

***PROACTIVE MEASURES TO PREVENT ACCIDENTS DUE TO ELECTROCUTION  
FROM RECURRENCE.***

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**Abstract**

In Maharashtra there are various companies working in different power sector. In power generating Mahagenco, Tata power, Reliance power, KSK, Adani power, Indiabulls, JSW energy, Abhijeet, Suzlon. In power transmission Mahatransco, Tata power, Reliance power, Adani power, Indiabulls. In power distribution Mahadiscom , Tata power, Adani power, Best and in power trading Indiabulls, NTS,DM Corporation and Knowledge is power. Electrical accidents happened in various location and in all companies. In spite of training and timely updation about safety,number of accidents are increasing trend. In this research we are concentrating on those accidents that are occurred in distribution area in few district of Maharashtra.

Keywords: Fatal, non-fatal, Fire, Electrocution, Accident

**Introduction**

It is inconceivable to imagine modern society functioning without electricity. Ensuring universal access to electricity is the aim of the 2003 Electricity Act [24]. Even though our country is becoming more developed, electrocution incidents continue to occur. It is impossible to tell the difference between a live line and a deadline just by looking at them; electricity is invisible. Ignorance has led to both fatal and non-fatal electrical accidents involving humans and animals. An unpleasant, unanticipated, and unexpected incident that results in either property damage, human casualties, or both is called an accident.

Human error, HRM's contribution to fewer departmental employee electrical accidents at Power Distribution Company, and the efficiency of pertinent public awareness campaigns in lowering the incidence of outsider accidents are all examined in this study. According to data from the National Crime Records Bureau, [27] there are an unsettlingly high and increasing number of electrical accidents that result in people electrocuting themselves. Below is a comparison of the rise in incidents related to electrocution from 2018 to 2022.

(Table 1: Statical data of electrocution cases in Maharashtra)

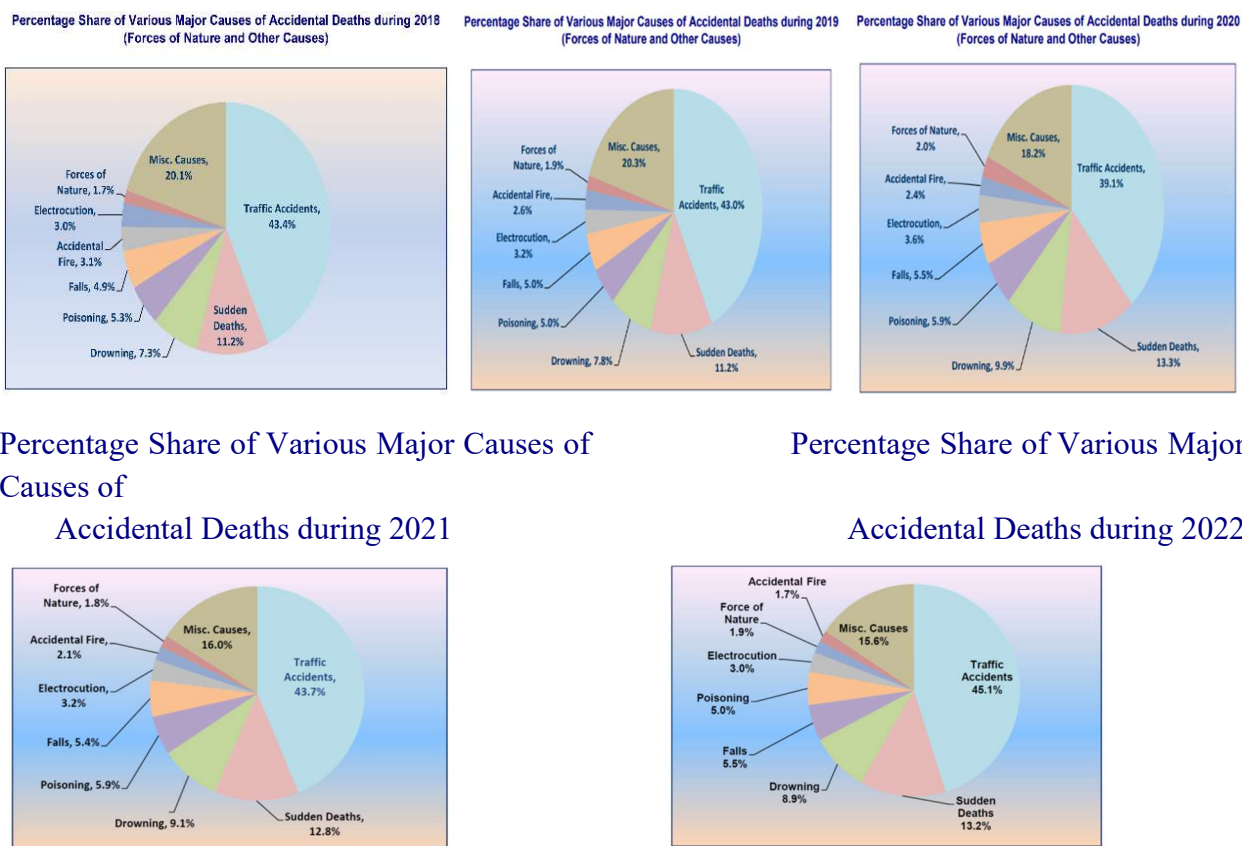
Sr.No.	Years	Male	Female	Total
1	2017-18	1157	276	1433
2	2018-19	1269	230	1499

3	2019-20	1271	279	1550
4	2020-21	1134	236	1370
5	2021-22	1230	218	1448

(Source: www.ncrb.gov.in)

From the last five years data of Maharashtra, it is observed that every year people die due to electrocution irrespective of gender. The number of males were more than eleven thousand and female were more than two hundred. So every year nearly more than @ fourteen hundred fatal accidents were occurred. It means educating them about fundamental use of electricity is needed of today to avoid the recurrence of incidents.

(Fig 1: Statical data of various types of accudents cases in Maharashtra)



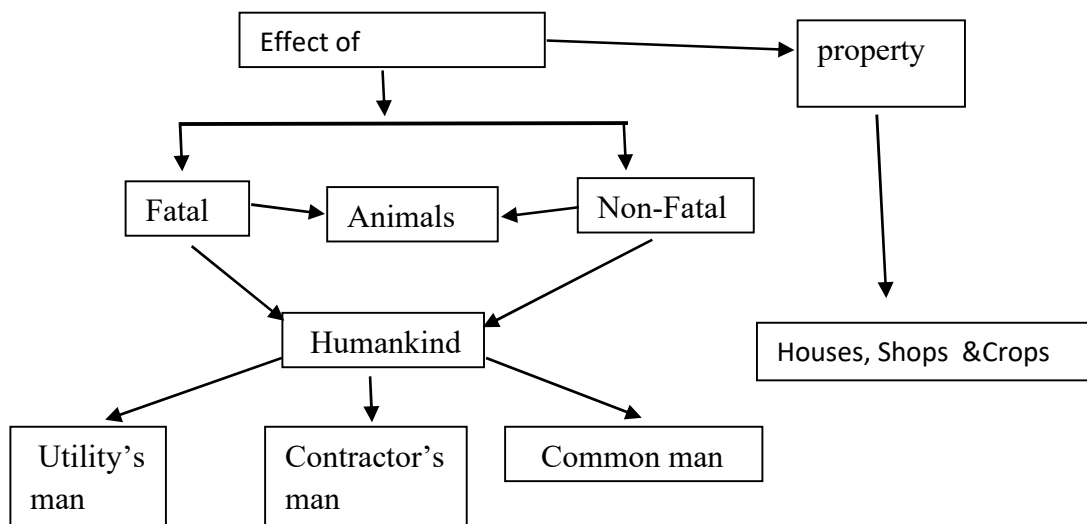
(Source: www.ncrb.gov.in)

In above graphical representation, it is seen that in the last five years, the percentage of electrocution-related accidents is almost in the range of 3.0% to 3.6% out of total various causes of accidental deaths .

### Reasons for Conducting the Study

Effect of electrocution is to both humankind and animals. It has also resulted in destroying properties. Humans and animals are suffering to fatal or nonfatal. It is illustrated in the following diagram below.

(Fig2: Effect of electrocution)



It's time to remind people how to use electricity safely. Why is it required? Why do you feel the need for protection? because safety and accident rate have an inverse relationship. What does an accident consist of? An accident may indicate a safety protocol violation. Both humans and animals can be affected by this sub-insight, which is categorized as either fatal or non-fatal.

### **An analysis of previous studies and any gaps**

Not much research had been done on industrial safety and accidents, especially with regard to workers in the power industry, according to a review of the literature. Consequently, the safety procedures that are currently in place in the manufacturing sector are putting the required safety laws and regulations into practice. Their main goal is to keep an eye out for potential risks and regulate employee behavior to ensure that safety rules are followed.

In an analysis of occupational injuries, M. M. Bagali [3] emphasized the importance of personal protective equipment. On the other hand, effective use, appropriate PPE, and management strategies are required.

Many academics have made recommendations regarding the safety of mechanical and industrial accidents. However, no comprehensive research has examined the causes of power utility-related accidents or outside accidents caused by mismanaged electrical equipment or infrastructure. How can electrocution incidents involving innocent individuals be avoided?

What options do they have for corrective action, and how can a safety culture be established? Because it doesn't go into enough detail about applying safe operating procedures and using safety tools appropriately, there is a gap in the literature.

The research will concentrate on the frequency of electrical accidents in Maharashtra and the need for the state's power distribution companies to lower these occurrences.

A review of the incident involving departmental, contractor labour, and innocent people does not currently exist in the literature.

### **The purpose of the research**

- 1) Finding the causes of the accidents in the designated area
- 2) To investigate the efforts being made by the public and the utility to reduce the accident rate using corrective and preventive measures.
- 3) To ascertain the quantity of noteworthy incidents that have occurred.
- 4) To make recommendations for actions that will help prevent or lessen accidents and guarantee safety
- 5) The goal of the study is to create a plan of action for the safety management team's proactive approach to preventing incidents involving departments, outside parties, and outsourcing.
- 6) It should be accident-free.

### **Research Methodology**

The study's methodology includes a sizable portion of data gathered from structured interviews, questionnaires, and analysis methods, along with updated research on sites that require attention.

Secondary information taken from a range of media, including periodicals and newspapers. A survey and questionnaire are available for a range of individual behavior and awareness programs based on usefulness and their effects on the community.

For the full analysis of errors in rural and urban settings, separate analytical studies are carried out. Information about the research methodology employed has been attempted to be provided.

Employer reports of accidents, safety guidelines, information about safety equipment, accountability secure with reasons for security guidelines and guideline violations, etc., and the significance of preventing accidents as well as the legal requirements meant to ensure safety in that area are all used in the study. Detailed accident reports from various locations and analyses thereof are also used.

Every electrical mishap is investigated from the standpoints of the public and services, the electric link, the individual sources, the accessible resource, and the location. Individual performance issues can stem from a variety of factors, including age, living standard, capacity to give, occupation, town, sex, training, and a host of other factors connected to past mistakes.

### **Range of the Study**

The Maharashtra State Electricity Distribution Company's frontline and back-office employees in a few districts of the state, along with a sample of residential, commercial, industrial, and agricultural consumers, were the only participants in the study.

Separate questionnaires are made in the local language for the public and employees. The divisions where accidents happened over the preceding three years provided the employee data.

### **In-group interview**

In-group interviews were used to interview members of various groups, including domestic, commercial, industrial, and agricultural consumers in the vicinity of the accident. An overview of some general expectations was given to the group, including information on load shading, planned and unplanned outage management notifications, planned and unplanned electrical safety awareness programmes, the value of earthing, the use of protective appliances, service connection issues, electrical installations, and basic electricity use.

In rural and remote area, consumers dare to handle electrical problems on their own knowledge. Electricity is need of everyone, but proper precaution or safety measures are ignored. In discussion with relatives of victims in case of outsider, there are certain facts which should be resolved /addressed at proper time. The basic knowledge of fundamental use of electricity must be made available to layman and farmers.

### **Sample size**

Sample size are decided on basis of population ,possibility, level of confidence and margin of error. In this pilot study interviews were conducted with 92 employees of utility which includes working frontline employees, supervisors, engineers, and operators of substations. The employees inclusive of junior employee to senior level officers.

In case of peoples 55 interviews and six numbers of public seminars at accident places has given some relevant information about occurrence of mishap there. Innocent people inclusive of all categories of consumers. The age range in case of peoples were from 18 years to 55 years. It is tabulated as below.

(Table2: Employee survey)

Sr. No.	Particular	Number of respondents	Percentage of respondents
1	Frontline	56	60.86%
2	Supervisor	10	10.86%
3	Operators	12	13.04%
4	Engineer	14	15.21%
Total			100%

(Table3: Common man survey)

Sr. No.	Particular	Number of respondents	Percentage of respondents
1	Household	28	43.75%
2	Business	11	17.18%
3	Industrial	08	12.5%
4	Agriculture	17	26.56%
Total			100%

### Research Results and Accident Causes

Since every location has a unique set of factors that contribute to accidents, no two locations can use the same remedy. In some respects, the study of behaviour- and need-based safety training will be beneficial. The primary causes of accidents were unsafe behaviour, hazardous conditions, and uncontrollable events like storms, earthquakes, floods, etc. Overconfidence, haphazard work, carelessness, and a contempt for safe operating procedures are characteristics of the unsafe act. Unsafe conditions include things like defective appliances, a lack of knowledge or experience, dangerous equipment, a shortage of safety supplies, and a lack of task instructions.

It was discovered that the tender documents had omitted information about the human resources division's liability responsibilities as well as some specific safety requirements for hiring contractors. When hiring operators or workers for outsourcing, standard tender conditions ought to be followed. The best employees are those who have received training and expertise. Electrical

inspectors should grant authorization. Common outsider accident causes include work done beneath overhead power lines or unauthorised building additions.

(Fig3: Extension of construction below line)

(Fig4: In



Agriculture use starter is kept on ground.)

It was noted that because they rely on the overhead conductor for security, pipes are installed in it.

It was found that there is insufficient room, both horizontally and vertically, between the buildings, other structures, and the electrical network. As per the Center Electricity Authority 2023 regulation [ 23 ] "**62. Clearance from buildings of lines of voltage and service lines not exceeding 650 V.** – (1) An overhead line shall not cross over an existing building as far as possible, and no building shall be constructed under an existing overhead line.

(2) Where an overhead line of voltage not exceeding 650 V passes above or adjacent to or terminates on any building, the following minimum clearances from any accessible point, on the basis of maximum sag, shall be observed, namely: –

(i) for any flat roof, open balcony, varandah roof and lean-to-roof, –

(a) when the line passes above the building, a vertical clearance of 2.5 metre from the highest point, and

(b) when the line passes adjacent to the building, a horizontal clearance of 1.2 metre from the nearest point;

**63. Clearances from buildings of lines of voltage exceeding 650 V.** – (1) An overhead line shall not cross over an existing building as far as possible and no building shall be constructed under an existing overhead line.

(2) Where an overhead line of voltage exceeding 650 V passes above or adjacent to any building or part of a building, it shall have, on the basis of maximum sag, a vertical clearance above the highest part of the building immediately under such line, of not less than, –

(i) for lines of voltages exceeding 650 V and up to and including 33 kV – 3.7 metres;

(ii) for lines of voltages exceeding 33 kV - 3.7 metre plus 0.30 metre for every additional 33 kV or part thereof.

(3) The horizontal clearance between the nearest conductor and any part of such building shall, on the basis of maximum deflection due to wind pressure, be not less than, –

(i) for lines of voltages exceeding 650 V and up to and including 11 kV - 1.2 metres;

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(ii) for lines of voltages exceeding 11kV and up to and including 33 kV - 2.0 metre;

(iii) for lines of voltages exceeding 33 kV - 2.0 metres plus 0.3 metres for every additional 33 kV or part thereof."

Standard safety equipment should be provided by the company to its employees. The outsourcing process should be managed by a knowledgeable committee.

Agricultural installations are not typical; starters that are defective are used and kept on the ground. According to the suggested guideline, the Dummy line needs to be kept apart. An installed overhead line typically covers a section of a street, other public area, or any consumer property that is not shielded by earth guarding[8].

Faults in consumer installations and cost-cutting electrical structure modifications are examples of unauthorised power supply to fences built around farms to keep wild animals out.

### **Analyses of accidents**

It is discovered that some accidents could have been prevented if a simple precaution had been taken at the time after carefully examining a variety of accidents and closely examining a few of them. The precautions listed below are helpful and mostly helpful. The research study produced the following appalling findings.

It is found that most incidents involving strangers happened in consumer spaces because the individuals involved were unaware of the basic applications of electricity[7]. Customers may reduce accidents if they are made aware of the use of tripping circuits like AFDD, RCCB, and ELCB.

When performing work near electrical installations, coordination between the utility and other local departments is required. There should never be a compromise on safety; all local departments must adopt and adhere to common safety norms and regulations.

Furthermore, it has been noted that common people have been involved in accidents due to a failure to take appropriate precautions when working in close proximity to electrical installations. When handling the situation of working close to electrical installations, one may not be aware of the severity of the electricity or may have the wrong impression.

### **Methods of mitigation to prevent mishaps.**

It is possible to prevent and control accidents. An electrical mishap is an unforeseen circumstance. An accident's nature may vary depending on its location. Accident prevention is essential. It will lessen or eliminate negative effects or consequences of social, economic, legal, and human aspects of society at large if everyone takes responsibility for their own safety and there is proper planning in place. With their inexperience, youthful workers exhibit recklessness and overconfidence in their work. They believe that their experience negates the need for protective gear.



Safe working practices must be followed in order to prevent and eliminate accidents. Safety rules and regulations must be enforced in the workplace.

Raising employee and family safety awareness in work-related and everyday situations is critical for our organisation. It is necessary to inform the public. The public can support the promotion of safety precautions.

### **Suggestions**

It is imperative to give careful public awareness campaigns top priority. Psychophobia should be deeply embedded in the thoughts of both the general public and employees, with a focus on highlighting the strict measures taken against unfair practices and the uncompromising stance taken against unsafe working conditions. Discharge rods are required for departmental workers when working on overhead lines. If workers are not using safety devices, a way to lock the system should be devised. It's unclear how T&P should be provided for outsourcing resolution. Workers cannot be contracted out before they have undergone the required training.

Any unauthorised construction should be notified of extensions below lines with a formal, legally sufficient notice that is formatted correctly. In addition to forming a safety committee, local authorities should monitor any electrical infrastructure violations that fall under their jurisdiction.

### **In summary**

Accident rates are rising because of unfair business practices and shortcuts. It should be carried out by one man, one task at a time. Variety in mental tasks is detrimental to physical activity because it makes it easier to lose focus on the task at hand. Before starting work, make sure that all necessary safety precautions have been taken. Work should not start until the mechanism for the complete safe operating procedure has been developed.

It is necessary to develop the mechanism for the comprehensive safe operating procedure. Our investigation and analysis of accident cases has led us to conclude that, provided a prescribed procedure is not followed, we have control over the outcome of accidents. In this situation, what would be the best course of action?

- 1) Ascertain the nature of the work.
- 2) Examine the associated risks.
- 3) Techniques for reducing
- 4) Strategies for mitigating
- 5) In what situation will things get the worst?
- 6) Should you set your work as a priority?
- 7) Took precautionary action.
- 8) A system of interlocks in case things spiral out of control.
- 9) Double or triple check information before starting any work.
- 10) An instantaneous safety alert that notifies the user that using safety devices or following safe operating procedures is necessary.

According to accident analysis, individuals who are not technically trained were involved in more accidents than any other group. This lends credence to the theory that one's confidence when working on electrical installations is bolstered by technical knowledge.

In an emergency, technical expertise can be useful in determining the best course of action for safety.

### **Where are the absent links located? in preventing accidents.**

People compromise their electrical safety to install things more affordably. They use non-standard and inferior appliances. Is there a possible deficiency in consumer awareness? Individuals who handle electricity don't have the skills or background needed to perform their jobs effectively. The public ignored the security most of the time. Laws should be enforced by the government, and sanctions and criminal prosecutions should be available. To guarantee correct implementation, it is crucial to create separate regulations for monitoring.

### **Holistic Approach Towards Electrical Safety**

Three categories exist for electrical safety Managing Systems, Humans, and Equipment  
A Comprehensive Perspective on Human/Employee Safety. Ability to perform a task with skill. knowledge of appropriate action. Willingness to put in the effort Expertise in knowing how to act. One can characterise a qualified individual as being: Capable of understanding the risks related to electricity Able to identify electrical dangers when they are

Ability to Avoid Electrical Hazard; Understanding of System Construction, Operation, and Maintenance. Equipment with inherent safety features is preferred for safer electrical environments. However, even though these features are more expensive initially, they will eventually become more cost-effective. As per Regulation 12 of the CEA 2010 (Measures Relating to Safety & Electric Supply), [23] materials and equipment must meet the applicable standards set by the Bureau of Indian Standards or the International Electro-Technical Commission, where applicable standards have already been established.

### **Proactive steps to stop electrocution incidents from occurring in the future.**

Make it easy for your clients and departmental or outside workers to handle electrical appliances, obtain safety information, and follow safe operating procedures to reduce the risk of electrocution. Easy complaint procedure with prompt resolution; they'll make it easier for you to recover. told customers or staff how the distribution company's services should be used.

When something breaks, they are the first to notice it. Safety concerns are given top priority. The best in the industry use feedback from letters, calls, and surveys to determine the main causes of customer dissatisfaction, address them, and alter the perception of safety to quickly satisfy customers.

A safety table for carrying out precautionary measures to prevent mishaps.

- 1) Verification of work prior to completion
- 2) The availability of work-related safety equipment
- 3) Safe practices for operations
- 4) Adequate locking mechanism

- 5) Training repetition
- 6) Proper kind of safety equipment.
- 7) A thorough plan in place before beginning any work, whether it be emergency or repair, by departmental or external staff.
- 8) Prompt correction of small errors.
- 9) Strict instruction
- 10) Applying safety gear
- 11) Action against defaulters
- 12) Defaulter names are published
- 13) Those who work safely are rewarded.
- 14) Powerful awareness technique

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