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Electrical Injuries in Nepal: An Analysis of Nepal Police Records

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Abstract

Electric shock is a major cause of injury-related mortality and morbidity. However, it remains a neglected issue in Nepal because mortality and morbidity data are unsystematic and many of them are even unknown. Realizing the need of a systematic study in this regard, I aim to present the available national status of electrical injuries using incidents recorded by Nepal Police from July 2014 to July 2019 for an analysis. The data, obtained in descriptive narratives include information on the injured person's age, sex, place of occurrence, month of occurrence, activity during the occurrence, and the number of casualties per incident. This article explores the issue in some detail to open up the avenues for further study. The findings that I mentioned above indicate a significant burden of electrical injuries in Nepal, potentially higher than reported due to limitations in the police data recording system. As the government regulates electricity distribution, it should also be accountable for preventing electric shock incidents and saving many lives.

Keywords: electrical injuries, police record, death, injury, Nepal

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Injuries result from acute exposure to physical agents like mechanical energy, heat, electricity, chemicals, and ionizing radiation, which interact with the body at levels or rates surpassing human tolerance thresholds (Gibson, 1961). Accident is an event that results in injury. Injuries can be caused by exposure to physical agents, mechanical energy, heat, electricity, chemicals, and object interacting with the body exceeding the threshold of human tolerance (Baker et al., 1992). The risk of injury is everywhere, travelling, working, playing, or even while people are asleep. Electrical injury is thus a serious public health issue.

Globally, injury accounts for one in eight deaths among males and one in 14 deaths among females (Pal, 2012). Global analysis found that poor groups are generally more at-risk wealthier ones, especially among children. About 90 percent of injuries occur in the low and middle-income countries (WHO, 2008). WHO estimated the injury mortality of 43 per 100,000 for unintentional injuries in 2019 alone in Nepal (WHO, 2020). WHO also estimated that the majority of 15,391 injury-related deaths occurring in Nepal were unintentional (79%) and remaining are intentional (WHO, 2020).

In 1959, Heinrich visualized injury causation through the ‘domino’ model, primarily for occupational safety purposes (Heinrich, 1959). Similarly, the Haddon Matrix was developed to understand the factors involved in injury causation and prevention. This model integrates three phases of an event (pre-event, event, and post-event) with four categories of factors (human, vehicle/agent, physical environment, and social environment) (Haddon, 1980). People have regularly been exposed to electric power, which has become an integral part of modern lifestyle. Sometimes, the inattentive use or exploitation of electricity may result in injury and mortality. Electrical hazards can take various forms and result in different types of injuries.

Most electrical injuries occur as a result of lightning, low-voltage (<1000 V), high-voltage (>1000 V), or short circuits or substandard wiring and hooking (Arnoldo et al., 2004). The first electrical fatality was recorded in France in 1879, in which the carpenter was killed by an alternating current (AC) of 250 volts (Harvey-Sutton et al., 1992). Workplace electrical injuries are common while performing tasks. Similarly, many people are exposed to electric shocks during daily household activities, recreational activities, and many more (Gautam & Prasain, 2011). Electrical injuries often result in either deformity, disability, or mortality and most of these electrical injuries are accidental and preventable (Zemaitis et al., 2021). The primary victims of electric electrical injuries were young men (Arnoldo et al., 2004), which happened due to work-related activities (Campbell & Dini, 2015).

Nepal is producing electricity on a large scale and distributing electricity in all parts of the country (Gunatilake, et al., 2020). The risk of electrical injuries has increased with this increased production, coverage of electricity, changing lifestyles, lack of knowledge, lack of safety measures, and unsafe behaviors. A study showed that about 1% of the injury cases registered in the emergency department at B. P. Koirala Institute of Health Sciences from January 2013 to December 2013 were electrical injuries (Gupta, et al., 2017).

The majority of injury-related deaths occur in developing nations (Peden et al., 2008). Nepal is one of the countries which experiences many electric shock-related injuries. Over the five years, 2,267 incidents were recorded, with 59.1% being fatal. The mean age of the casualties was 30.7 years (SD =15.6). Electrical injuries were significantly more common among males than females. Bagmati Province, had the highest rates of deaths and injuries, followed by Madhesh and Lumbini Provinces. The trend of electric shock deaths and injuries increased linearly, nearly tripling over the five years. Thirteen broad activities were identified during which victims suffered electric shocks, with household activities

being the most common. Monthly analysis revealed a spike in electrical injuries during the monsoon season compared to summer or winter. Notably, the number of reported deaths exceeded reported injuries, demonstrating that non-fatal incidents are underreported to the police.

There are few small-area-based studies on electrical injuries in Nepal (Dhital et al., 2020; Gautam & Prasain, 2011; Ghimire, et al., 2018). Furthermore, there is no systematic research or published studies on electrical injuries in Nepal. Thus, the actual magnitude of electric injuries and related mortality is almost unknown. The lack of information on the magnitude and causes of electrical injuries is a glaring challenge for preventing mortality from electric shocks. Hence, there is a need for research on electrical injuries to generate evidence on preventable injuries, disabilities, and deaths from such an essential commodity. This research aims to present the current status of electrical injuries by age, sex, provinces, months, and activities during incidents.

Materials and Methods

The positivist paradigm is a research approach that emphasizes empirical data, scientific methods, and observable, measurable phenomenon to understand and explain aspects of reality. This study also utilized the Nepal Police record the facts and evidence of injuries pertinent to an incident onto their database through the Daily Incident Recording System from all parts of the country. A retrospective descriptive study was conducted from the Nepal Police records of electrical injury-related incidents for five years (July 2015 to July 2019). With the official data request from Padma Kanya Multiple Campus, the national-level raw data on electrical injuries were received. Before extracting the variables, the records were read and checked manually to identify uniform patterns and correct inconsistencies throughout the case narratives.

A data extraction algorithm was developed, and available variables were extracted in MS Excel. The narrative data was in Nepali language. The variables (age, sex, district, province, reporting time, activities during the electric shocks and month of occurrence) were extracted using a pattern recognition algorithm. After extraction, variables were thoroughly checked with the original narratives. Simple frequency distribution has been used in the analysis. Some of the information were presented in the bar graph. In the analysis, age and sex were considered demographic variables, and administrative divisions (province) were used for the place of crash occurrences. Electric shock incidents were also discussed by month of occurrences and activity during the incidents. Further, the activities by broad population groups (children and adults) are presented in the result section.

Results

In five years, a total of 2,267 incidents were reported to the Nepal Police of which 59.1% were fatal (Table 1). Table 1 provides the distribution of electric shock-related deaths and injuries by age and sex group. About three fourth (75.1%) of the electric shocks victims were male. This study found that 5.4% of the electrical injuries victims' sex was missing. The percentage of male-female deaths and injuries remains almost similar (Table 1).

The age was grouped to present the information by children under age five, growing children and young children (15-17 years). Further age was grouped 18-29 years to study about early youth population and working age group and population aged 60+ years. The largest number of electric shocks-related fatalities (413) and injuries (383) were recorded among the 18-29 years age population followed by the population aged 30-34 years. Among total cases 1.9 percent were children under age five. Table 1 further revealed that children aged 5-14 years are also at high risk of electrical injuries in Nepal. The largest proportion (74.7%) of

electrical injury cases is represented by people aged 18-59 years. The mean age of the 2,267 persons with casualties from electrical injuries was 30.7 (SD = 15.6) years, the mean age for the injured people was less (3.8 years less) than the mean age of the people died (Mean Age 32.2 years) from electrical injuries. About 2 percent of the victim's age was missing.

Table 1

Distribution of Deaths and Injuries by Sex, Age group from Electric Shocks for Five years in Nepal

Characteristics of the victims	**Type of injury**		**Total Cases**
	Death N (%)	**Injury N (%)**	**N (%)**
Sex			
Female	265 (19.8)	178 (19.2)	443 (19.5)
Male	999 (74.6)	701 (75.5)	1700 (75.1)
Missing	75 (5.6)	49 (5.5)	124 (5.4)
Age group			
0-4	27 (2.0)	16 (1.7)	43 (1.9)
5-14	120 (9.0)	89 (9.6)	209 (9.2)
15-17	79 (5.9)	54 (5.8)	133 (5.9)
18-29	413 (30.8)	383 (41.3)	796 (35.1)
30-44	351 (26.2)	225 (24.2)	576 (25.4)
45-59	223 (16.7)	98 (10.6)	321 (14.2)
60-69	75 (5.6)	21 (2.3)	96 (4.2)
70+	30 (2.2)	18 (1.9)	48 (2.1)
Age missing	21(1.6)	24(2.6)	45 (2.0)
Mean	32.2	28.4	30.7
SD	16.4	14.1	15.6

Total: N (%)	**1339 (59.1%)**	**928 (40.9%)**	**2267 (100%)**

Table 2 below provides the distribution of electric shock-related deaths and injuries by Seven Provinces. The number of death cases was higher in Madhesh Province (381), whereas more injuries were found in Bagmati Province (420). In total, about one-third of the casualties (33.3%) were recorded in Bagmati Province. Table 2 further reveals that Karnali Province and Sudurpaschim Province recorded comparatively fewer electric shock incidents; deaths and injuries are proportional to the percentage of household electrification except for Gandaki Province. Bagmati Province has the highest household electrification rate (90.3%) and the highest percent (33.8%) of electrical injuries. Likewise, Karnali Province has the lowest household electrification (27.03%) and this province shares only 0.9 percent of the total electric shock cases of Nepal.

Table 2

Distribution of Deaths and Injuries by Provinces from Electric Shocks for Five Years in Nepal

Province	**Type of injury**		**Total N (%)**	Household electrification %*
	Death N (%)	**Injury N (%)**		
Koshi Province	195(14.6)	95(10.2)	290(12.8)	75.9
Madhesh Province	381(28.5)	158(17.0)	539(23.8)	79.77
Bagmati province	346(25.8)	420(45.3)	766(33.8)	90.30
Gandaki province	121(9.0)	88(9.4)	209(9.2)	87.39

Lumbini province	214(15.9)	133(14.3)	347(15.3)	81.03
Karnali province	12(0.9)	8(0.9)	20(0.9)	27.03
Sudurpaschim province	70(5.2)	26(2.8)	96(4.2)	58.90
Total	**1339(100.0)**	**928(100.0)**	**2267(100.0)**	

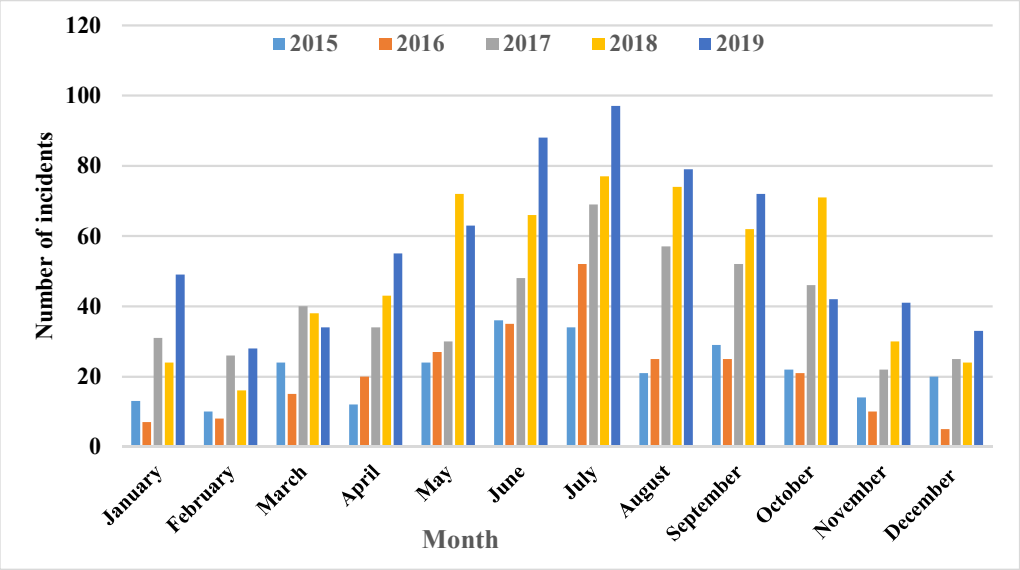
Note. *(Nepal electricity authority, 2020) ** (Provincial Population, 2017)

Figure 1 shows the five-year trend of electrical injuries in Nepal, with continuous linear increments, except in 2015, when the devastating earthquake occurred in Nepal. In five years, electrical injuries have increased by almost three times (259 to 681).

The monthly incidents are plotted for each year to demonstrate the monthly changing pattern of electrical injuries in Nepal. An almost similar pattern of monthly electrical injuries was observed in Figure 1. The number of electrical injuries was higher in the rainy season (May to August). In all years, the casualties were more elevated in June and July.

Figure 1

Electrical Injuries by Months in Five Years



Thirteen broad activities for electrical injuries were identified from the recent five-year data. A substantial number of people (485) died or were injured during household activities. The use of electronic appliances has appeared as the second most important activity (17.9%) for electrical injuries. Likewise, many people died or were injured from electric shocks during activities related to agricultural work and farming (292) and working on or near electrical poles (297). About one in ten electrical injury cases occurred at workplaces or during construction works. Similarly, 4% of electrical injuries happened when a moving vehicle accidentally touched an open wire. Table 3 shows comparatively few death or injury cases (19) during electric hooking. Table 3 also presents electric shocks by children below 18 years and adults aged 18 or above; among total cases, 17 percent of the electric shocks occurred to children and the rest to adults above 18 years. Among the activities largest percent of incidents in the children occurred during the short circuit (26.3% for children and 73.7% for adult), followed by hooking. Similarly, about one-fifth of the incidents occurred while farming, factory works, short circuits, and high voltage current.

Table 3

Activity during Electric Shocks Incidents

Activity	%Children (>18)	%Adults (<=18)	Number of incidents (%)
Household activity	6.9	93.1	485 (21.4)
Using electronic appliance	10.7	89.3	405 (17.9)
Working on or near an electric pole	6.9	93.1	297 (13.1)
Farming	21.5	78.5	292 (12.9)
Construction works	21.6	78.4	208 (9.2)
Short circuit	26.3	73.7	142 (6.3)
Factory works	22.0	78.0	119 (5.2)
Vehicle touched an electric cable	18.5	81.5	85 (3.7)
High voltage current	20.0	80.0	76(3.4)
Transformer install/ maintenance	5.5	94.5	56 (2.5)
Electric work	15.0	85.0	28 (1.2)
Hooking	22.3	77.7	19 (0.8)
Others	10.4	89.6	55 (2.4)
Total	**17.3**	**82.7**	**2267 (100.0)**

Note. The sum of children and adult percent is 100.

Discussion

Our study has demonstrated that many people die or are injured from preventable electric shocks in Nepal. Usually, the number of nonfatal injuries should be significantly larger than the number of fatal injuries (Baker, O'Neill,

Ginsburg & Li, 1992). In contrast, our data source showed fewer injuries (928) than deaths (1339) from electric shocks. This indicates the fact that many nonfatal electric shock incidents were not recorded by the Nepal Police. However, it can be another argument whether it is the police who keep the records of all electrical injuries. The frequency of electric shock fatalities and injuries was highest in the 10-40 age group population, and the mean age of the victim was 30.7 years (SD =15.6). This finding is consistent with the results of developed and developing countries (Gupta & Trangadia, 2021; Ivanova et al., 2016; Mashreky et al., 2011; Massey et al., 2018).

In Western European countries, mortality from electric shocks is low, and children up to the age of ten years are almost unaffected (Ivanova et al., 2016). However, Nepal's findings contradict Western European countries' electrical injury statistics. It was matched with low and middle-income countries' electrical injuries for children under ten years old (Gupta & Trangadia, 2021; Mashreky et al., 2011). The data makes a pitiful revelation about how 5% of the deaths and injuries occurred in children below ten years.

The overall age distribution of electrical injuries revealed that people died 40 years before the average life expectancy of Nepal (Central Bureau of Statistics, 2014). Males accounted for most of the deaths (74.8%) and injuries (75%); this may be due to more male exposure to electric hazards than females. An analysis of data from the National Institution of Occupational Safety and Health also showed that very few females were dead or injured from the electric current compared to the males (Baker et al., 1992).

Nepal suffered from severe load shedding (scheduled power cut) until 2016/17, and the electricity supply slightly increased by 2017/18. Electrical injuries have been increasing every succeeding year. In the year of the devastating earthquake, electrical injury cases were lower than in the other average years. The

number of electrical injuries has tripled in five years. This trend of electrical injuries shows an increased risk to lives due to electric shocks in the years ahead.

Analysis of the spatial distribution of electrical injuries revealed that Bagmati Province has the highest number of incidents of the other six provinces. On the other hand, electrical injuries were at a smaller scale in Karnali and Sudurpachhim. The pattern of electrical injuries and household coverage of electricity are proportional, i.e., the higher the household coverage, the higher is the number of electrical injuries. In this context, our government is trying to increase household electricity coverage and promote the use of electric appliances. This relation speaks about the possibility of a rising risk of electrical injuries in the population.

Monthly analysis of electrical injuries shows increased cases of electrical injuries in the rainy season rather than summer and the winter season; this finding is consistent with the findings of a study of the Shivalik hills area in northern India (Kumar & Kumar, 2015). The proportion of electric shock incidents among males and females was almost similar to the studies from Maryland (Massey et al., 2018).

Electrical injuries can occur anywhere there is an electricity supply. However, they are more common in the home and workplace (Gupta & Trangadia, 2021). A study in India and Bangladesh showed that electrical injuries occurred in the surroundings of the home (Choudhary et al., 2019; Mashreky et al., 2011). This study also showed that one-fifth of electrical injuries happened while carrying out household activities.

A substantial proportion of electrical injuries occur as a result of work-related activities. This study identified that working on electric poles was another critical reason for electrical injuries in Nepal. Article 26 of the Nepal Electricity Act (2049 BS) has instructed the authority to ensure electrical safety during the

production and distribution of electricity. There were 19 cases of death and/or injuries that occurred while the person was hooking electricity directly from the transmission line which is an offense according to Articles 6 and 7 of the Electricity Theft Control Act (2058 BS). In Nepal the Internet and TV cables are also distributed from the electric pole. During the data extraction, it was found that a larger number of the technicians working for internet and television connection got electric shocks while working on the poles compared to electricians. The statistics showed that 17.9 percent of electrical injuries happened from electronic appliance use. This shows a lack of safety training for the internet and cable technicians, highlighting the need for safety training. Despite significant improvements in electronic product safety, electrical injuries are still a major cause of deaths and injuries. This study also indicated that the increasing usage of electronic appliances increases the risk of electrical injuries.

Farming also appeared as another vital activity for electrical injuries. Among all farming activities, fishing was more common, and 115 people got electric shocks. While working on the farm, people accidentally injured/died from electric shocks of open wires on the land. So, fishing from electric current should be completely stopped to prevent deaths and injuries from electrical injuries. Further, the electricity authorities should maintain the broken or fallen wires from the poles for the safety of general public. Occupational safety is neglected in Nepal (Gautam & Prasain, 2011). It may sound like there is a lack of legal provisions for electrical safety, however, the Electrical Rules (2050 BS) have specified many binding provisions to follow. The entire Section 6 is dedicated to electrical safety. As in other kinds of injuries, the implementation and enforcement of electrical safety legislation are found too weak; it is also reflected in electrical injury incidents, in which more than 25 percent of the total electrical injuries occur in the workplace. During travel, some of the vehicles come into contact with the electric current, and this study also found 85 people died and

were injured from electric shocks from the contact of the vehicle with the high-tension electric wires. There are legislative provisions specified in Articles 48, 49, 50, and 51 in Electricity Rules (2050 BS) regarding the height of the electrical transmission lines from the ground level and safety measures to apply when the transmission line has to cross a road.

The coverage of the electricity supply is increasing in Nepal. Along with the increment in the supply/coverage of electricity, deaths, and injuries from electric shocks have been increasing every succeeding year. The five-year trends and activity analysis during electrical injuries suggest an increasing number of electrical injuries in the years ahead.

Conclusion

Numerous lives have been lost or forced into disability from preventable electric shocks. Electrical injuries count of people is increasing every passing year. Statistics show up to 18 people are impacted by single electric shocks. Despite the serious public health threats, the electric shock-related issue is largely neglected in Nepal. As the government is entirely responsible for electricity distribution in the country, it should also be accountable for saving people's lives from electric shocks.

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References

Arnoldo, B. D., Purdue, G. F., Kowalske, K., Helm, P. A., Burris, A., & Hunt, J. L. (2004). Electrical injuries: A 20-year review. *Journal of Burn Care and Rehabilitation*, *25*(6), 479–484. https://doi.org/10.1097/01.BCR.0000144536.22284.5C

Baker, S. P., O'Neill, B., Ginsburg, M. J. & Li, G. (1992). *The injury fact book* (Second). New York: Oxford University Press, INC.,

Campbell, R. B., & Dini, D. A. (2015). *Occupational injuries from electrical shock and arc flash events*. The Fire Protection Research Foundation.Massachusetts, U.S.A. Retrieved fromhttps://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Electrical/RFArcFlashOccData.ashx?la=en

Central Bureau of Statistics. (2014). *Population monograph of Nepal, Volume II*. Kathmandu. https://nepal.unfpa.org/sites/default/files/pub-pdf/Population Monograph V02.pdf

Choudhary, U. K., Rathod, V. V., Ghormade, P. S., & Keoliya, A. N. (2019). Deaths due to electrocution in central India: A study of two years. *Medico-Legal Update*, *19*(2), 289–294. https://doi.org/10.5958/0974-1283.2019.00190.7

Dhital, B. M., Regmi, S., Regmi, S. R., Shrestha, B., Budhathoki, K., GC, A., Sedhai, S., Khan, A., Murtuza, S., Gurung, P., & Thapa, S. (2020). Cardiac arrhythmias in patients with electrical injury: Hospital based study. *Nepalese Heart Journal*, *17*(2), 29–32. https://doi.org/10.3126/njh.v17i2.32675

Gautam, R. P., & Prasain, J. N. (2011). *Current situation of occupational safety and health in Nepal*. General Federation of Nepalese Trade Unions (GEFONT) (Vol. 80).

Ghimire, A., Budhathoki, S. S., Niraula, S. R., Shrestha, A., & Pokharel, P. K. (2018). Work-related injury among welders working in metal workshops of Dharan Municipality, Nepal. *Journal of Nepal Health Research Council*, *16*(2), 156–159. https://doi.org/10.3126/jnhrc.v16i2.20302

Gibson, J.J.(1961). The contribution of experimental psychology to the formulation of the problem of safety: A brief for basic research. *In Behavioral approaches to accident research* (pp 77-89). New York: Association for the Aid of Crippled Children.

Gunatilake, H., Wijayatunga, P., &, & Weber, D. R. (2020). *Hydropower development and economic growth in Nepal* (No. 7). Manila. https://doi.org/10.4324/9781315543000-6

Gupta, B. D., & Trangadia, M. (2021). Profile of deaths due to electrocution : A retrospective study. *Journal of Indian Academy of Forensic Medicine*, *34*(1), 13-15.

Gupta, P. P., Malla, G. B., Bhandari, R., Kalawar, R. P. S., & Mandal, M. (2017). Patterns of injury and mortality in pediatric patients attending emergency department in a tertiary care center in Eastern Nepal. *Journal of the Nepal Medical Association*, *56*(207), 331–334. https://doi.org/10.31729/jnma.3096

Haddon, W.J. (1980). *The basic strategies for preventing damage from hazards of all kinds.* Hazard Prevention.

Harvey-Sutton, P. L., Driscoll, T. R., Frommer, M. S., & Harrison, J. E. (1992). Work-related electrical fatalities in Australia, 1982-1984. *Scandinavian Journal of Work, Environment and Health*, *18*(5), 293–297. https://doi.org/10.5271/sjweh.1574

Heinrich, H.W. (1959). *Industrial accidents prevention: A scientific approach* (4th edition). McGraw-Hill.

Ivanova, N., Gugleva, V., Dobreva, M., Pehlivanov, I., Stefanov, S., & Andonova, V. (2016). Epidemiology and diagnostic problems of electrical injury in forensic medicine. *Intech*, (tourism), 13. Retrieved from https://www.intechopen.com/predownload/19164

Kumar, V., & Kumar, V. (2015). Seasonal electrocution fatalities in free-range rhesus macaques (Macaca mulatta) of Shivalik hills area in northern India. *Journal of Medical Primatology*, *44*(3), 137–142. https://doi.org/10.1111/jmp.12168

Mashreky, S. R., Rahman, F., Rahman, A., Baset, K. U., Biswas, A., & Hossain, J. (2011). Burn injury in Bangladesh: electrical injury a major contributor. *International Journal of Burns and Trauma*, *1*(1), 62–67.

Massey, B., Sait, M., Johnson, W., Ripple, M., Fowler, D., & Li, L. (2018). Deaths due to electrocution: An evaluation of death scene investigations and autopsy findings. *Journal of Forensic Science and Medicine*, *4*(4), 179–183. https://doi.org/10.4103/jfsm.jfsm_57_18

Nepal Electricity Authority. (2020). *Distribution and consumer services directorate: A yearbook of the fiscal year (2019/20)*. Retrieved from https://nea.org.np/admin/assets/uploads/annual_publications/dcs_2076.pdf

Pal, R. (2012). Injury epidemiology: The neglected chapter. *Nepal Journal of Epidemiology*, *2*(4), 216–218. https://doi.org/10.3126/nje.v2i4.7825.

Peden, M., Oyegbite, K., Ozanne-Smith, J., Hyder, A. A., Branche, C., Rahman, A. K. M. F., Rivara, F., & Bartolomeos, K. (Eds.). (2008). *World report on child injury prevention*. World Health Organization.

WHO. (2008). *The global burden of disease: 2004*. World Health Organization. https://doi.org/10.1038/npp.2011.85/.

WHO. (2020). *Global health estimates 2019: Deaths by cause, age, sex, by country and by region, 2000-2019.* World Health Organization. https://www.who.int/data/gho/data/ themes/mortality-and-global-health-estimates.

Zemaitis, M. R., Foris, L. A., Lopez, R. A., & Huecker, M. R. (2017). *Electrical injuries.* StatPearls Publishing. www.ncbi.nlm.nih.gov/books/NBK448087/