

# Lightning Mass Casualty Incident Killing Ten, Injuring Four, and Traumatizing an Entire Village

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**Abstract**—On 28 August 2020, the press reported ten boys killed by a lightning strike during a local football match between schools at a pitch near Odramacaku trading center, a small town near the border between Uganda and the Democratic Republic of Congo (DRC). When rain started, the children playing football took shelter under the overhang of a nearby thatched hut under construction, using the small, raised earth foundation as a bench. A single lightning strike killed nine children. A tenth boy died on the way to hospital. There were four survivors.

After fundraising, ACLENet sent a team to make a detailed investigation through interviews and site inspection in October, less than two months after the incident. No autopsies had been performed on the ten dead children. The four survivors sustained injuries, physical and psychological, many with potentially life-long medical aftereffects and disabilities. Additionally, the team found the press reports had distorted some facts. Some of the locals connected spiritual connotations to the incident. At the time of ACLENet's visit in October 2020, local officials and many of those interviewed expressed significant frustration with the government's lack of acknowledgment and response to the disaster despite the new district structure for disaster response initiated in response to the United Nations Sendai Framework for Disaster Risk Reduction to which Uganda is a signatory.

**Keywords**—lightning, lightning injury, school, lightning safety, lightning injury prevention, lightning risk assessment, Village, lightning in Arua, Uganda, lightning in Africa.

## I. INTRODUCTION

Near the end of August 2020, shocking news appeared in headlines in Uganda and internationally reporting that ten boys (ages 11-15) had been killed by a single lightning strike in far northwestern Uganda near Arua, a twelve-hour drive from Kampala, Uganda's capital [Fig 1]. The Arua regional office of the Uganda Police Force (UPF) took the lead on this incident, issuing a press statement naming the children who died and confirming the survivors [1].

After successful fundraising for an investigation and with co-operation from the UPF regional office, ACLENet dispatched a team to the incident in October 2020 with two main objectives:

- To reconstruct the lightning incident as much as possible through interviews, direct examination, and photographs.

- To establish and record injuries and health issues attributed to the lightning incident by survivors.

## II. SETTING

### A. Location

Abiria Primary School, attended by all fatally injured children, is in the remote countryside of Uganda called Ayivu (sub-county) and near the town of Odramacaku, on the border between Uganda and the Democratic Republic of Congo (DRC), near the city of Arua, in the west Nile region of Uganda. GPS coordinates of the lightning incident scene are 3.1151417, 30.8283933.

Ayivu is a typical African village, covered with lush vegetation, grass thatched huts, and small iron roofed houses spread across meandering hills and valleys. Travel from Kampala to Arua, the closest regional city, is a ten-hour drive on tarmac road plus an additional two hour/approximately 20km drive on a murrum road to reach Ayivu.



Fig. 1. Top - Map of Uganda showing Arua city and Kampala, the capital. Bottom - Route from Arua city to the scene of lightning incident

### *B. Story reconstructed from first responders, witnesses, and survivors narrations*

On the afternoon of Thursday, August 27<sup>th</sup>, 2020, children from two neighboring villages, Gbuluku and Nyaute, were engaged in a competitive game of football. This was on a small open field a few tens of square meters in size between a field of a few growing pine trees and a small hut that Mr. JN was building.

After it started drizzling, the game continued while some of the spectators and substitutes took shelter under the eaves of Mr JN's building (Fig 2). The majority of children playing football that afternoon went to school at nearby Abiria primary school. About an hour into the game, AE (16 year old male) asked his young brother to substitute for him. As he stood in front of his peers who were squatting on the veranda of Mr. JN's hut with his hand reaching out for his brother, lightning struck, leaving him shocked and confused.

Four boys were thrown about four feet in front of the veranda, piled together. The bodies of six others lay scattered nearby. Three surviving boys had been either squatting or seated near their colleagues who lay on the ground. AE and others ran to alert nearby homesteads, about 100 feet away, about the incident.

Mr. RA, a local leader, was among the first responders. He recalled that he found the bodies of the victims lying on the ground with their faces looking skywards. According to RA and other first responders, they administered first aid by moving the tongues of the victims out of their mouths to aid breathing. They recruited nearby motorcycle riders to help move these children to a nearby medical clinic in Odramacaku trading centre. They believed the children's hearts were beating at this time. At the clinic in Odramacaku, one boy was declared dead, and his body transferred back to his parents' home for burial.

A vehicle belonging to MS, an international non-governmental organization, helped transport nine others to Arua hospital, a drive of only about 20 kms, but requiring about 2 hours' time on a bad murrum road made worse during the rainy season with gullies and potholes of varying sizes. All nine were declared dead on arrival at Arua hospital. Their bodies were released to their families for burial. No autopsies were done for two reasons: there was no medicolegal question about the cause of death and hospitals in Uganda are not equipped with either skilled personnel nor equipment to perform autopsies. Only the names of the children were listed by the Arua regional hospital that pronounced the children dead.

### III. METHODOLOGY

First responder/witnesses were sought to give information helpful in reconstructing the incident. Survivors who could be traced from areas around or near Ayivu were gathered with the help of the UPF. Direct interviews were conducted for each survivor who was given a chance to recall the incident. Interviewer guided discussion was used to reconstruct the incident. Translation was done by one of the local police officers.



Fig. 2. Most of the children who were injured were sitting a small veranda around this unfinished hut, taking shelter from a drizzle. The top center point of the roof was not yet thatched, remaining open so that rain and sunlight could penetrate to the inside.

### *A. Institutional Review Board*

The institutional review process was not possible because of Covid-19 restrictions. The need to investigate this tragic incident came at a time when public offices were still closed to the public in Uganda because of the Covid-19 lockdown.

### *B. Instrument and Consent*

Mr. RE, a leader representing the local parish of Ayivu in the district council of Arua, was unanimously chosen to represent all parents in interactions with ACLENet team and signed the consent forms to authorize the interview and photograph the surviving children.

### *C. Study Team and Training*

The field study team was led by Richard Tushemereirwe and included George B. Bamu, Martin Omara, and Mary, a nurse from Kiryandongo hospital, herself a survivor of lightning in 2001. The team was briefed by their leader before the onset of the journey from Arua. The team was complemented by the regional UPF office in Arua city.

### *D. Study Subjects*

The ACLENet investigating team interviewed two groups of people. The first responder-witness group, the first people to come to the scene of lightning incident, was comprised of four witnesses. The second group contained the four survivors who had been at the scene playing football or watching.

### *E. Time period of the investigation and interviews*

The field visit to the lightning incident scene in October 2020 took three days. The first day was dedicated to orientation with the remaining two days for direct interviews.

### IV. RESULTS

#### *A. Reconstruction of the Injury Scene*

A small, unfinished, uninhabited grass thatched hut lies on the edge of the scene of the deadly lightning incident that claimed the lives of the ten children in Ayivu near Odramacaku town (Fig. 2). As the drizzle started, several children took shelter, using the 'veranda', a raised pounded soil foundation surrounding and protruding from the base a



Fig. 3. A bicycle stands in the center of the field which was being used for the football game during which lightning struck. Mr JN's hut is to the left.

foot or more, as a makeshift bench. The football players ignored the rain and continued playing on the field (Fig. 3).

### B. Witness Stories

1. MM, 42 years. MM is the parent of two sons, AE, 16 years - grade 5, one of the survivors, and AS, 14 years – grade 4, one of those who died.

AE told her mother that his younger brother, AS, had been struck by lightning. She immediately ran to the scene. She found four of the victims were piled near a hut besides the football playground, three facing in one direction, and another lying across their feet, with six more scattered a few meters away with their bodies facing upwards.

AE sustained burns on his back, sides of his trunk, chest, and abdomen. When MM reached the scene, she made an alarm and immediately started to remove the tongues (clear the airways) of the five children she thought were still alive, believing the others to already be dead. As four more responders joined her in the rescue, and after starting first aid on the five, she decided to run to inform her relatives of the disaster. She did not learn how the victims were taken to the nearest clinic until much later from those who transported them there.

2. BM, 44 years. BM is the mother of one of the dead boys, GB, 16 years, who was in grade 5 at Abiria primary school.

At about 5 pm, she learned of the disaster through the alarm that was made by the first arrivals at the scene where lightning struck. The place of the scene appeared to be dark, with a drizzle so it was not easy to identify her son among the victims. She saw the boys lying down and facing upwards. It was at that time when she was able to identify her son. She realized that his body temperature was very high, the tongue was white, and, as she touched the eyes, they would not close. She, in addition, saw burns at the back, forehead, chin, face, sides, feet, and private parts.

3. AL, 31 years AL is the mother of AY, 14 years in grade 3 at Abiria primary school, one of the survivors.

When she heard an alarm, she came out of the house to see boys running haphazardly from the scene and became suspicious, so she proceeded in that direction to find out what had happened. She was the third person to arrive at the scene.

AL found the victims lying on the ground and, like other rescuers, tried to remove their tongues from their throats to facilitate breathing. She was informed by one of the boys that her son could still be alive, so she concentrated on him, trying to do first aid. They carried him, together with his brothers to their home where she removed his damaged clothes. Almost immediately, a good Samaritan took him on a motorcycle to a nearby medical clinic in Odramacaku town.

4. OC, 16 years, in grade 5 at Abiria primary school. OC is also a student at Abiria primary school with the other boys.

OC was at home cooking and suddenly heard an alarm and to her surprise saw the Nyaute team running from the playing field. She was told that some of the boys had been struck by lightning.

Her brother, AF, told her that his leg had been hurt, but he would be alright by God's Grace. She took him to a medical clinic for treatment of a superficial burn on his foot which healed after a week. He also had wounds on his buttocks and back. She was told that some boys were squatting, while others were seated on the verandah leaning against the wall of the small hut adjacent to the playground.

### C. Survivor accounts

Four survivors were interviewed to ascertain any injury, physical or psychological, that might have been sustained after the reported lightning incident. AY, one of the three survivors, was a spectator. He also sustained burns on the back, chest, elbow, and buttocks.

Immediately after the lightning incident, each of these four were admitted in a nearby medical clinic at Odramacaku Trading Centre and were discharged after three days. The observed injuries and ailments are summarized in Table 1.

Most of the skin burns sustained by survivors were superficial and located either on the back or buttocks, suggesting injury as current came through the wall and soil of the veranda.

Corroborating information came from the testimonies of the survivors who recall that they were seated on the raised ground veranda around the hut. They further stated that some had their backs leaning against the wall of the hut.

### D. Longer term medical conditions.

MB, 14, the first interviewee among the group of survivors interviewed, expressed persistent pain in the shoulders. This pain increases when he gets into bed trying to sleep.

Children related a chronic sense of fear raising concerns about survivors, families, and other villagers suffering Post-Traumatic Stress Disorder (PTSD). Other common sequelae of lightning injury include brain injury often manifested as learning disorders in children. These could not be assessed due to school closures during Covid-19.

### E. Further observations

The witnesses in Gbuluku village volunteered information that happened at about the same time as the deaths of children:






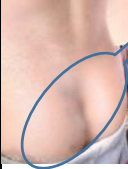

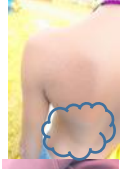



- About 40 meters from the lightning incident field, shrubs, cassava, and potatoes leaves were burnt in a neighboring field. This was later cleared by the owners of the garden because it was associated with bad omen.
- Deafening noise and an extra bright flash were observed in the homesteads neighboring the field of main incident.
- About 5 children in the neighborhood, about 80m away, were shocked and jumped in fear into their mother's laps.



Fig. 4. Photo of the wall where thatch roof meets the mud wall. The inside was scorched by fire apparently started by lightning. A rosary was hung to chase away evil spirits

Inside the hut shown in Figure 1, it was observed that the inside grass thatching was scorched. It looked like a flame of fire started on the grass inside and later stopped without causing much destruction. Witnesses remember seeing smoke coming from inside the grass thatching.

TABLE I. SUMMARY OF INJURIES AND AILMENTS TO THE FOUR SURVIVORS OF LIGHTNING INCIDENT NEAR ODDRAMACAKU

OBSERVATIONS	From Nyaute village.  MB, 14	From From buluku village.  AY, 14	From Gbuluku village.  AF, 11	From Nyaute village.  AM, 11
<b>What do you remember?</b>	He only realized his surroundings when he was already down, he can't remember what exactly happened.	He only remembers when he was already lying down on the ground.	He only remembers that he was lying on the ground.	He remembers seeing something like fire and very bright light.
<b>How have you been feeling ever since the incident happened?</b>	He reported pain on the shoulders.	Ok. He is feeling better now	He has not been feeling well, he feels scared most times.	Still scared of lightning, fearing that it might come back anytime.
<b>How have you been sleeping?</b>	He reported feeling pain at night when in bed.	He is sleeping well.	He has been restless while sleeping at night (scared most times).	He is sleeping well.
<b>Where were you when the incident happened?</b>	Was sitting on the veranda when lightning struck.	He was sitting under the veranda.	He was squatting on the veranda.	He was sitting on the veranda.
<b>Other physical observations.</b>		 Round skin scar on buttocks.	 Scarred skin on the back.	
	Sustained injuries with scarred skin on the left elbow and right leg as shown in the photos.	He has visible burns (scarred skin) on the right elbow, back, waist, and the buttocks as seen in the photos.	Visibly scarred skin on the waist, buttocks, right knee and on the left side of the back as seen on photo above.	Scarred skin can be seen on the left side of the back as shown in the photos.
	His cloth was visibly burnt on the left elbow as seen in the photo. He has no appetite.	He has no appetite		He has no appetite for eating food.
				

A rosary had been hung on the scorched grass thatching and some witnesses claimed this had the ability to chase away evil spirits that were thought to have caused this incident (Fig. 4).

Mr. JN has abandoned plans to finish and settle in it. The land around the hut is owned communally by the extended family headed by his father. Attempts by the family to sell the field with the hut have failed because no one in the neighborhood is prepared to buy a cursed/demon possessed piece of land.

#### F. Lightning Location Data

The investigating team consulted with Vaisala Inc., the operators of Global Lightning Data (GLD-360) to ascertain the occurrence of lightning in and around the scene in the evening of Thursday 27 August 2020 (Fig 5).

The GPS coordinates were submitted for the search and the time period was specified as between 3–8 pm in the evening. GLD-360 data indicated that there were many lightning flashes in the specified period in a 25 km radius around the scene of incident (Fig. 5). This corroborated the time given by witnesses as ‘approximately 5 pm in the evening.’

#### G. Comments Offered by the General Public about Response by the Government

Members of the public, after learning of the ACLENet’s team presence in the village on the first day, came forward to volunteer information. They were eager to narrate how the lightning incident happened and the unfolding of subsequent events. Much of what they had to offer was hearsay and was disregarded by the investigating team.

However, these members of this public expressed views which were important in the overall picture of Disaster Risk Reduction (DRR) plus Disaster Response and Management (DRM). They expressed their dissatisfaction towards government response to this lightning disaster. After the incident, no member of the district disaster committee or Ministry responsible for disaster response had ever visited the scene or interacted with affected families. This left them wondering if there was any program responsible for disasters from the government.

They further asked whether they should expect any relief item(s) or compensation, especially the families who lost children in this lightning incident. The investigating team referred these people to their local district authorities.

Also, members of the public corroborated their belief in hanging the rosary in the hut to help in repulsing evil spirits thought to be responsible for the deadly lightning incident.

## V. DISCUSSION AND LIMITATIONS OF THE STUDY

This investigation was done to attempt to learn as much as possible about the incident. While much useful information was obtained there are several limitations to the study which must be mentioned.

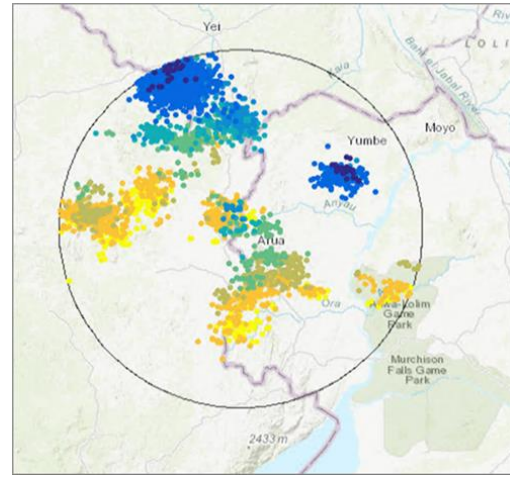


Fig. 5. GLD-360 data in a 25km radius around the lightning incident scene, between 3 – 8 pm on August 27<sup>th</sup>, 2020. It can be seen that the place was cloudy with many lightning strokes.

It was to be expected that no autopsy information would be obtained on the ten children who were killed since there was no medicolegal question about the cause of death. Additionally, rural Ugandan hospitals are highly unlikely to have facilities or skilled personnel to do autopsies and families would likely to have objected to post-mortem examination of their sons.

It must be admitted that the team investigating the incident had no formal forensic training, little medical expertise, and only one other investigation in their experience [5]. As is often the case with such dramatic, traumatic, and unexpected incidents, especially in remote areas like this, the scene and order of events obtained from interviews is probably less than complete for many reasons.

Interviewers were unable to speak the tribal language of the villagers and used a local police officer as a translator. The presence of a police officer, despite aiding in the, is always a source of anxiety for both adults and children, limiting responses. It is likely that many dramatic expressions filled with emotions were lost in the process of translation. The team found that an unknown number of ‘respondents’ may have participated expecting material compensation, potentially clouding the veracity of their accounts. Fortunately, most information was corroborated by numerous witnesses and survivors to produce a reasonably coherent picture of events as they were believed to have happened by these observers.

#### A. Reconstructing the lightning incident

The surviving children who suffered injuries like skin burns and other forms of trauma lacked the capacity for a vivid narration. This was mainly due to their young age with lack of confidence to express themselves or just not being able to remember events or confusion generated by the tragic events. Amnesia for the events is also common for survivors of lightning incidents [2].

Nonetheless, their testimonies are filled with critical pieces of information. Pieced together, the turn of events was most tragic immediately after the lightning and more dramatic

afterwards. The adults who responded to the first alarm simply did not know what to do medically.

From testimonies, the children were seated on the raised soil surrounding the hut or squatting with their buttocks touching the ground. This can also explain the burns which were consistently located on the buttocks and backs.

Respondents also corroborated the smoke seen emerging from the hut which agrees with the signs of a fire which scorched the inside surface of the grass thatching. Full conflagration of the grass thatch was probably avoided because the continued rain extinguished kept any substantial fire from starting.

### B. *Spiritual causation*

The lack of solution to lightning hazard seems to create hopelessness especially when it results in death in the local population. This hopelessness, in turn, creates a void which is often filled by conspiracy theories involving a spiritual causation.

Members of the public, especially those who talked to investigators, believed that there was a spiritual cause to this lightning incident. It is not something solid that they could point a finger at, but they all believed there must have been demons responsible for this tragic incident. In addition to hanging a rosary in the hut and abandoning it, cassava and potato plants scorched by lightning were immediately uprooted as another way to disassociate the garden owners from the evil spirits or bad omen.

### C. *Disconnect with government disaster response*

Uganda is a participant in international efforts to reduce and manage disasters and is a signatory to the Sendai Framework [3]. As a result of recommendations from the United Nations International Strategy on Disaster Reduction (UN/ISDR), the Uganda government established a Ministry responsible for disaster risk reduction. The Ministry of Disaster Preparedness and Refugees was to include Disaster Risk Reduction (DRR) in the Sustainable Development agenda [4]. Consequently, in planning for and mainstreaming of DRR, the Ministry has established disaster reduction/response committees at the local government district level.

However, the discontent expressed by the populace of Ayivu suggests a disconnect between the district DRR committees and the people they are constituted to serve. Unfortunately, if the local district committee is not provided with enough resources and appropriate infrastructure to support the communities, then they might remain just on paper. Alternatively, it might be a problem of strategy and work-plans. If the committee or the central government department does not come up with appropriate work plans, the district committees might remain useless.

It might be a problem of both lack of resources and lack of work-plans. For an example, in the case of this lightning incident in Ayivu, if a properly stocked ambulance were available to respond in time, loss of life could have been prevented or reduced. Also, if the district committee were

educated in lightning safety, they would take appropriate messages to the affected communities.

In the current situation pertaining in Ayivu, there is no ambulance to save lives and no message to promote lightning safety. So, it can be stated that, the district committee has not responded to the incident at all because they have no resources and/or message to take to the affected community.

## VI. CONCLUSIONS

Despite the limitations, useful information was obtained, concerns of the villagers addressed by the team, and the team gained useful experience on how to work with respondents and how to do these investigations in the future. ACLENet hopes to be able to provide training to our teams in forensics, both material and medical, for future investigations, but that depends on funding.

Some of the findings from another mass casualty lightning investigation in Uganda apply to this study as well [5]:

- This was a mass casualty incident that overwhelmed the village's capacity and medical resources to care for the victims.
- Fear, superstitions, and blaming of curses was common in the community after the incident.
- There were no lightning-safe places to go and no warning of bad weather or lightning danger.

Finally, villagers felt that they had not been well served by the new decentralized local response team for disaster management since no one from the team had contacted them, offered aid, nor sought their accounts by the time our team visited two months after the incident occurred.

## ACKNOWLEDGMENT

The ACLENet team appreciates the support given by the Uganda Police Force (UPF) in the work of scene investigation where this incident happened. We are also thankful to our generous donors who contributed money to this investigation.

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