851

Lightning-caused Deaths and Injuries at Schools

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GOALS of STUDY

To examine lightning-caused casualties in and near non-US schools.

To provide information to two organizations involved in lightning injury prevention:

1. **ACLENet, the African Centres for Lightning and Electromagnetics Network www.ACLENet.org**
2. **CELP, the Centre for Electromagnetic and Lightning Protection Research www.celp.upm.edu.my/index.php/e**

MOTIVATION for STUDY

Lightning casualties in developing countries often involve people inside unsafe structures and working outside during labor-intensive agriculture or other work.

Multiple lightning fatalities and injuries are frequently reported at schools in developing countries.

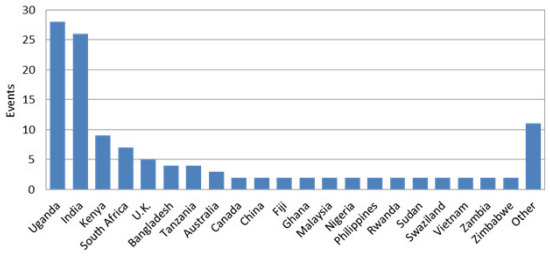
Multiple-fatality events at schools in Africa have motivated some organizations to provide lightning protection at schools ("Lightning Kills! Save a Life in Africa.") to serve as an example for the general public in these areas.

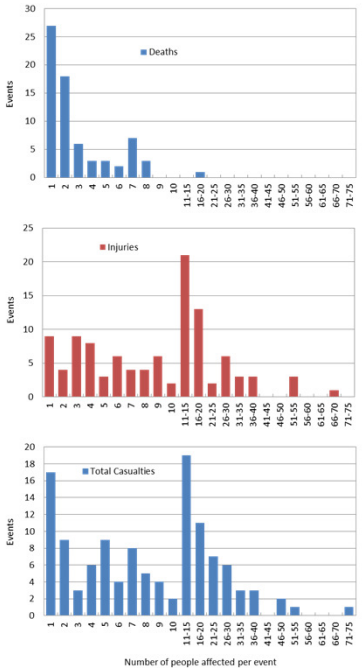
METHODOLOGY

The cases were randomly collected from web reports, other publications and sources, and from published papers.

The study period was limited to 2002 through 2015 in order to identify lightning impacts on contemporary structures.

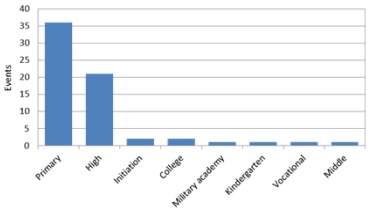
32 Countries – 123 total reports



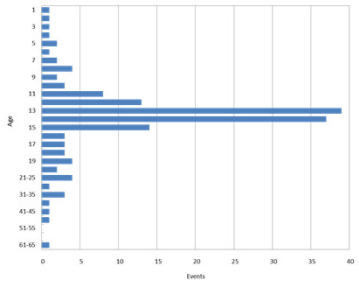


Casualties per school event

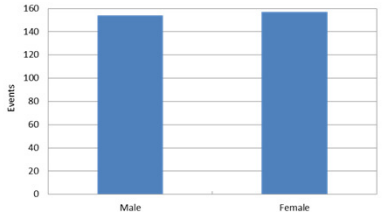
The database consists of 218 fatalities and 710 non-fatal injuries in 123 reports. All events are outside the USA.



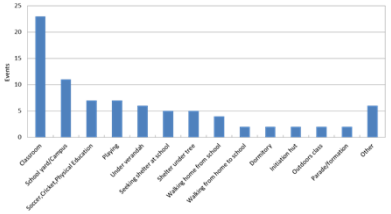
Types of educational institutions (n = 65, 53%)



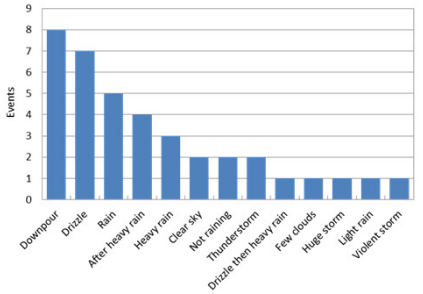
Ages of casualties (n = 156, 17%)



Gender of casualties (n = 311, 33%)



Location and Activity (n = 84, 68%)



Weather reported (n = 38, 31%)

SUMMARY and CONCLUSIONS

123 reports (all non-USA) from 2002-2015 had 218 fatalities and 710 non-fatal injuries.

Large numbers injured for each event, unlike US, where 90% of reports are single deaths.

Publication bias may occur for English reporting, more stable countries and for events involving larger numbers of casualties.

The most common type of school was primary with secondary next.

Age of those injured was inconclusive because only 17% reported.

The most common site of injury was *inside the classroom*, although more total cases were related to outdoors activities around the school. Lightning injury prevention programs will need to take these activities into account to substantially change injuries.

90% of sub-Saharan buildings, including schools, are not lightning safe, so nearly everyone is at risk 24/7.

Weather during the events was most often reported as raining but no rain and drizzle were reported as well.

Month, Day of the Week, Time of Day reported in Holle, R.L., and M.A. Cooper, 2016: Lightning-caused deaths and injuries at schools. Preprints, 33rd International Conference on Lightning Protection, September 25-30, Estoril, Portugal, 5 pp.