateau State in the North, Benue State in the Southwest, Northeast by Karim Lamido, Bali, and
135 Takum Local Government Area (LGA). It has a territory of around 4308 km² (1663 sq mi).As
136 indicated by [15] Wukari LGA covers a region of around 6500 sq. Km.

137 Wukari is portrayed by a tropical mainland atmosphere. As indicated by Koppen's atmosphere
138 arrangement plot, the atmosphere of the examination zone compares to the Aw sort of
139 atmosphere which is portrayed by stamped particular wet and dry season. The mean yearly
140 precipitation esteem ranges from 1000 - 1500 mm. The disconnected of the sprinkling season is
141 as a rule around April while the balance time frame is October. This implies the stormy season
142 ordinarily goes on for seven months and around five months of dryness from November to
143 March [15]

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

155 **Methods:** The data for the study was collected from primary and secondary sources. The
156 primary source was through questionnaires and interviews while the secondary data was
157 collected from different sources. The weather records for the two days were obtained from the
158 Meteorological Observatory of the Department of Geography, Taraba State University. Others
159 were from published news in some Nigerian media companies that covered the event as well as
160 the Governmental Hospitals in the area. A total of 60 copies of well-structured open and close
161 ended questionnaires was administered, 30 in Jalingo and 30 in Wukari. The sample population
162 comprised those who had been affected directly or indirectly by the rainstorm events. The
163 interview method employed for victims who could not read, speak and write in English language
164 and were assisted in Hausa language. Collected data were analyzed using simple descriptive
165 statistics and presented in tables and cartographic charts.

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169 **RESULTS AND DISCUSSION**

170 **Weather Pattern on 18 April and 5 May, 2018.**

171 **Table 1** shows the weather pattern on the days the storms occurred. The sunshine duration of 11
172 hours was sufficient enough to give rise to the high temperature of 39°C and 37°C in Jalingo on
173 these days. The high temperature gave rise to the high evaporation. Moderate to high relative
174 humidity of 62% and 89% was recorded. The recorded rainfall of 29mm and 28mm in Jalingo
175 on 18 April and 5 May show that very little amount was captured. This is due to the strong wind
176 that accompanied the rains. The wind direction was South South-Westerly was moisture laden
177 with the wind speed of 327 m/s (635.64 knots) and 281 m/s (546.22 knots) in Jalingo indicated
178 the presence of a strong wind which resulted in the damages experienced in the two locations.
179 As indicated by Areola et al., [16] wind having 6 knots is a strong breeze which makes large
180 branches to be in motion with whistling heard in telegraph wire. The high wind speed was
181 responsible for the damage of roofs of buildings and the rain shows evidence of a torrential
182 storm, a characteristic of the tropical regions of the world.

183 **Table 1:** The weather Elements in Jalingo LGA on the 18th April and 5th May, 2018.

S/N	Weather variables	Value on 18 th April	Value on the 5 th 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

184 **Source:** Department of Geography Weather observatory.

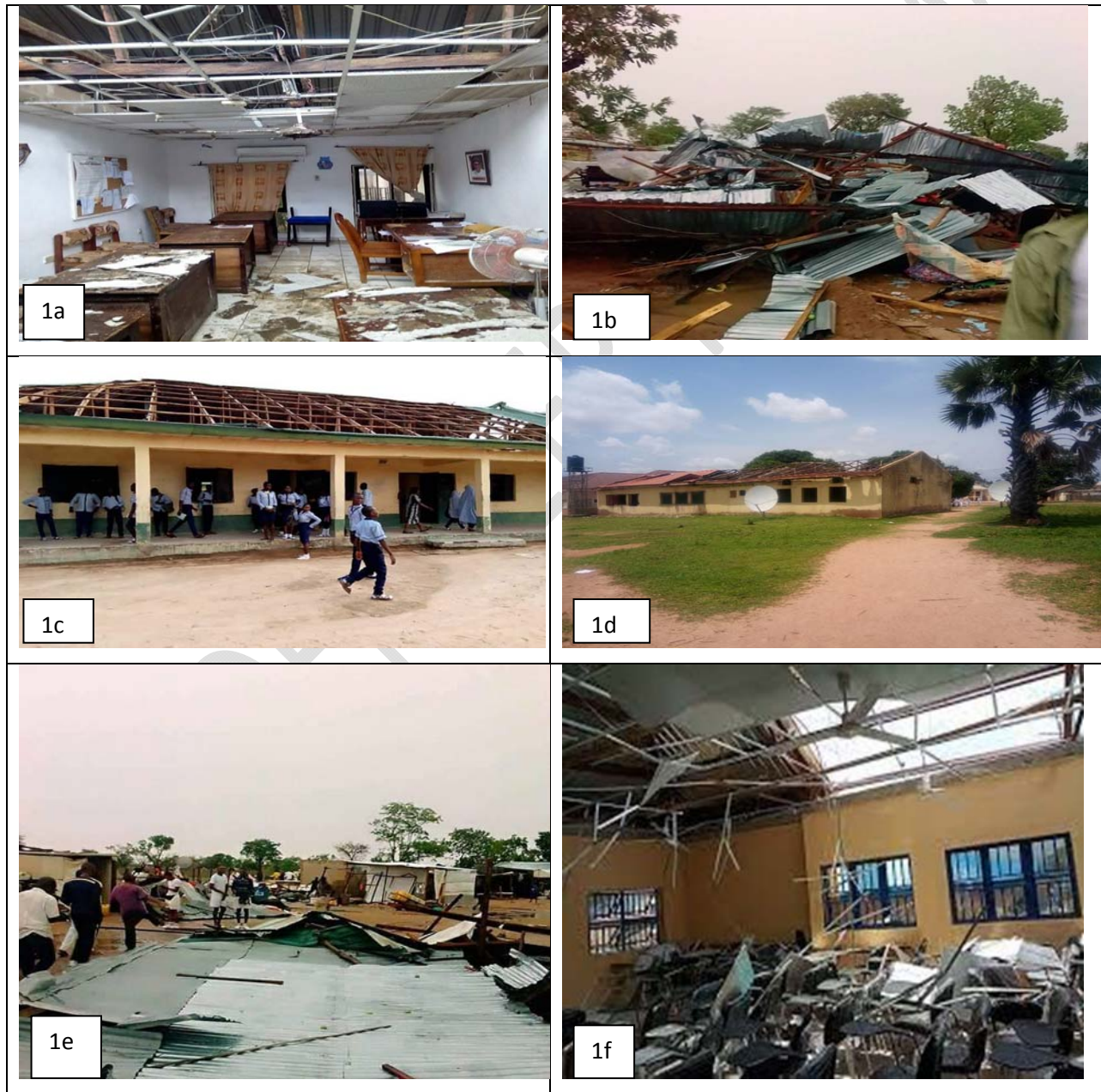
185 **Table 2:** The localities affected by rainstorm of 18 April and 5 May, 2018 in Jalingo

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

186 Source: Field survey, 2018.

187 **Table 2** shows the locations (angwan in Hausa), numbers of lives lost and the damages to
 188 buildings and infrastructures (**Fig. 1a-h**) which corroborates the newspaper reports and that of the
 189 medical director of the Taraba State Government Specialist Hospital.





190 Fig. 1a-g showing Damages caused by Rainstorm on 5th May, 2018 in (1a) Nigeria Television
 191 Authority (NTA) Jalingo Office (1b) National Youth Service Corps Camp Jalingo (1c) Class
 192 room blocks of Government Model Day Secondary School Jalingo (1d) ICT laboratory at the
 193 Government Science Secondary School Jalingo (1e) NCCF Family House Donga Road Jalingo
 194 (1f) Lecture Hall at Taraba State University (TSU); (1g)The Vice Chancellor of TSU shows the
 195 extent of Damage to the Visitor of the University, the Governor of the state and (1h) Wukari
 196 town

197 **Table 3:** 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

198 Source: Field survey, 2018

199 **Table 3** shows the major affected locations in Wukari and the extent of damages. Several
 200 building roofs were badly damaged while 13 people sustained injuries from the episodic
 201 rainstorm event. According to the assessment conducted on the negative impacts of extreme
 202 weather events on human health in Wukari, the result shows that about 5 people were carried to
 203 the general hospital in Wukari to undertake different treatments ranging from cold and external
 204 injuries. However, several other people numbering about eight (8) especially young children, the

205 aged and disabled persons were affected by the horrible weather events and were treated at home
206 because their injuries were not very severe.

207 In both Jalingo and Wukari, a total of seventeen (17) communities were seriously affected by a
208 very strong rainstorm on 18th April and 5th May, 2018 alone. Jalingo town was worse hit with
209 five (5) live lost as victims, while Wukari recorded four injuries on the 18th April besides the
210 nine (9) recorded on the 5th May 2018. In the affected communities, roofs of the affected houses
211 were either completely or partially blown off with several household items destroyed such as
212 mattresses, pillows, clothes, electronics, handsets, wall clocks, carpets/rugs, electrical gadgets,
213 foodstuffs, crops, domestic animals, documents and so on (table 4 and 5). [17] reiterated that
214 rainstorms and flooding in Jalingo have made the area one of the most vulnerable cities in
215 Nigeria in the recent past not only because the number of such incidents has increased in the last
216 few years, but also because the severity has translated into extensive damage to properties and
217 livelihoods of the people. Electronics, mattresses and rugs were destroyed. To buttress further,
218 on the 4th of August 2018, 22 youth corps members serving in the Taraba state were on a picnic
219 in the River Mayo-Selbe, in the Gashaka LGA and while they were swimming in the river, there
220 was a sudden upsurge in the volume of water which swept them away. “Nine of them drowned
221 while others managed to escape [18]

222 Ejiofor [19] stated that windstorms occur all over Nigeria especially in the North periodically
223 causing ecological disasters of catastrophic proportion as buildings are usually destroyed, lives
224 lost, farmlands and produce damaged and many people rendered homeless. Other localities
225 affected by the rainstorm on the said day are rural with few houses and very low population.
226 This made the number of victims to be very low. This scenario eventually turned the victims into
227 environmental refugees as some of them had to squat with relations and neighbors’ for days or
228 weeks (table 4).

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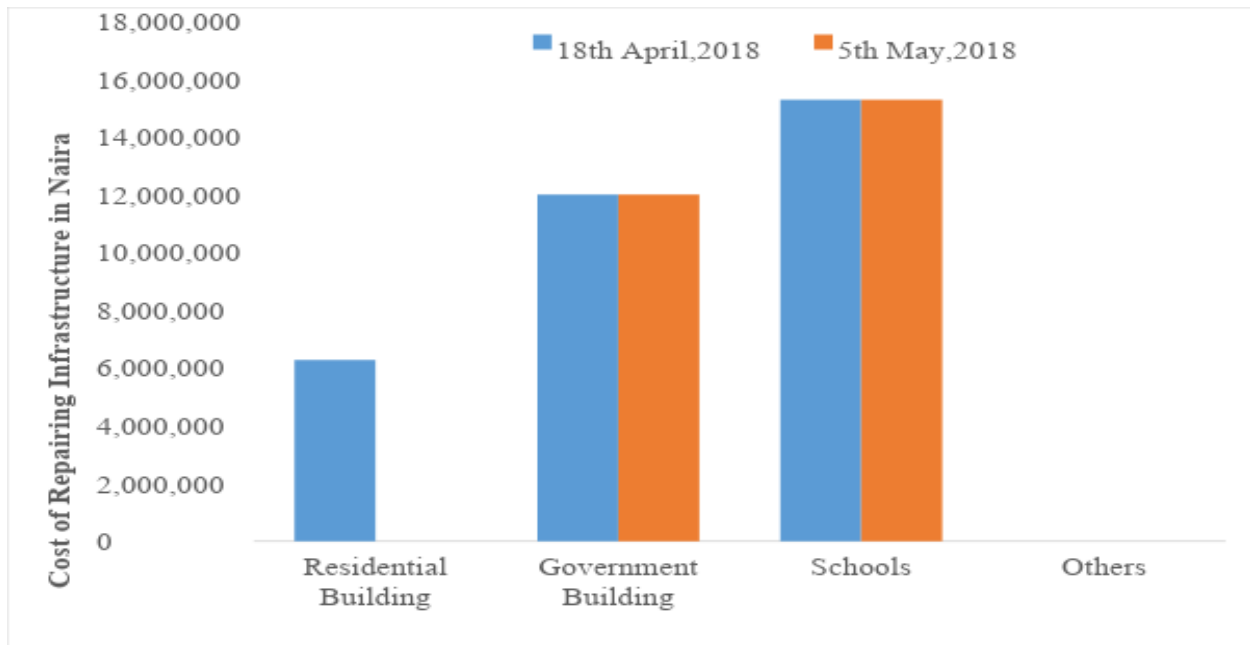
233 **Table 4: Days spent outside their homes by victims of rainstorm of 18th April and 5th May,**
 234 **2018**

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

235 **Source: Field survey, 2018**

236 Whenever roofs of houses are blown off, the victims are vulnerable to physical injuries and other
 237 health issues such as cold, catarrh, pneumonia and malaria fever due to exposure and other
 238 environmental problems. Also, the socio – economic life of the victims are affected as the
 239 victims and / or their relations rally round to see that the blown – off roofs are put in place
 240 thereby increasing their economic hardship. In most cases, the roofing materials (zincs, nails and
 241 planks) were badly damaged that they had to be completely replaced thereby leading to high cost
 242 of re – roofing. At the same time, because of the rush to buy the roofing sheets, the price was
 243 increased with about ₦2000.00 (~ 6 US Dollars)

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

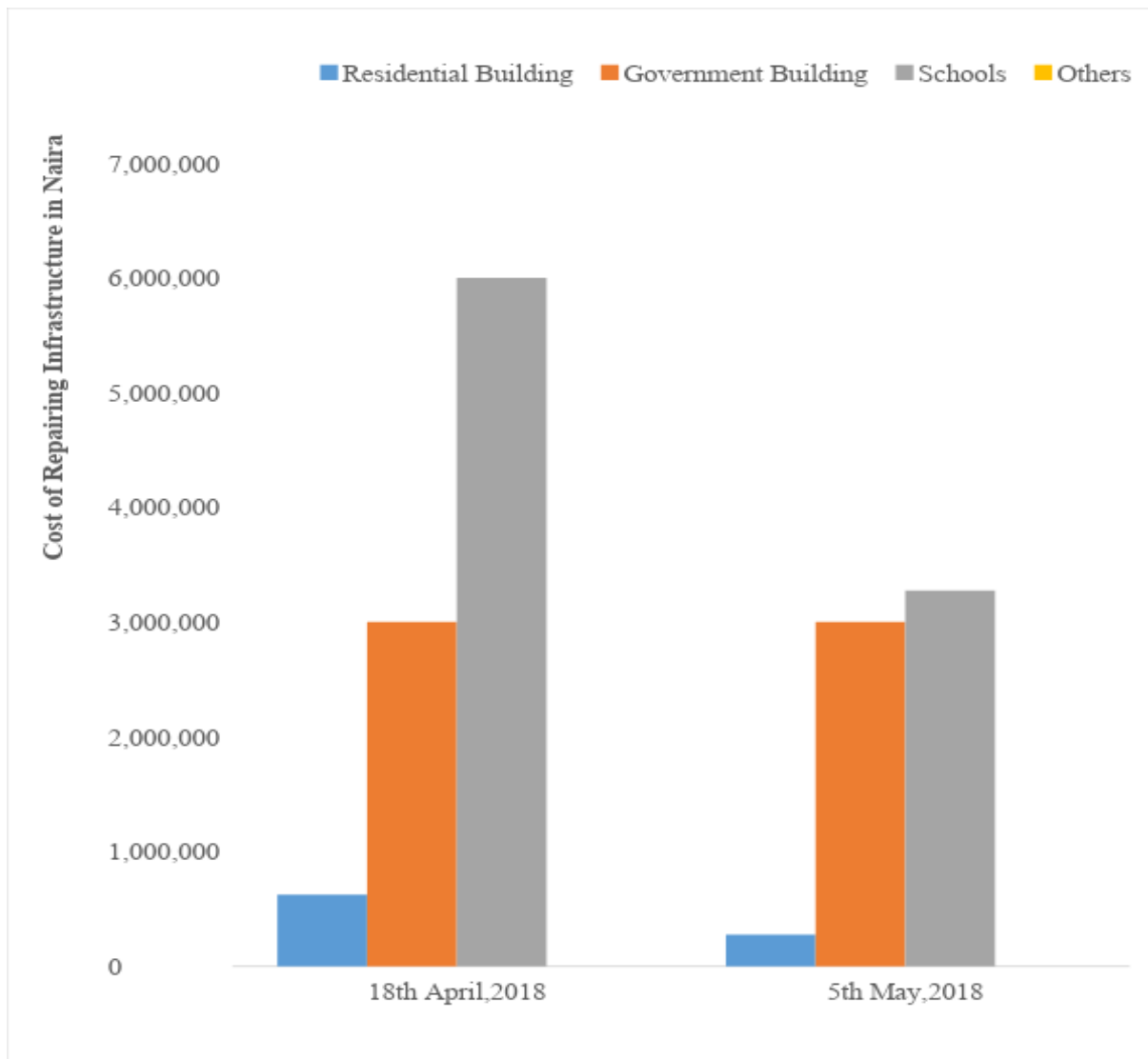


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246 **Fig. 2:** The cost of financing the infrastructure destroyed on the 18th April/5th May in Jalingo.

247 **Source:** Author's Analysis 2018

248 The cost of replacing the blown off roofs varied due to the location either urban or rural,
 249 severity, type of materials to be used and size of building among others. The cost of fixing the
 250 affected infrastructures range from ₦6,275,000 for private buildings, ₦12,000,000 for
 251 Government owned establishments (buildings) and ₦15,275,000 for School buildings each in
 252 Jalingo. These stated amounts are also needed for fix the second storm destruction on the 5th May
 253 thereby doubling the cost. This is apart from the lives that were lost and amount paid for
 254 treatment for those who sustained one form of injuries and the other.



255

256 **Fig. 3:** The cost of financing the infrastructure destroyed on 18th April and 5th May in
 257 **Wukari.**

258 **Source:** Author's Analysis 2018

259 **Fig. 3** shows the cost of fixing damaged infrastructures in Wukari. The **fig. 3** indicated
 260 ₦6,250,000, ₦3,000,000, and ₦6,000,000 respectively are needed for repairs in residential
 261 buildings, government buildings and schools destroyed on the day of the first rainstorm, 18th
 262 April, 2018 while ₦270,000, ₦3,000,000 and ₦3,275,000 respectively are needed for repairs in
 263 residential buildings, government buildings and schools destroyed on the day of the first
 264 rainstorm, 5th May, 2018. On a comparative basis, the total amount of money needed to fix the
 265 destroyed infrastructures is presented in **Table 5.**

266

267 **Table 5: 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

268 Source: Author's Analysis 2018

269

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

279

280 **Perceived Activities Enhancing extreme Weather Events in Taraba State.**

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

289 **Conclusion**

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

297 **Recommendation**

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

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