

Health and safety incidents at a power utility in the Eastern Cape province of South Africa

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ABSTRACT

Background: Many high-risk and construction-related activities are performed in the course of distributing electricity throughout South Africa, including working at heights, driving, operating electrical networks, excavation work, and maintenance of electrical structures. South Africa has one power utility that provides electricity to the entire country. Different sectors of the utility are distributed throughout the nine provinces, with eight sectors in the Eastern Cape province.

Objective: We sought to compare health and safety incidents, and their causes, between the sectors in the Eastern Cape province.

Methods: Incident data from 2015 to 2019 were extracted from the power utility's Systems, Applications and Products in Data Processing of Environmental Health and Safety (SAP EH&S) database. The most common health and safety incidents and their reported causes are compared across sectors and described as counts and frequencies.

Results: There were 614 health and safety incidents recorded in the study period with motor vehicle accidents being the most common overall ($n = 482$, 78.5%). Incidents related to damage to equipment ($n = 48$, 7.8%), operating errors ($n = 16$, 2.8%), falls ($n = 15$, 2.4%), hand injuries ($n = 13$, 2.1%), and insect/animal bites ($n = 13$, 2.1%) were also recorded. Workers ignoring safety rules was the most common reported cause of these health and safety incidents ($n = 449$, 73.1%).

Conclusion: Motor vehicle accidents, damage to property, operating errors, falls, and hand injuries were frequently reported in the energy utility sectors in the Eastern Cape province. The most common recorded cause was workers ignoring health and safety rules. Training workers on the importance of reporting incidents, including near misses, can potentially reduce the frequency of health and safety incidents.

INTRODUCTION

Workplace health and safety plays a pivotal role in all industries. In South Africa, employers are mandated to identify hazards in the workplace and to determine corrective measures to prevent the occurrence of accidents and injuries.¹ In the national power utility, eight sectors constitute the maintenance and operations department in the Eastern Cape province. These sectors are mandated to repair and maintain the electrical distribution network. In all, safety rules, practices, and procedures are administrative controls for managing hazards. In compliance with legislative requirements, workers are made aware of their responsibilities to adhere to these rules and procedures.

Researchers have highlighted the interaction between humans, external factors, and unsafe work methods as factors that contribute to workplace health and safety incidents.² It is well documented that injuries and fatalities are due to health and safety incidents caused by human behaviour, including unsafe workplace practices, and unsafe use of machinery, equipment, and tools.

There is a strong relationship between the attitudes of workers and health and safety incidents.³ Workers who fail to adhere to safety rules and procedures compromise workplace safety, while positivity, knowledge, behaviour, and adherence to a company's safety culture reduce the frequency of health and safety incidents.⁴ Thus, a reduction in incidents can be achieved by encouraging positive safety behaviour amongst workers,⁵ which includes open communication policies, the rapid reporting of incidents, and training programmes.⁶

Psycho-social factors to consider when analysing health and safety incidents include extended working hours, improper use of personal protective equipment (PPE), lack of training, ignorance, little or no experience, age, and lack of supervision and resources.⁷ Extreme weather patterns also play a role.⁸

There is limited data regarding the types of health and safety incidents and their causes in power utilities. In this paper, we compare the different types and reported causes of health and safety incidents in the various sectors of a power utility in the Eastern Cape province of South Africa.

METHODS

This was a quantitative descriptive cross-sectional analysis of data from the power utility's Systems, Applications and Products in Data Processing of Environmental Health and Safety (SAP EH&S) database, for the period 2015 to 2019. The database is used to manage all health and safety incidents from the time of occurrence, through processing, to implementation of corrective measures, and is used by the health and safety officer to capture, store, and draw reports and information about health and safety incidents.

Health and safety incidents are reported to the supervisors by the workers as soon as possible. The supervisors notify the managers and the health and safety department immediately, and the incident is recorded on the SAP EH&S system within 48 hours after notification by the supervisor. South African legislation requires the employer to investigate a health and safety incident within seven days of occurrence,⁹ to determine the causal factor of the incident and to establish corrective and preventative actions.

Table 1. Health and safety incident types, 2015–2019 (N = 614)

Type of incident	Sector																	
	Aliwal North		Butterworth		East London		Grahamstown		Lukhanji		Matatiele		Mthatha		Uitenhage		All	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Motor vehicle accident	62	83.8	39	70.9	39	63.9	26	65.0	126	82.9	59	79.7	96	86.5	35	74.5	482	78.5
Damage to equipment	4	5.4	8	14.5	3	4.9	3	7.5	13	8.6	10	13.5	2	1.8	5	10.6	48	7.8
Operating error	3	4.1	2	3.6	1	1.6	0	-	5	3.3	1	1.4	3	2.7	1	2.1	16	2.6
Falls	3	4.1	0	-	3	4.9	5	12.5	2	1.3	0	-	1	0.9	1	2.1	15	2.4
Hand injury	1	1.4	0	-	6	9.8	2	5.0	1	0.7	0	-	1	0.9	2	4.3	13	2.1
Insect/animal bite	0	-	1	1.8	5	8.2	2	5.0	1	0.7	1	1.4	3	2.7	0	0.0	13	2.1
Electrical contact	0	-	2	3.6	1	1.6	0	-	2	1.3	1	1.4	3	2.7	2	4.3	11	1.8
Eye injury	1	1.4	1	1.8	1	1.6	0	-	2	1.3	2	2.7	2	1.8	1	2.1	10	1.6
Back injury	0	-	1	1.8	0	-	1	2.5	0	-	0	-	0	-	0	-	2	0.3
Struck by moving object	0	-	1	1.8	1	1.6	1	2.5	0	-	0	-	0	-	0	-	3	0.5
Near miss	0	-	0	-	1	1.6	0	-	0	-	0	-	0	-	0	-	1	0.2
Total	74		55		61		40		152		74		111		47		614	

Data Analysis

The health and safety incidents were categorised as back injury, damage to equipment, electrical contact, eye injury, fall incident, hand injury, insect or animal bite, motor vehicle accident, near miss, operating error, 'slip, trip, and fall', or struck by moving object. Findings were compared between the sectors and reported as basic counts and frequencies.

The power utility granted permission to analyse the health and safety incident data. The study was approved by the Faculty Research Committee of the Central University of Technology, Bloemfontein, and the Health Sciences Research Committee of the University of the Free State (Ethics clearance number UFS-HSD2020/1714/2302).

RESULTS

Health and safety incidents

Six hundred and fourteen health and safety incidents occurred in the period 2015 to 2019 (Table 1). The most common incidents in all eight sectors, and overall, were motor vehicle accidents (n = 482, 78.5%), followed by damage to equipment (n = 48, 7.8%). Other notable incidents were falls (12.5% in Grahamstown), hand injuries (9.8% in East London and 4.3% in Uitenhage), animal/insect bites (8.2% in East London), and electrical contacts (4.3% in Uitenhage and 3.6% in Butterworth). Only one near miss was reported in East London.

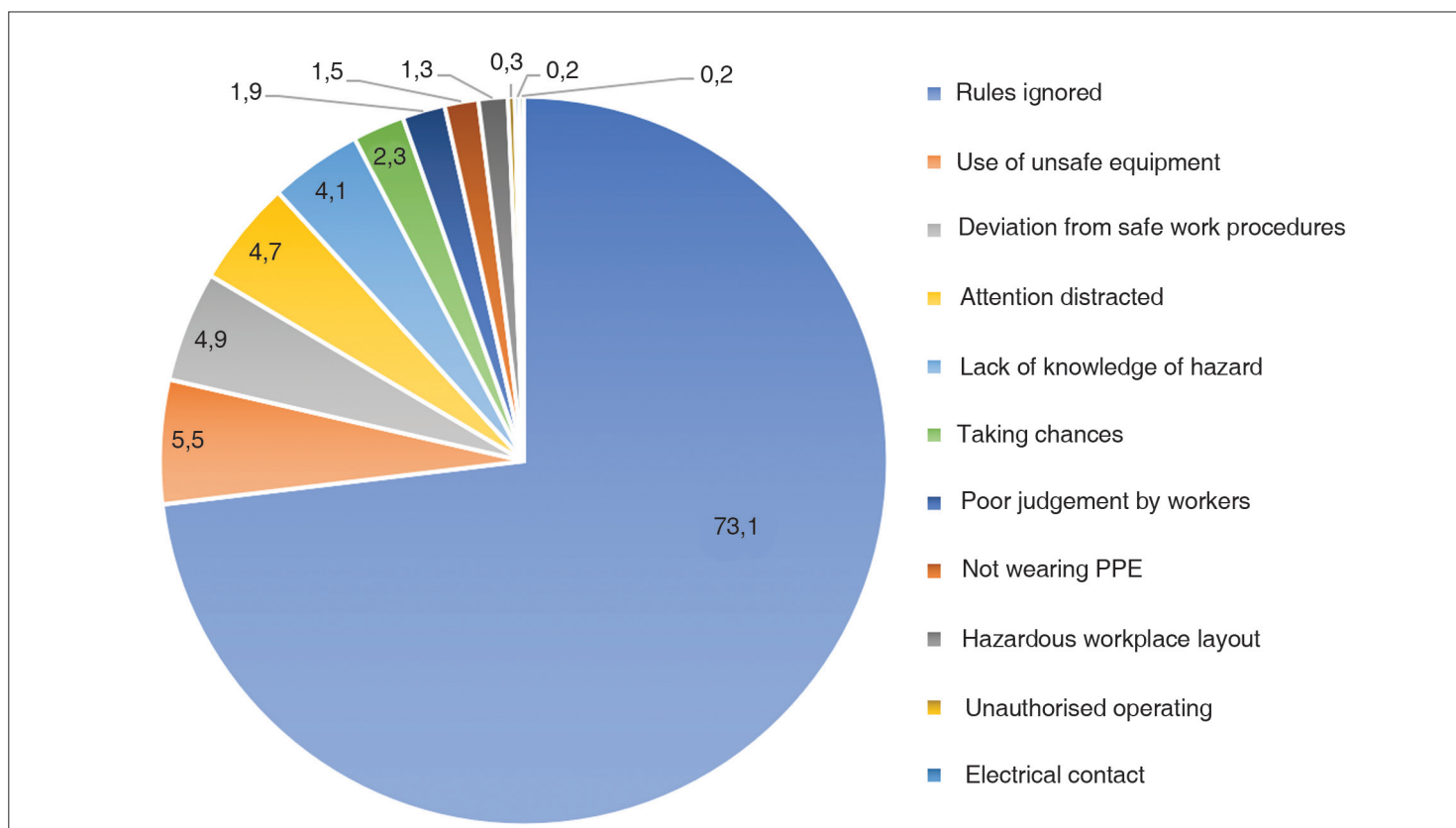


Figure 1. Factors contributing to workplace health and safety incidents, 2015–2019 (N = 614)

As shown in Figure 1, the highest proportion of health and safety incidents were reported to be caused by workers ignoring safety rules ($n = 449$, 73.1%). Other causes were the use of unsafe equipment ($n = 34$, 5.5%), deviation from safe work procedures ($n = 30$, 4.9%), distraction of attention ($n = 29$, 4.7%), and lack of knowledge of hazards ($n = 25$, 4.1%).

DISCUSSION

Industries that have **high-risk** or construction-related activities are known for their poor performance regarding health and safety, which translates into high accident and injury rates.⁸ Economic growth in both low- and middle-income countries and high income countries can be adversely affected by high rates of workplace health and safety incidents.^{10,11}

The activities performed at the different sectors of the power utility are regarded as being high risk and result in health and safety incidents, and injuries. Motor vehicle accidents were the most frequent type of incident type in the eight sectors of the power utility in the Eastern Cape province, followed by damage to equipment, operating errors, falls, hand injuries, and animal/insect bites.

More motor vehicle accidents were reported in the Lukhanji and Mthatha sectors than in the other sectors. These two sectors provide maintenance on the distribution network in the rural parts of the Eastern Cape. The workers drive long distances on gravel roads to maintain and repair electricity network structures. The condition of the roads is poor, which contributes to the occurrence of road accidents. Fatigue can be induced by long driving distances on gravel roads. There is a correlation between driver drowsiness and motor vehicle accidents. Fatigue reduces concentration and leads to poor decision making and errors when driving. The frequency of motor vehicle accidents in the power utility could be reduced by drivers taking regular rest breaks during long-distance driving. The development of a travel route risk assessment tool is necessary to ensure that the drivers are aware of the road conditions before undertaking a journey.

Incidents related to damage to equipment made up almost 8% of all reported incidents. Safe work procedures are developed for every task performed by the workers in the power utility, which, if followed, ensure the protection of workers against injury and equipment against damage. It is essential to communicate safe work procedures effectively and regularly to the workers.

Incidents due to operating errors were also relatively common in the eight sectors of the power utility, and occur when workers fail to follow instructions from the controller while operating on the electrical network. Training workers on operating instructions promotes awareness of safety risks associated with operating errors. Regular assessments of operating procedures, including observations of workers, can assist in evaluating competencies.

Falls were also relatively common incidents in the power utility; workers use fall arrest systems when working at heights, but unsafe use of such systems leads to injuries and fatalities. Training and awareness about the safe use and limitations of the fall arrest system are important in preventing falls.

Hand injuries result in worker disability, reduced productivity at the workplace, and significant financial burden. A lack of awareness of physical risks while performing high-risk work is a barrier to preventing hand and other injuries.

Animal/insect bite injuries made up a small proportion of the incidents. Animals and insect bites are common in rural areas, although not necessarily directly related to the workplace. There should be a facility at the workplace to deal with poisonous and venomous bites, including snake bites, dog bites, cat bites, bee stings, etc.

Despite that fact that South African legislation requires the reporting of near-miss incidents in the workplace,¹ only one such incident was reported across the eight sectors in the five-year study period. Lack of reporting of near misses hinders the identification and implementation of preventive measures that may reduce the occurrence of injuries.¹² It is important to train workers about the importance of reporting near-miss incidents from a legislative point of view, but even more importantly, to avoid injuries in the future. Near-miss incidents can be used to identify workplace hazards and implement measures to prevent health and safety incidents from occurring.

In industries where workers perform high-risk activities, the employer must conduct observations of the workers' activities. There appeared to be a lack of personal safety responsibility among workers in the eight sectors of the power utility, as most of the health and safety incidents were reportedly caused by workers ignoring safety rules. Motor vehicle accidents, damage to equipment, hand injuries, falls, and operating errors could be attributed to negligence and disregard of protocols and safety rules. This suggests that there is a strong relationship between employee attitudes and health and safety incidents. Stringent measures are needed to enforce legislated employee safety responsibilities in the workplace. Health and safety incidents can be reduced if workplace health and safety culture and employee attitudes and behaviour are aligned.

One of the limitations of our study was that the analysis of health and safety incidents was confined to the power utility's maintenance and operations department in the Eastern Cape province. Incidence per sector could not be calculated as we did not have information about the size of the workforce in each sector. We did not investigate associations between incidents and causes, beyond what was reported. Future analyses of the power utility's health and safety data could include the association of incidents with socio-demographic factors, such as age and duration of employment, awareness and perceptions of hazards in the workplace, and workplace factors.

The power utility in the Eastern Cape province is in the early stages of implementing a health and safety management system, which could reduce the frequency of health and safety incidents and improve health and safety performance. The data should be analysed again after the management system has been implemented to evaluate the success of the intervention.

CONCLUSION

Motor vehicle accidents, damage to property, operating errors, falls, hand injuries, and animal/insect bites were reported in the eight energy utility sectors in the Eastern Cape province in the period 2015 to 2019. Workers ignoring health and safety rules was the most common recorded cause of these incidents. Training workers on the importance of reporting incidents, including near misses, would go a long way to reducing the frequency of health and safety incidents. The implementation of a health and safety management system can improve the health and safety culture at the power utility.

KEY MESSAGES

1. Motor vehicle incidents were the most common type of health and safety incident in the power utility in the Eastern Cape province.
2. Ignoring health and safety rules at work is associated with occupational injuries.
3. The implementation of a health and safety management system might reduce the frequency of health and safety incidents in the eight power utility sectors.

DECLARATION

The authors declare that this is their work; all the sources used in this paper have been duly acknowledged and there are no conflicts of interest.

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AUTHOR CONTRIBUTIONS

Conception and design of the study: NQ, KL

Data acquisition: NQ

Data analysis: NQ, KL

Interpretation of the data: NQ

Drafting of the paper: NQ, KL

Critical revision of the paper: NQ, KL, NM

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