

Analysis of the major causes of accident and standardize the safety measures for the electricity distribution system

By

Md. Siful Islam



A Project submitted in partial fulfillment of the requirements for the degree of Master of Science in Engineering in Industrial Engineering and Management.

Khulna University of Engineering & Technology
Khulna 9203, Bangladesh.




Declaration

This is to certify that the project work entitled 'Analysis of the major causes of accident and standardize the safety measures for the electricity distribution system' has been carried out by Md. Siful Islam in the Department of Industrial Engineering and Management, Khulna University of Engineering & Technology, Khulna, Bangladesh. The above research work or any part of the work has not been submitted anywhere for the award of any degree or diploma.


24/03/09.

Professor Dr. Md. Kutub Uddin
Head
Department of Industrial Engineering and Management



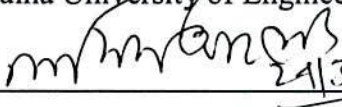

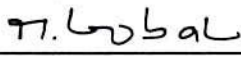

28/03/09

Md. Siful Islam
Roll No. 0611505

Approval

This to certify that the project work submitted by Md. Siful Islam entitled 'Analysis of the major causes of accident and standardize the safety measures for the electricity distribution system' has been approved by the Board of Examiners for the partial fulfillment of the requirements for the degree of Master of Science in Engineering in the Department of Industrial Engineering & Management, Khulna University of Engineering & Technology, Khulna, Bangladesh in March 2009.

BOARD OF EXAMINERS

1. 
24/02/09
Professor Dr. Md. Kutub Uddin
Department of Mechanical Engineering
Khulna University of Engineering & Technology
Chairman
(Supervisor)
2. 
24/03/09
Head of the Department
Department of Industrial Engineering and Managements
Khulna University of Engineering & Technology
Ext. Officio
3. 
24/3/09
Professor Dr. Naseem Ahmed
Department of Mechanical Engineering
Khulna University of Engineering & Technology
Member
4. 
24/03/09
Professor Dr. Tarapada Bhowmick
Department of Mechanical Engineering
Khulna University of Engineering & Technology
Member
5. 
24.3.09
Professor Dr. Engr. Mohammad Iqbal
Department of Industrial & Production Engineering
Shahjalal University of Engineering & Technology
Member
(External)

Acknowledgement

First of all the author would like to convey his gratitude to the Almighty Allah without his blessing not a single activity on earth come to in success.

The author also would like to convey his gratitude and respect to his respected teacher and supervisor Dr. Md. Kutub Uddin, professor & Departmental head, Industrial Engineering & Management, KUET, Khulna whose active guidance through the project period enabled the author to complete it. Without his valuable suggestions and generous support from the beginning of the project, completion of the project was near to impossible. To integrate the entire materials & present it at a standard level, at the same time, ensuring continuity between chapters an uphill task and it was possible due to recommendations and directions from the supervisor whose keen eyes and attention to details continually amazed the author. After all without his support this project would not have taken this shape.

Author is grateful to all teacher and staffs of Industrial Engineering & Management, KUET, Khulna for their cordial cooperation during the course. Special thanks to Sikder Mainul Hasan, Assistant Professor, Md. Lutfor Rahman, Assistant Professor & Azizur Rahman, Lecturer of IEM dept. KUET, Khulna for their valuable suggestions and encouragement to author time to time.

The author would like to thank A N M Asadullah, Manager Unit-1, Sk. Shahiduzzaman, executive engineer (I&C), Md. Nurul Islam, former executive engineer (I&C) of Khulna Power Station, BPDB who provided necessary executive support through the M.Sc Engineering course and encouraged the author for completion such project. The author is indebted specially to Engg. Md. Rezaul Karim, Sub-divisional Engineer (I&C) of Khulna Power Station who helped the author in many ways due to which providing necessary effort in project work was possible. The author is also grateful to Md Arif Reza khan and Md. Rezaul Hoq, Assistant Engineer, Mechanical Maintenance Division of Khulna Power Station who contributed their valuable time and knowledge for preparing this project.

The author wishes to pay tribute to his beloved parents and special thanks to his wife for her support and tolerance in many ways to this project.

The author wishes to thank the professional staffs of different distribution organizations under the study. Md. Nazrul Islam, General Manager, Khulna PBS, Md Moslem Uddin, Executive Engineer, Division-3, WZPDCL to be added who contributed in many ways to provide necessary information that were essential for completion the project. The professional manner of the staffs, form top to bottom have supported this project for which the difficult task became more enjoyable. Special thanks go to Md. Kamruzzaman, Sub-divisional Engineer, Division-3, WZPDCL and Md. Alamgir Hossain, Junior Engineer, JPBS-2 for providing the author a lot of information to complete the dissertation.

The author is feeling gratitude to public whose sincere cooperation in answering the prepared questionnaire with attention & patience made this project possible.

Finally the author would like to remind those unnamed people with feeling of gratitude for their assistance to trace out the desired destination of the author during field visit.

24th March, 2009

The Author

ABSTRACT

Electricity distribution is a vast sector and it is stretched out over the whole country. Huge quantity of distribution line, line equipment, workers and public are involved in the system. The activities of the distribution system are mainly risky. The possibility of safety breaks in this system is very much for it's complex and risks involved operation. Death due to electrical shock is as usual news published in most of the Daily Newspapers.

For a country like Bangladesh due to economical and technological drawbacks and lack of giving proper importance of the sector, the management of distribution system in Bangladesh is still using very primitive methods with minimum or without using of personal protective devices (PPE) for completion of distribution system activities. Non availability of safety measures posses a great challenge to the workers enhancing the uncertainties and risks, resulting injury and accident. In this research, it is tried to explore the occupational safety problems that exist in distribution system in Bangladesh. It is also investigated, the possible hazards available in distribution system and tried to find out the main causes and agents responsible for accidents.

Keeping this view in mind, data for this project were collected from distribution systems as primary data through a prescribed questionnaire. Three sets of questionnaires were prepared; one for distribution system workers, one for managers and the another for public. Six distribution organizations were taken into consideration for data collection. During study, different categories of distribution system workers, managers and public were interviewed based on the level of technical knowledge, experience, intimacy with the accidents and also educational level. The sample was kept relevant considering the time and cost. Victim, witness, experienced workers and managers were included in the sample. The sample size was limited to 155 for distribution system workers, 20 for Managers and 175 for public. The different categories of workers were regrouped into four categories for the study purpose, such as High- skilled, Skilled, Semi- skilled and Un -skilled. 19% High-Skilled, 36% Skilled, 29% Semi-Skilled and 16% Un-Skilled workers were selected as sample to reflect the staffing pattern of a distribution system (**Appendix-A**). About 91% of workers experienced with accident during their work in distribution system. Personal negligence,

lack of experience, not to use PPE, absence of good working environment, over confidence and finally excessive work loads were also identified unanimously by workers as causes of accident. Most of the managers were agree with the causes mentioned by workers. Both the managers and workers mentioned that illegal use of electricity, tree adjacent to distribution line, improper clearance of line is the main causes of accident for public.

To prevent accident (in case of workers) 30.76% managers suggested to use PPE followed by 21.15% suggested for continuous supervision, 17.3% for raising awareness, 13.46% for training, 9.61% for ensure good work environment on distribution system works and 7.6% recommended for justified work load. For public safety, both the workers and managers provided some suggestion as- improving public awareness, operation to remove illegal connection and discourage public to plant trees near distribution line. As far as knowledge of rules and regulations is concerned about 7% workers know about Electricity Acts-1910. But most of them do not have any idea about Electricity Acts-1910. Moreover, the government departments responsible for looking after the workers right and occupational safety & health issues along with the working environment of distribution organization and surroundings were not active at all.

At last, some recommendations are made for the betterment of distribution sector. The proper application of the recommendations will be helpful to reduce the frequency of accidents and there by will be possible a sound operation of the distribution organizations as a whole.

Contents

	DESCRIPTION	Page
	Title Page	01
	Declaration	02
	Approval	03
	Acknowledgement	04
	Abstract	06
	Contents	08
	List of Tables	11
	List of Figures	12
	List of Appendices	13
	List of Abbreviations	14
	Chapter-1: Introduction	
	1.1 General	15
	1.2 Accident and Hazards	16
	1.3 Introduction to of distribution system	17
	1.3.1 Existing Distribution Organization in Bangladesh	17
	1.3.2 Activities Performed by Distribution Organization	19
	1.4 Background of the research	20
	1.5 Objectives	21
	1.6 Scope of the study	22
	Chapter-2: Literature Review	
	2.1 General	23
	2.2 present state of art of the research topic	23
	Chapter-3: Methodology	
	3.1 General	26
	3.2 Research Methodology	26
	3.2.1 Selection of Sample	27
	3.2.2 Sampling Technique	27

3.2.3	Period of Research	27
3.2.4	Instrument of Research	28
3.2.5	Procedures of Data Collection	29
3.2.6	Data Screening & Analysis	30
3.2.7	Interpretation of Results	30
Chapter -4: Data Analysis & Results		
4.1	Data Analysis (Based on the questionnaire of workers)	31
4.1.1	Categories of Workers based on skill	31
4.1.2	Accidents faced by workers	33
4.1.3	Analysis of past accident records	34
4.1.4	Accidents observed by the workers	36
4.1.5	Knowledge on hazards of workers	37
4.1.6	Hazards available in distribution system	38
4.1.7	Main causes of accidents	39
4.1.8	Recommendations for accidents prevention	41
4.1.9	Knowledge about Electricity Act-1910	45
4.2	Data Analysis (Based on the questionnaire for Managers)	47
4.2.1	Level of education of Manager	47
4.2.2	Hazards involved in distribution system	48
4.2.3	Knowledge about electricity act and other ordinances	49
4.2.4	Main causes of accidents in distribution system	50
4.2.5	Means of accidents prevention	51
4.3	Data Analysis for public accident based on ques. for workers)	52
4.3.1	Month wise accident records	52
4.3.2	Hazards available in distribution system	54
4.3.3	Main causes of accidents	55
4.3.4	Means of accidents prevention	56
4.4	Data Analysis for public acc. based on ques. for public)	58
4.4.1	Classification of accidents based on age group	58

4.4.2	Main causes of accidents	59
4.4.3	Means of accidents prevention	60
4.5	Data Analysis for public acc. based on the ques. for Managers	61
4.5.1	Main causes of accidents	61
4.5.2	Main obstacles to follow rules & regulations	62
4.5.3	Means of accidents prevention	65
Chapter-5: Discussion & Recommendations		
5.1	Discussion	66
5.2	Recommendations	69
References		73
Appendices		74

LIST OF TABLES

Table Number	Caption of the Table	Page
Table-1 :	Accidents faced by workers(Classification based on designation)	34
Table-2 :	Accidents faced by workers(Classification based on skill)	34
Table-3 :	Hazards involved in distribution system(As per worker's view)	38
Table-4 :	Record of safety tools of division-3 of West Zone Power Distribution Company	43
Table-5 :	Knowledge of worker's on Electricity Act	46
Table-6 :	Level of education of managers	47
Table-7 :	Hazards involved in distribution system(As per Manager's view)	48
Table-8 :	Knowledge of Manager's on Electricity Act and other ordinances	49
Table-9:	Means of accidents prevention(As per Manager's view)	51
Table-10:	Hazards involved in distribution system liable for public accidents	54
Table-11:	Main causes of accidents as per worker's view(In case of public accidents)	55
Table-12:	Main causes of accidents as per Public view(In case of public accidents)	59
Table-13:	Main causes of accidents as per Manager's view(In case of public accidents)	61

LIST OF FIGURES

Figure Number	Caption of the Figure	Page
Figure-1 :	Percentage of Worker's based on skill	32
Figure-2 :	Accidents faced by workers	33
Figure-3 :	Skill basis classification of Workers	35
Figure-4 :	Accidents observed by workers	36
Figure-5 :	Accidents classification based on severity	37
Figure-6 :	Conception of workers on hazards	37
Figure-7 :	Main causes of accidents (As per worker's view)	39
Figure-8 :	Main causes of accidents (Percentage)	40
Figure-9 :	Negligence for accidents occurrence	41
Figure-10 :	Means of accidents prevention from Manager's side	43
Figure-11:	Means of accidents prevention from Worker's side	44
Figure-12:	Main causes of accidents(As per Manager's view)	50
Figure-13:	Electrical accident record from July/07 to June/08	52
Figure-14:	The ways of prevention accidents	57
Figure-15:	Classification of accidents based on age group	58

LIST OF APPENDICES

Appendix No.	Description	Page
APPENDIX-A	Staffing pattern of PDB & PBS	74
APPENDIX-B	Minimum clearance of distribution line	75
APPENDIX-C	Safe distance of human body from electric line Current flow and its effect on human body The standard specification of tree trimming	76
APPENDIX-D	Complain record of Jessore Palli Bidyut Samity- 02(Calendar year 2007)	77
APPENDIX-E	Work plan of Jessore Palli Bidyut Samity-2(Fiscal year07- 08)	78
APPENDIX-F	Lineman tools record form(As per REB standard)	79
APPENDIX-G	List of Tools for complain centre(As per REB standard)	80
APPENDIX-H	Personal tools inventory form(As per REB standard)	81
APPENDIX-I	Line shut down form	82
APPENDIX-J	Photographs of different activities and tags of distribution system	83
APPENDIX-K	Questionnaire prepared for worker	86
APPENDIX-L	Questionnaire prepared for Manager	89
APPENDIX-M	Questionnaire prepared for Public	92
APPENDIX-N	Accident records of BPDB	94
APPENDIX-O	Record of accidents (for lineman) from 2000-2008	95
APPENDIX-P	Record of electrical accidents for fiscal year 07-08 collected from Purbanchal	96

List of Abbreviations

- WAPDA: Water and Power Development Authority
BPDB: Bangladesh Power Development Board
REB: Rural Electrification Board
DESCO: Dhaka Electric Supply Company
DESA: Dhaka Electric Supply Authority
PBS: Palli Bidyut Samity
WZPDCL: West Zone Power Distribution Comapy
MW: Mega Watt
LT Line: Low tension Line
HT Line: High Tension Line
CB: Circuit Breaker
LT: Line Technician
MR: Meter Reader
SBA: Switch Board Authority
ALM: Apprentice Lineman
CMO: Consumer Meter Order
SD: Service drop
PPE: Personal Protective Equipment
ROW: Right of Way
JPBS-1 & 2/ SPBS: Jessore Palli Bidyut Samity-1&2/ Satkhira Palli Bidyut Samity
AE/ SAE/JE: Assistant Engineer/ Sub Assistant Engineer/ Junior Engineer
XEN: Executive Engineer
GM/DGM/AGM: General Manager/ Deputy General Manager/ Assistant General Manager
SDE: Sub Divisional Engineer

CHAPTER 01

INTRODUCTION

1.1 General

Safety is a management tool used to manage hazards involved in a work while it is completing. It identifies the related problems, hazards and complexities etc. of a work and there by reduces the risks of occurrence of accidents. It is useful to create clean work environment that ensures the protection against any harm of workmen as well as working equipment. Thus, safety measures taken before starting work is useful to-

- Monitor working conditions, required equipment, compliance & working environment.
- Identify risks involved in the work so that precautions may be taken to reduce or avoid risks.
- Create response against accidents & injuries.
- Complete work within time successfully without causing any harm of valuable equipments or personnel engaged in the work.
- Improve the quality of work and environment.

Normally, everyone is following a level of safety in everyone's daily activities. Walking over a highway, except an abnormal, a normal people must walk over the footpath not over the middle portion of the high way because he knows that a great danger involved in it. No body jumps to get down from a bus while it is in running condition because it may cause a vital injury. The examples described above are the normal safety measures that are taken from the common sense of human being. Actually, safety is simply using common sense and judgment. If something appears to have the potential for injury, then that is the time to take steps to make sure the injury does not happen.

Consider the pipeline system for delivering water in a housing complex and a steam power station. In case of housing, the control system is very simple but for power station, it is not so. The temperature and pressure of water and steam at different stages of a power station are different and it is very high. The control system in case of power system is very critical.

Due to high temperature and pressure the possibility of safety breaks in a power station is very high. So, possibility of safety breaks and necessary safety measures are different in nature and in degree of sophistication that varies from work to work, Working conditions, work environment, equipment necessary and technology etc. are considerable factors.

In a power distribution system such as PDB, the activities involved are of different types and there exists a different level of voltage that is very much dangerous for workmen in case of insincerity & unsafe working environment.

1.2 Accident and Hazards

Hazard- The inherent potential to cause injury or damage to public health.

Hazards classification-The main hazards associated with the use of electricity are:

- electrical shock
- electric burns, both from current passing through the body and from the effects of arcing
- the effects of fire that has an electrical origin
- the effects of an explosion that has an electrical origin
- the effects of electromagnetic radiation [10]

Accident- An accident is an incident which has given rise to injury, ill health or fatality.

Classification of electrical accident

- **Electrical shock accident:** If electrical current of sufficient magnitude and duration passes through the body it may disrupt nervous system causing the painful sensation of electrical shock.
- **Burn accident:** Burn accident are of two types-
 - Electrical contact burn
 - Arc burn (flashover burn)- Arc burns are commonly associated with the failure of insulation in electrical equipment, leading to an arc developing in the air between adjacent conductors
- **Fire-** Fire accident which has an electrical origin may be following types
 - Wiring fault
 - Bad connection
 - Overloading

Overheating

- Explosions- Explosions which has an electrical origin may be the following types
Oil circuit breaker explosion
Flammable atmospheric explosion [10]

Causes of accident

There are two basic causes of accident- unsafe acts and unsafe conditions (environment)

Unsafe acts- not using safety equipment, not following procedures are example of unsafe acts.

Unsafe conditions- Exposed electrical wire, damaged personal protective equipment are examples of unsafe conditions.

Preventive measures for accident control

- Identify and correct hazards
- Immediately report any hazards like- exposed electrical wire, damaged personal protective equipment, damaged working equipment etc.
- Review past accident to find out the causes of accident
- Provide training on safety in such a way that no employee is attempt to any task without proper training.

1.3 Introduction to distribution Organization

Before entering into the detail analysis of safety problems in the next section a brief description about distribution Organization is given.

1.3.1 Existing distribution organization in Bangladesh

Different types of distribution organization exist in Bangladesh such as PDB, WZPDCL, DESA, DESCO and REB & PBS.

Rural Electrification Board

About 80% people live in village in our country. The figure was above 90% during 1970. After the liberation, the former policy maker of Bangladesh Government realized that to turn the economy into superior position, it was necessary to make energy especially electricity, available to the door of villagers. In those days, BPDB(Former WAPDA) was the only distribution organization present in Bangladesh and its electrification activities were town

oriented with a slow motion. The policy makers thought that the way to develop the country rapidly was the quicker electrification of villages. But rapid electrification was really impossible by existing WAPDA. Then the policy makers concentrated their focus to establish a new organization that will concentrate its activities only in rural areas. The conception was up to the stage of dream for few years. In 1977, the idea was again brought in day light & REB ordinance was circulated on 29th October of the same year. REB started its commercial mission in 1981 by electrifying a village near Savar Thana under Dhaka district with 500 consumers with a demand of 0.5 MW. The main function of REB is to distribute electricity in rural areas through Palli Bidyut Samity (PBS). But it also generates electricity in a small scale. REB purchase power from BPDB and then sales it to the consumers in rural areas. REB has so far constructed 1, 44,805 kilometers of distribution line connecting 42, 21,713 consumers in the system. Its present demand is 1044 MW and system loss is 16.51% with bill- collection rate of 99.39% [6].

Palli Bidyut Samity

Palli Bidyut Samity is the project of Rural Electrification Board. There are sixty seven PBS exists in Bangladesh. Almost in every district there is a Palli Bidyut Samity. Through 33KV line PBS purchases power from BPDB and sales to the consumers. Rural Electrification Board provides rules, regulations, technical and financial support to PBS & these rules regulations are approved by Palli Biduyt Samity Board. Palli Biduyt Samity Board consists of Board of directors who are directly elected by consumers.

Bangladesh Power Development Board

Bangladesh Power Development Board (BPDB) was created in May 1, 1972 by Presidential Order No. 59 after bifurcation of erstwhile Bangladesh Water and Power Development Authority. The BPDB is responsible for major portion of generation and distribution of electricity mainly in urban areas (except Dhaka city) of the country. The Board is now under the Power Division of the Ministry of Power, Energy and Mineral Resources. BPDB's vision is to provide quality and reliable electricity to the people of Bangladesh for desired economic, social and human development of the country undertaking institutional and structural reforms leading to the creation of a holding company [6].

West Zone Power Distribution Company

Western Zone Power Distribution Company (WZPDCL) is an enterprise of BPDB. It was separated from BPDB in 1st October 2003 and vendor agreement was committed in 1st April 2005. The working area of WZPDCL is over 21 districts of Barisal, Khulan and part of Dhaka division (greater Faridpur district).

Dhaka Electric Supply Authority (DESA)

To render quality service, reduce abnormally high system loss to an acceptable limit and to increase revenue collection in the greater Dhaka area, Dhaka Electric Supply Authority (DESA) was separated from the operations of the BPDB in 1st October 1991. This organization purchases electricity at 132KV-voltage level from Bangladesh Power Development Board. DESA has been supplied electricity through Siddirgonj, Ghorashal, Haripur, Hasnabad and Tongi Grid substation of BPDB.

Presently DESA is supplying electricity to 5.5 Lac consumers through 14 grids S/S, 31 nos. 33/11KV S/S and 8000 nos. of 11/.4KV S/S. Besides, there are 532 km 132KV transmission line, 952 km 33KV line and 5700 km 11/.4KV lines in DESA system.

Dhaka Electric Supply Company (DESCO)

Dhaka Electric Supply Company Limited (DESCO), incorporated as a public limited company in November 1996, under the companies Act. 1994, is responsible for distribution and supply of electricity in greater Mirpur Area. DESCO started its operational activities on 24th September 1998. At the beginning DESCO's consumer was 71,000 and the electricity demand was 75MW. Presently, number of consumer and maximum demand are 1, 09,490 and 150MW respectively.

1.3.2 Activities performed by distribution organizations

1. Construction of distribution line.
2. Inspection and maintenance of distribution line.
3. Operation of distribution line
 - Installation of energy meter, transformer, safety equipments and other equipments.
 - Load management and load shedding management.
 - Load balancing of phases.

- Technical data (voltage and current) collection for smooth operation distribution system.
- Taking actions for system loss reduction (Meter checking, Drive for remove illegal connection etc.)
- Attend to public complain.
- Tree trimming.
- Meter reading .
- Disconnection of consumers due to non-payment of bills [**Appendix-E**].

1.4 Background of the research

The frequency of accidents in distribution system is significantly high in our country. Since, electricity exists in invisible state and in contact with living beings, these cause accidents. No other sources of energy exist in such a state. Although people are informed of destructive power of electricity, they are not so conscious to keep them safe from electricity due to its invisibility. People cannot differentiate between a live line and a dead line in an open eye and it is one of the main cause of accidents in distribution system.

For a country like Bangladesh due to economical and technological drawbacks and lack of giving proper importance of the sector, the management of distribution system in Bangladesh is still using very primitive methods with minimum or without using of personal protective devices (PPE) for completion of distribution system activities. Non availability of safety measures posses a great challenge to the workers enhancing the uncertainties and risks, resulting injury and incidents and ultimately turned to sufferings of workforce, sometimes loss of human lives also.

The news of death due to electrical shock is a usual in daily Newspapers. News of accidents due to electrical shock published in the regional daily newspapers since January 2007 to June 2008 [**Appendix-P**] are collected and the figure is 80 (Eighty) (both for public & the workers) in which the number of death is 67 (Sixty seven) and wounded is 13(thirteen). The Newspaper covered the news mainly for greater Khulna and greater Jessore. During this short period the number of electrical accidents occurred is obviously high. If the whole country is taken into consideration, as per occurrence rate, the result must be an alarming.

In respect of our country, to collect information about any accident especially an unusual one like death due to electrical shock, railway accidents etc. is difficult. Public feel them unsafe to give comments about any accidents to police, any inquiry team, any news paper correspondent or any other law enforcing agencies. They have the belief that they may have run into trouble, a case may be filed and they may have to be witness and even they have to give witness in front of court. So, collecting information about electrical accidents by newspaper correspondent is very difficult. Beside this, most of the newspapers have not correspondents in remote area. As a result, the newspaper does not cover most of the news for lack of information. Beside these, mainly death injuries are covered by newspapers. The actual number of occurrences may be too much higher than our imagination.

Electricity distribution system is a vital sector of the country. Electrical accidents causes the system unstable sometimes. Once the workers got injured or die due to electrical accidents, the problem will not only faced by the particular workers but also their family as well as the distribution system management. When any worker or public becomes disable or die due to electrical shock, in some cases the victim's family losses the only earning member. The family goes utterly ruined and becomes destitute. The organization losses an expert worker. Electrical accidents sometimes causes interruption of power supply that results in hamper of power based activities. This has a bad impact on our economy.

1.5 Objectives

Electricity distribution is a vast sector and it is stretched out over the whole country. Huge quantity of distribution line, line equipment, workers and public are involved in the system. The activities of the distribution system are mainly risky. The possibility of safety breaks in this system is very much for it's complex and risks involved operation. The objective of the research work is to analyze the safety system of distribution system in a systematic manner and the specific objectives of this is as follows:

1. Summarizing the activities performed in a distribution system. Finding the hazards involved in each activity and the precautions to be taken.
2. Review some accidents that happened in different distribution system recently and analyzing the causes of safety breaks.

3. To recommend standard safety measures on the basis of the findings of the study.

1.6 Scope of the study

Data has been collected from the PBS and WZPDCL as the correspondents of REB and PDB respectively. While carrying out the research work, data was collected from the following six-distribution organizations.

- 1) Jessore Palli Bidyut Samity-01, Topsidanga, Jessore.
- 2) Jessore Palli Bidyut Samity-02, Monirampur, Jessore, Bangladesh.
- 3) Khulna Palli Bidyut Samity, Thikrabanda, Dumuria, Khulna, Bangladesh.
- 4) Satkhira Palli Bidyut Samity, Patkelghata, Satkhira, Bangladesh.
- 5) Division-2 of West Zone Power Distribution Company Bangladesh.
- 6) Division-3 of West Zone Power Distribution Company Bangladesh.

During study, different categories of distribution system workers (Foreman C and D, Switch Board authority-A,B and C, electrician-A,B and C, lineman-A,B and C, Meter reader, Server, Line technician, Lineman grade-1 and 2, Apprentice lineman, Meter repairer and Meter tester), managers and public were interviewed based on the level of technical knowledge, experience, intimacy with the incidents and also education level. Victim, witness, experienced workers and managers were included in the study. The respondents as interviewee were limited to 155 numbers for distribution system employees (High skilled-30, skilled-55, Semiskilled-45, and unskilled-25), 20 Managers and 175 public. In case of public accident, 15 accident places were visited and 175 related public were interviewed. The same workers and managers were interviewed both for accident of workers and public.

CHAPTER 02

LITERATURE REVIEW

2.1 General

Every distribution organization in Bangladesh follows very primitive procedures, tools and equipment for distribution system activities. Though most of the activities of distribution system are risky, the workers remain unsafe due to lack of proper safety guidelines. There is hardly, any systematic work, so far, has made on safety issue regarding distribution system in Bangladesh. As this sector is technical and general people have limited access to information about occupational safety, health and distribution system environment, it is out of sight from mass people. For conducting the research work, the availability of information is one of the major issues, without this any significant development could not be possible on this specific issue. The information collected from newspaper is one of the important sources for monitoring the accident cases.

To conduct the research work several documents and literature are required. A limited number of references found to know about distribution system in Bangladesh. However, some important studies related to distribution system safety in the past are discussed. To conduct the present research the present activities related to safety from different corners of the society were also closely monitored.

2.2 Present state of art of the research topic

Activities needed to build up public awareness towards electricity are the responsibility of distribution organizations. But the distribution organizations are not conscious about their responsibility. Most of the distribution system does not take any activity in the field to increase public awareness. Even, activities necessary to make the distribution workers sincere are also not taken by the distribution organizations. The management does not provide necessary support to the employees to work safely.

For building public awareness various articles are published in daily newspaper related to different fields. Same activities are also observed in print media. Seminar, dialogue, talk show etc. on different issues are organized and proclaimed by private television channels randomly. But activities necessary for public awareness building towards electricity is fully absent. Media does not play any role for the betterment of the sector.

The plan of the policy maker of Bangladesh Government is not so prudent for the betterment of the sector. Where the Government does not take action to meet up increased demand, actions to keep workers and public safety is an affair of distant future. Government does not carry out any activity to increase public awareness to use electricity. Government also does not take action to keep public abstain from illegal activities. The law enforcing workers are not active against illegal activities related to electricity due to lack of guideline from government. Public television does not disseminate any program for public awareness building to electricity. Actually activities necessary to assure safety both for public and workers in distribution system are fully absent from all corners of the society.

The first guidelines ever prepared on power system safety in 1965 during East Pakistan entitled in '*Power system safety*'[11]. The manual prepared and published by Resident Engineers, Karnafuli Hydro Power Station, Rangamati. The guidelines cover the safety-related issues of generation and distribution system. It consists the general rules for operation and maintenance work in generation and distribution system, rules for sub station work, safety rules for handling heavy equipment, first aid and resuscitation in case of accident and rules for protection of the public. The aim of this study is to assess how far this guidelines along with other national rules regulations are being followed by distribution organizations exist in Bangladesh. The guidelines provide information about safety measures for different distribution activities. It also provides information about the safety clearance of the distribution lines, safe-working procedures, safety tools needed in distribution works etc.

Another document termed as '*General Regulations and Standard Operating Code- By Bangladesh Power Development Board (Reprint 1978)*'[3]. The document focused on safe

working practice in distribution system, division of employees' responsibility in distribution system, different types of tags used in distribution works etc.

A guideline for distribution system works specially in case of Palli Bidyut Samity distribution system, Rural Electrification Board provides an instruction series termed as '*Operating manual- 100 Instruction Series*'[2]. The guidelines provide information on hazards and safety measures needed at the work site for safe working. It consists a clear description about distribution system (both technical and managerial) which is very essential to understand the system.

The most valuable recent guidelines on distribution safety is found in the literature is '*Electrical Safety & the Law (2002)*'- Ken Oldhan Smith and John Madden. Ken Oldhan[10].

The literature summarizes the British legislation covering electrical safety, including those regulations derived from European directives. It also addresses the legislation relating to the supply and use of safety-related Electro-technical control systems, particularly on machinery. As well as describing the legal framework, and the main legal duties and applicable standards, the book describes the electrical hazards and how they arise; the types of accidents and dangerous occurrence associated with the use of electricity; the main safety precautions and protection techniques; testing and maintenance of electrical system; safety during testing work; the safety of electrical installations and equipment used in flammable atmospheres; and the particular risk associated with underground cables and construction activity. One of the aim of this study is to look at whether this approaches could be replicated to distribution system of our country.

CHAPTER 03

METHODOLOGY

3.1 General

A systematic procedure has been followed to collect information during research. The procedure includes- visit of different distribution organization to identify their activities, collection of primary information of some electrical accidents from distribution system, public and also from news paper, visit to the respective incident place and preparation of questionnaires for distribution system workers, managers and also for the public to find out the root causes of such accidents based on the experience of field visit. Several management personnel, workers and public were interviewed about the cause of electric accidents and about the way of remedies. While studying, the level of knowledge, education and skillness of managers, workers and public were taken into consideration.

In the earlier section, it was mentioned that there are various organizations exist in our country for distribution of electricity named as PDB, DESA, DESCO, WZPDCL & PBS (project of REB). Among these organizations except PBS system, all others are of similar type in respect of both technical and managerial considerations. Beside this, PBS system has an exceptional geographical location than others. Due to the different nature of geographical location, the work environment of PBS and other organizations are also different in nature. As a result, data is collected from the PBS and WZPDCL as the correspondents of REB and PDB respectively.

3.2 Research Methodology

The methodology used in this research covers the collection of information, screening of the information to make the information more valid and reliable and analyzing them to reach at correct decision. Keeping this in mind, utmost care has been taken through out the research. The details steps of the methodology to accomplish the objectives of the study are stated below:

3.2.1 Selection of Sample

The daily accidents occurred in different distribution organizations are mainly of similar type. As a result, not all the distribution organizations were taken into consideration while carrying out the research work. Data collected from six distribution organizations, named as Jessore Palli Bidyut Samity- 1 & 2, Satkhira Palli Bidyut Samity, Khulna Palli Bidyut Samity, Division-3 and Division-4 of West Zone Power Distribution Company. The mentioned distribution organizations are situated in the southwest region of the country. During study, different categories of distribution system workers (Foreman C and D, Switch Board authority-A,B and C, electrician-A,B and C, lineman-A,B and C, Meter reader, Server, Line technician, Lineman grade-1 and 2, Apprentice lineman, Meter repairer and Meter tester), managers and public were interviewed based on the level of technical knowledge, experience, intimacy with the accidents and also educational level. The sample was kept relevant considering the time and cost. Victim, witness, experienced workers and managers were included in the sample. The sample size was limited to 155 for distribution system workers, 20 for Managers and 175 for public.

3.2.2 Sampling technique

The purpose of the research work is to investigate the causes of electrical accidents and to provide recommendations to minimize it. So, to track out the causes of accidents the personnel related to accidents were mainly involved in sampling. The suggestions of supervisors, managers and workers (Victims, Witness and experienced workers) were taken to reduce accidents. In case of public related accidents, the neighbors comments were also covered in the study.

3.2.3 Period of Research

The occurrence of accidents under distribution system is highly influenced by natural disaster. The weather of our country does not remain same throughout the year. The weather during the period from March to August remains rough than the rest of the period in the year. From March to August, there is a heavy rainfall in our country due to monsoon and sometimes-heavy storm blows over the country. Due to storm trees fall massively. The trees near the distribution line fall on distribution line and when people reaches in contact of those

trees, they fall in accidents in some cases. Besides this, in rainy season the trees grow rapidly and the trees near the distribution line get touch with distribution line. When people climbs up on such trees to cut the branch of the tree or to pick up fruits or any other purposes, they get shock and in most cases serious accidents occur. So, to judge the variations in number of accidents occurrence, the research was carried out for one-year duration from July 2007 to June 2008.

3.2.4 Instrument of the research

Three set of questionnaires were prepared to collect information through interview. The specification of the questionnaires is mentioned below:

1. Questionnaires for Managers (**See Appendix-L**).
2. Questionnaires for workers (**See Appendix-K**).
3. Questionnaires for public (**See Appendix-M**).

The standard of the questionnaires were kept in such a level that it might be helpful to achieve the objectives. Except suitable knowledge on distribution system, it is impossible to make complete queries about any accident because some technical affairs are involved in each accident. Keeping this in mind, field visit was conducted several times in different distribution organization for an informal discussion with managers, workers, labors and public. Being intimate with the distribution system staffs, the accidents record of past few years were collected.

During visit, the activities performed by the distribution system were also observed closely to understand the risks and hazards involved in each activity. Based on the knowledge gathered through the field visit in different distribution system and conducting primary field survey in the incident place, 03(three) set of questionnaires were prepared. Before finalizing the questionnaires, it was discussed with the distribution system staffs of different level to avoid faulty and irrelevant questions. Workers were categorized into four groups such as high skilled (Foreman C and D, Line technician), skilled (Lineman-C, SBA-C, Electrician-C, lineman grade-01, meter repairer), semi-skilled (Lineman-A and B, SBA-A and B, Electrician-A and B, lineman grade-02, meter tester) and unskilled (Meter reader, server, apprentice lineman, labors).

3.2.5 Procedures of data collection

In respect of our country, to collect information about any accident specially an unusual one like death due to electrical shock, railway accidents etc. are so much tough. Public feel unsafe to give comments about any accidents to police, any inquiry team, any news paper's correspondent or any other law enforcing worker. They have the belief that they may have run into trouble, a case may be filed and they may have to be witness and even they have to give witness in front of court. So, collecting information about electrical accidents is very difficult.

During research, data was collected from the respondents of the study with the help of prepared questionnaires. The distribution system workers are normally not available in office because their works are consumer related, so they remain busy in the field during office hours. As mentioned before, the involved respondents in this study are with the accidents related personnel, the list of the personnel was prepared with their contact numbers. The supervisors and managers of distribution system were interviewed at office place at office hours, public were asked through direct field visit and the workers and labors were interviewed at office or field after communicating with them over mobile or any other way.

At the time of data collection when a respondent was requested for interview about any accident, the researcher found them irritated in most of the cases. Especially in case of official staffs, they hesitated to explain about any accident due to the fear of superior authority. In few cases when an interviewee was asked about any accident, he was describing the incident frankly but when he was requested to give the description in written as per questionnaire he refused. Falling in such problem, the objective of the study was explained to each of the interviewee to establish belief.

The interview was both open and close ended. When the respondents were invited to give their suggestions to avoid accidents, such invitation was open ended, other wise the interview was close ended. When any interviewee faced difficulties to understand any question, sincerely it was made clear to him. The respondents' were untouched or kept silent when there was possibility that the answer of any question would go against him or the

organization. To overcome these problem all possible efforts were given by the researcher to motivate them and after motivation they gave the information. After each interview was over, the questionnaire was checked carefully to avoid any possibility of missing.

3.2.6 Data Screening and Analysis

The collected data was screened to cut down redundant information. When any contradictory was arisen, the field was revisited to take interview again of the respective respondents. In such situation, if the questionnaire did not cover required quarries, the respondents were directly asked different necessary questions. The collected data (causes of accident and suggestion to avoid it) were analyzed and were arranged according to weight given by the respondents.

3.2.7 Interpretation of the Results

Collecting data from the respondents, after analyzing the causes of accident were detected and a Model was proposed to minimize the number of accidents. The total steps of the study are mentioned below in block diagram:

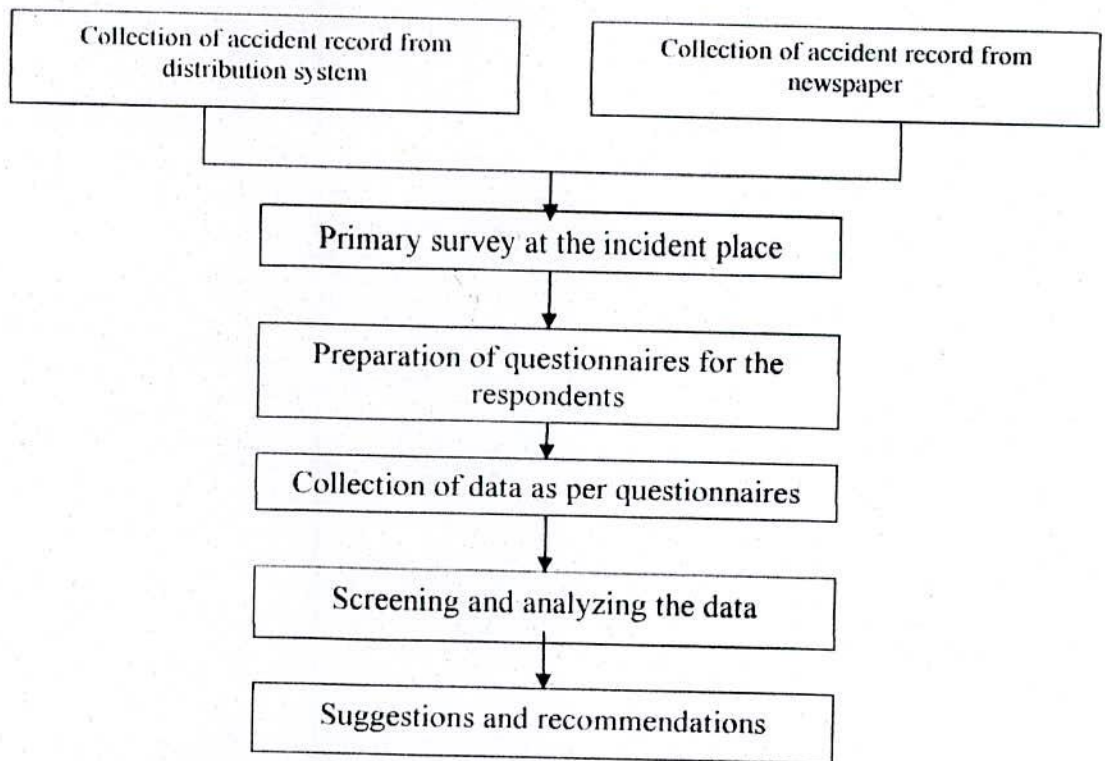


Figure: Procedure followed to complete the project

CHAPTER 04

DATA ANALYSIS AND RESULTS

Three sets of questionnaires were prepared, data collection and analysis has been made separately to complete the research. While preparing the questionnaires emphasis was given to find out hazards, causes of accidents and suggestions for remedies of accidents in distribution system. It is mentioned that mainly accidents related personnel were considered under the scope of the interview. Beside this some experienced workers and managers were also interviewed. Each interviewee was interviewed on a specific accident as well as about those accidents which they faced or are informed. When different persons related to a specific accident were interviewed, the findings from different persons were significantly different and it was due to the variations of educational level and skillness of the interviewee. So for analyzing data, interviewee was classified based on the education level and skillness. Twenty fatal & minor accidents (in case of workers) that happened during last few years (2000-2008) were covered during the study (**Appendix-O**). In total 155 workers including the related ones (High skilled-30, skilled-55, Semiskilled-45, & unskilled-25) with these accidents and 20 Managers were interviewed. 15 accidents(in case of public) and 175 related public were covered. The same workers and managers were interviewed both for workers and public accidents. Collected data has been grouped into two major types, one is for workers and another is for public. Then it was subgrouped based on the questionnaires for workers, managers and public. Collected data has been placed in tabular format and analyzed to achieve the objectives of the study.

4.1 Data Analysis for worker's accidents based on the ques. prepared for workers

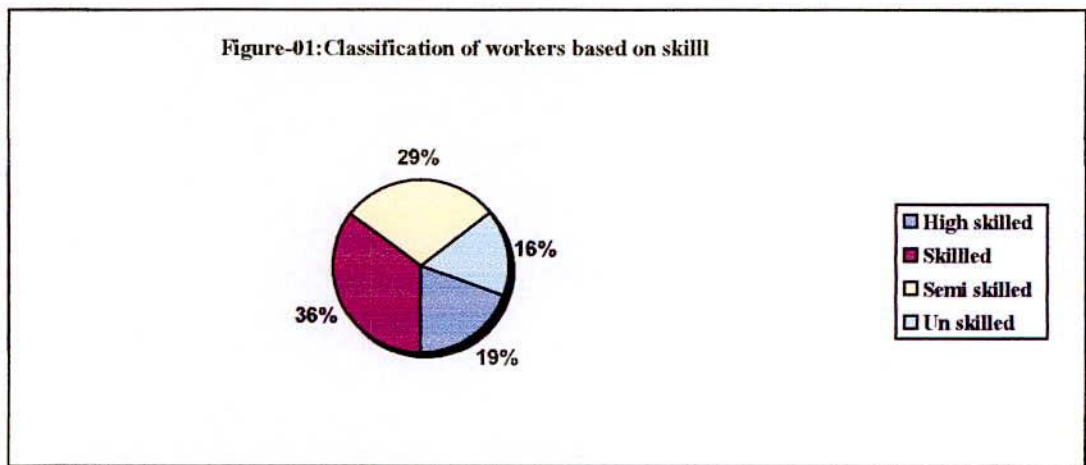
4.1.1 Categories of Workers Interviewed according to their Skill

Electrical accidents occur mainly from improper judgments by a worker while performing any activity. Judgment means to realize the risk free situation to do any work.

Knowledge about the risks and hazards involved in a work and standard working condition is the basic requirement for proper judgment. Electrical distribution system is a fully technical system. So to realize the activities and technology involved in a distribution

system a worker must have education, skillness and experience. Approximately twenty categories of workers are working in the distribution organization (**Appendix-A**) under technical departments who normally fall in accidents. All the categories were included in the study. For simplification the total categories were classified into four major categories such as high skilled (Foreman-C and D & Line technician), skilled (Lineman-01, lineman-C, electrician-C, SBA-C, meter repairer), semi-skilled (Lineman-02, lineman-A and B, electrician-A and B, SBA-A and B, meter tester, meter reader and server) and Unskilled (Apprentice lineman and daily labors). High skilled workers are working for a long period in the system and they are more experienced. They are well concerned in distribution system activities and are acquainted with all types of risks related to distribution system activities. This category mainly supervises the works and does not involve with the works physically. So, the possibility of this category to fall in accident is less. The Unskilled group comprises apprentice linemen who are newly recruited and labors. Though they are not capable to perform complicated and technical works, they are not engaged in such type of works. Possibility of accidents occurrence for this group is also lower. The later two groups, skilled and semiskilled are mainly the effective working force in the system. They are engaged in different types of works and became busy throughout the day. These two groups massively fall in accidents.

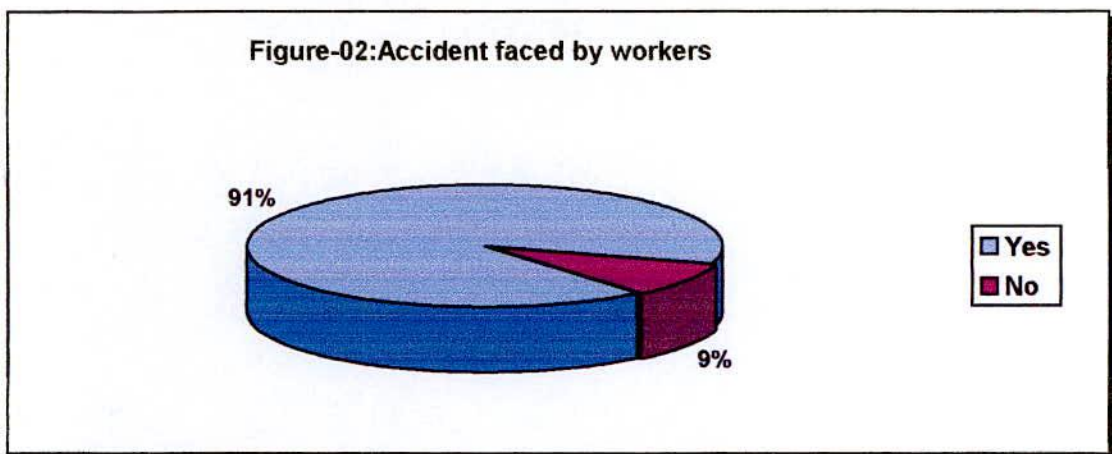
The interviewed 155 workers are classified as high skilled-19%, skilled-36%, semiskilled-29% & unskilled-16% and are represented in the **figure-1**:



4.1.2 Accidents faced by the workers

Accident is a common phenomenon in distribution system. Though the fatal accidents are comparatively lower, the minor accidents occurred frequently. Injured while handling heavy materials, shocked from distribution line, fallen from pole top, struck by a falling materials are common each and everyday. Accidents result in loss of workers lives or organs and working hours. Accidents also cause interruption of electricity supply which results consumer dissatisfaction.

The purpose of this data is to get an idea about the intensity of accident occurrence in distribution system. How many workers under research are experienced with accidents have been focused through this collected data. It was found that among 155 workers 141 were injured in different time. The rest workers did not fall in any accidents. The collected data is represented graphically in the figure-02:



From above figure it is seen that 91% interviewed workers faced accidents and the percentage is abnormally high. The figure indicates the frequency of accidents in distribution system and provides necessary supports on behalf of the respective research and also shows its importance.

4.1.3 Analysis of past Accidents record

Record of fatal & minor accidents that happened during January 2000 to June 2008 has been collected through field visit (Appendix-O). The collected data is segregated as per posts of the workers (Table-01)

Serial Number	Post of the worker	Total No. of accidents
1.	Junior Engineer	01
2.	Line Technician	01
3.	Lineman-01	03
4.	Electrician-C	1
5.	Electrician-B	1
6.	Lineman-02	09
7.	Lineman-A	01
8.	Helper	03

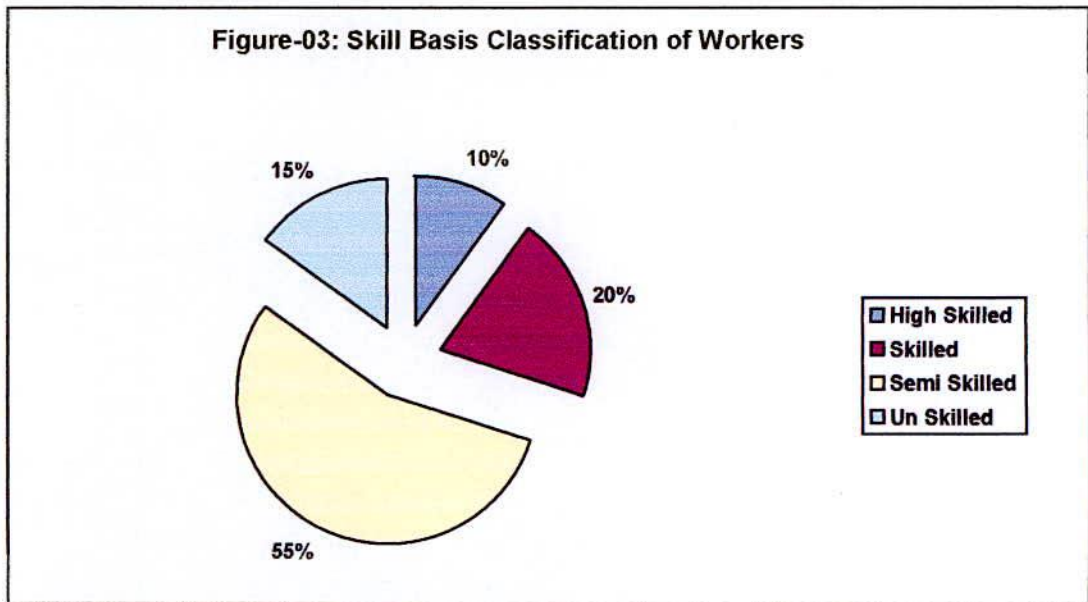
Table-01: Accident faced by workers (Classification based on Designation)

The information of Table-01 is finally categorized based on the skill of the workers i.e. as high skilled (Foreman-C and D and Line technician), skilled (Lineman-01, lineman-C, electrician-C, SBA-C, meter repairer), semi-skilled (Lineman-02, lineman-A and B, electrician-A and B, SBA-A and B, meter tester, meter reader and server) and Unskilled (Apprentice lineman and daily labors).

Sl. NO.	Post of workers	Skill ness	Quantity
1.	Junior Engineer, Line technician	High Skilled	02
2.	Lineman-01, Electrician-C	Skilled	04
3.	Lineman-02, Lineman-A, Electrician-B	Semi Skilled	11
4.	Helper		03
Total			20

Table-02: Accident faced by workers (Classification based on skill)

Figure-03: Skill Basis Classification of Workers



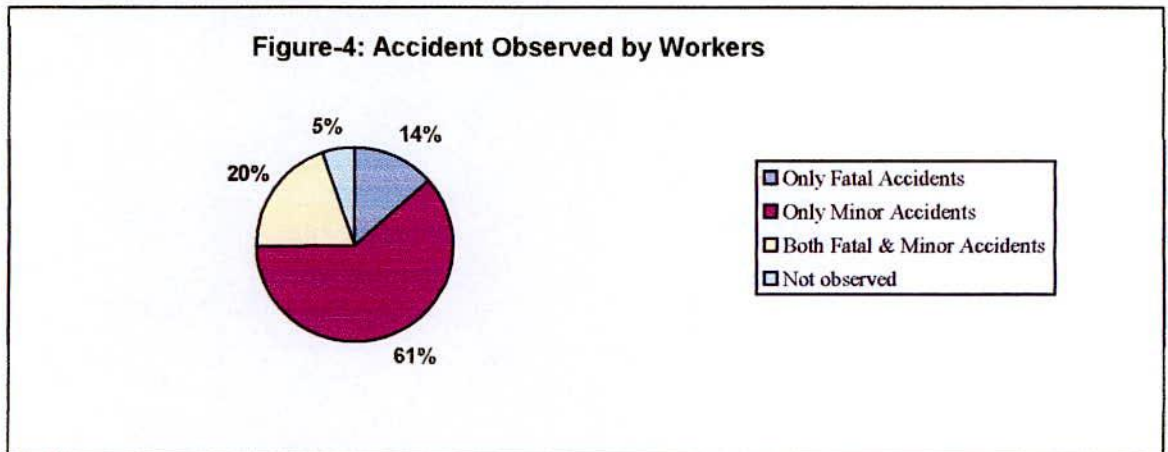
It is revealed from figure-03, 10% accidents took place in case of high skilled workers and 15% accidents for unskilled workers. The individual percentage of skilled and semi skilled group is 20% and 55% respectively. The total 75% accidents occurred in case of skilled and semi skilled workers.

In **section 4.1.1** it was mentioned that high skilled workers mainly supervise the works and unskilled workers are not devoted in risky jobs due to their inexperience. Skilled and semi skilled workers are mainly the driving force to perform all kinds of activities in the distribution system. As a result, these groups fall in accidents in most of the cases. The above statistics are authentic documents against the remarks of **section - 4.1.1** The study provides information about the most victimized groups and this information will be helpful to take safety measures for accidents prevention of these groups.

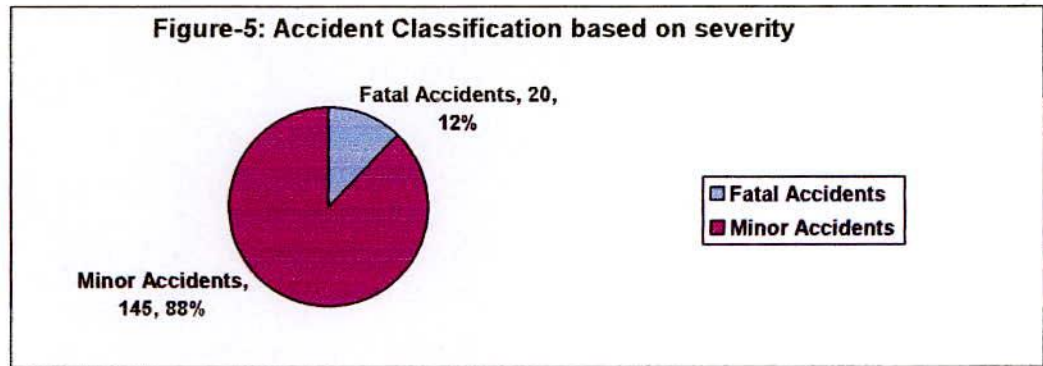
4.1.4 Accidents observed by the workers

The records of terrific accidents are normally preserved in distribution organizations. But the records of minor accidents are not available as preserved condition in most of the distribution organizations. Though there are no systematic records of minor accidents that happened in distribution system, the classification of accidents based on their severity was really tough. To get a picture on the ratio of fatal accidents to minor ones, the interviewee workers were asked about the accidents which they had observed since 2000 to 2008. Death and loss of any organ was considered as fatal accidents and the rest was as minors. The consideration was made clear to the interviewee at the time of interview. The interviewee gave the information of accidents which they could memorize.

When the collected data was analyzed it was found that 14 % workers observed only fatal accidents, 61% observed minor accidents only, 20% observed both fatal & minor accidents and 5% observed no accidents as yet. Those who did not observe any accidents are mainly the new comer in the system.



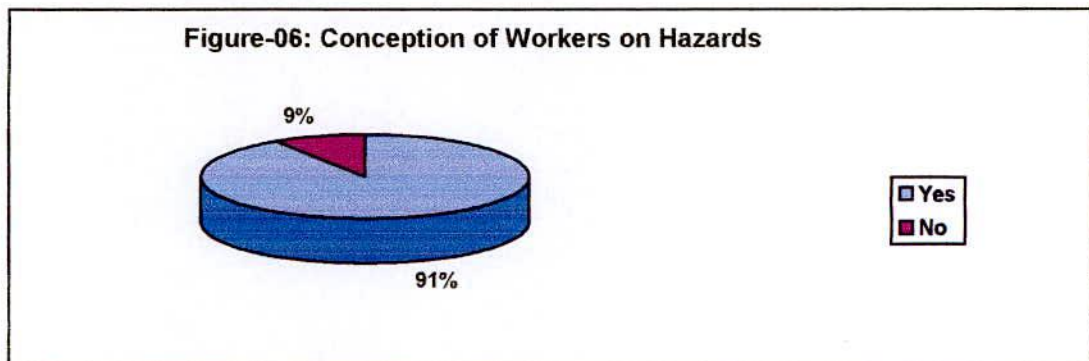
In this study, it was tried to segregate accidents according to their severity. After classifications of collected data 20 accidents were found fatal in nature and 145 were minor accidents in total of 165 accidents. So 12% accidents were fatal and the minor accidents were 88 %. The statistics are presented in **figure-5**.



4.1.5 Knowledge of workers about distribution system hazards

The frequency of accidents in distribution system seems to me very high in a country. Electricity exists in invisible state and in contact of living beings causes accidents. Although workers are acquainted with destructive power of electricity, sometimes accidents cannot be avoided due to its invisibility. Workers cannot differentiate between a live line and a dead line in an open eye and it is one of the main causes of accidents in distribution system because it is invisible. Invisibility is a great hazard for electricity. Beside this, various types of hazards are involved with distribution system.

During data collection the interviewee were asked about their conception on hazards in the system. Conception on hazards was not clear to some workers. The questions were open and close ended and the workers were made clear about hazards. Among 155 workers 141 had conception on hazards and 14 numbers did not answer the question. The percentage is shown in figure-06.



It is evident from figure-06 that 91% workers have idea on hazards and only 9% have not any idea.

4.1.6 Hazards available in distribution system

Precaution reduces the risks of accident. Precaution is quite impossible if a worker is ignorant about hazards involved in an activity. It is very much essential to become intimate with hazards related to a work to complete it safely. Skill ness of a worker depends on the capability of handling hazards more successfully. The purpose of the study is to judge worker's intensity of knowledge on hazards in the distribution system. The workers were asked to mention at least two hazards which they considered as exist in distribution system.

From **figure-06**, it is seen that 91% workers are acquainted with hazards and only 9 % are ignorant about hazards. Most of the acquainted workers mentioned more than one hazards.

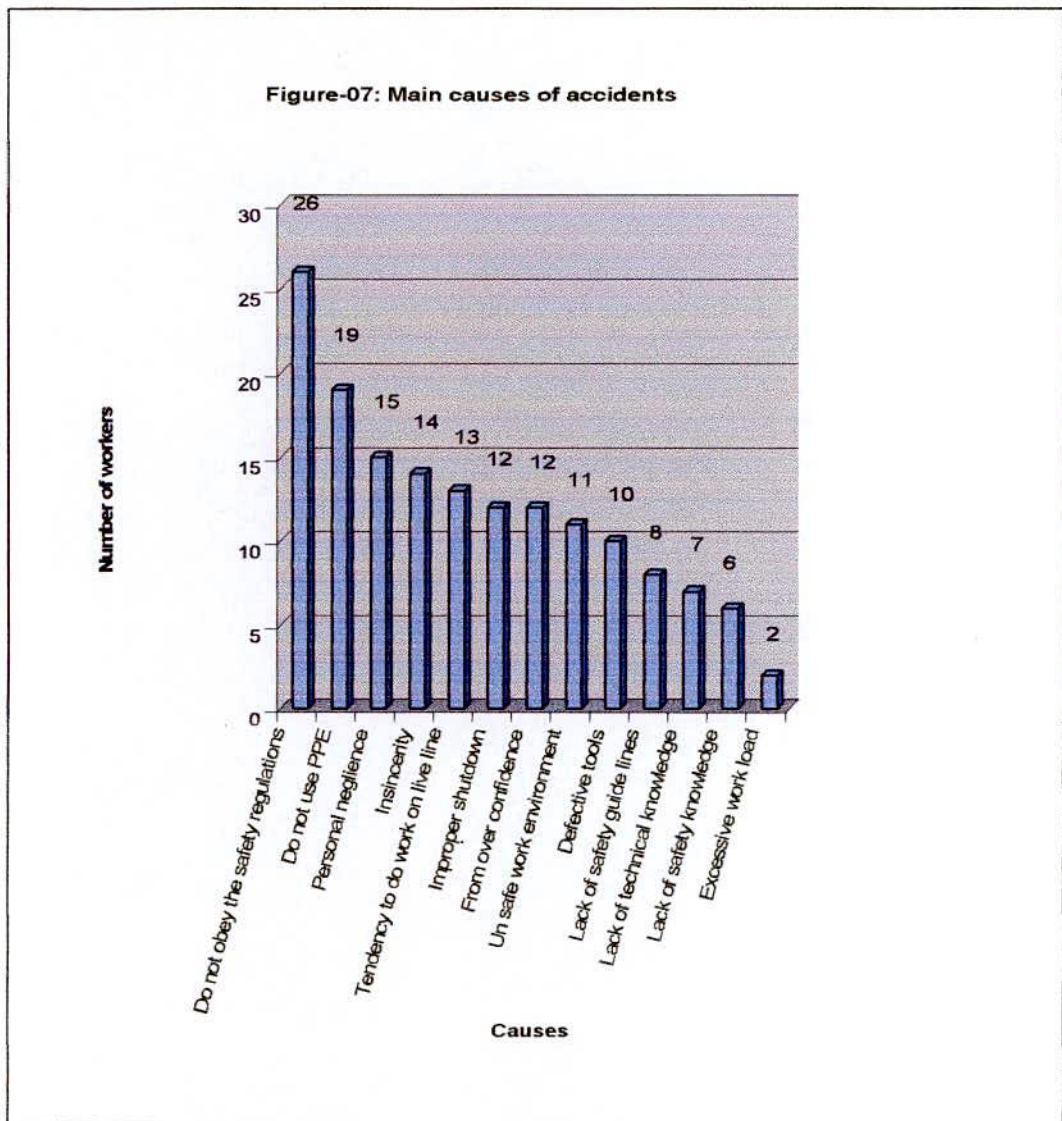
The mentioned hazards are listed in **Table-3**:

SL. No.	Name of Hazards	No. of Workers supported	Percentage
1.	Improper coordination of safety equipment	25	11.16%
2.	Line of different voltage on same pole	21	9.4%
3.	Dual source on same pole	18	8%
4.	Defective safety equipments installed on feeder	17	7.58%
5.	Defective design & construction of line	15	6.7%
6.	Improper clearance of line	15	6.7%
7.	Invisible state of electricity	14	6.25%
8.	Defective maintenance & construction tools	13	5.8%
9.	Crossing of feeders without proper clearance	13	5.8%
10.	Line equipments installed in unsafe condition	11	4.99%
11.	Charged line capacitor bank	10	4.46%
12.	Grounding wire disconnected	10	4.46%
13.	Side connection taken by consumers	9	4%
14.	Existence of consumers electric source	9	4%
15.	Trees are adjacent to distribution line	8	3.57%
16.	Thundering on distribution line during works	7	3.125%
17.	Sharp tree trimming tools	6	2.7%
18.	others	3	1.3%

Table-3: Hazards involved in distribution system

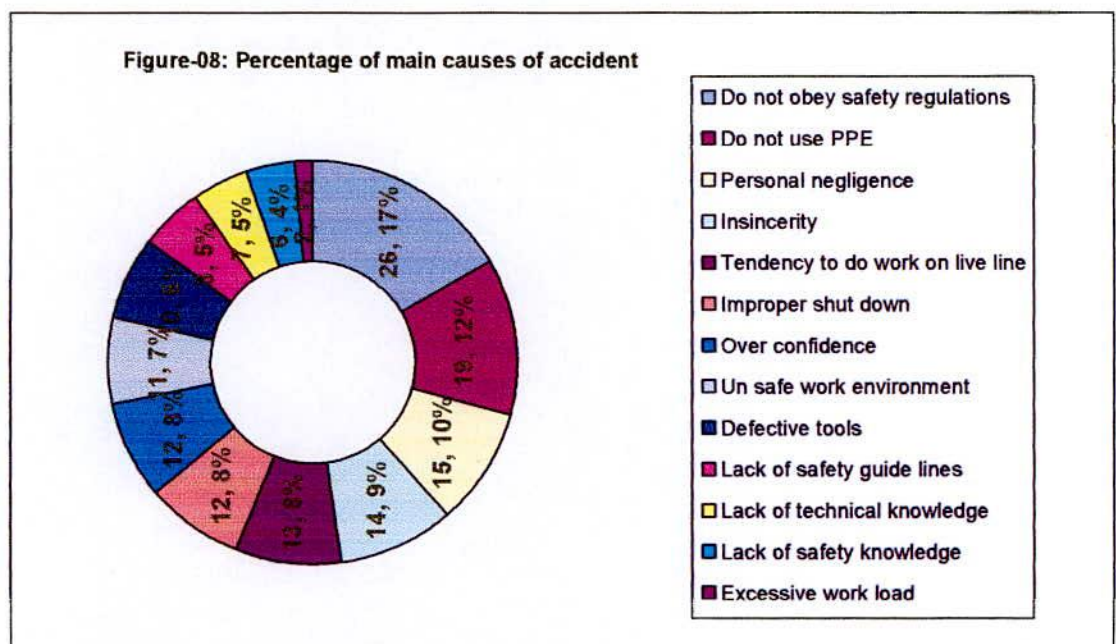
4.1.7 Main causes of accidents

The main objective of the research is to find out the causes liable for accidents in distribution system. In accordance with the objective, the workers were asked about the causes of accidents. The interviewee were asked to choose a question from a set of prefixed causes which he considered as the main of cause of accidents. The causes were summarized as per weight given by the workers. Weight means the number of workers supported the cause.



The main causes found out from discussion with distribution workers liable for accidents are mentioned below with their percentage:

1. Do not obey the safety regulations
2. Do not use personal protective equipment(PPE)
3. Personal negligence
4. Insincerity
5. Tendency to do work on live line
6. Improper shutdown
7. Over confidence
8. Un safe work environment
9. Defective tools
10. Lack of safety guidelines
11. Lack of technical knowledge
12. Lack of safety knowledge
13. Excessive work load

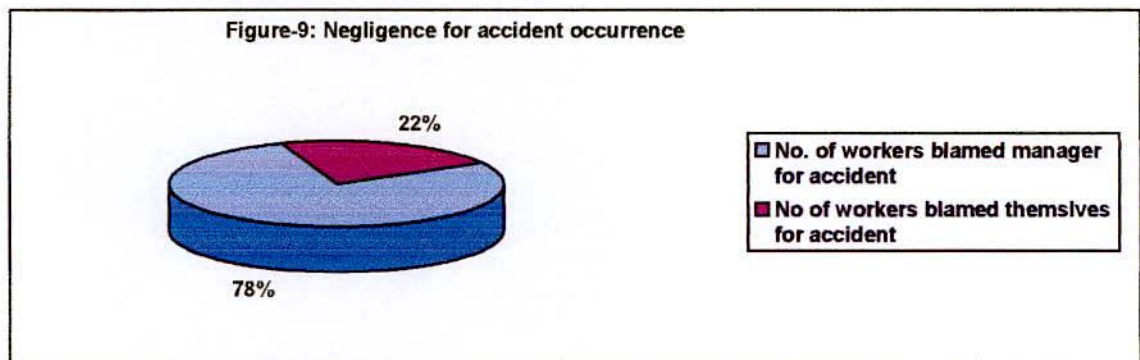


4.1.8 Recommendations for accidents prevention

The workers who faced either fatal or minor accidents were mainly included as respondents in the research. Some workers who did not face any accidents but observed one or more accidents and have been working in the system for a long period were also included in the research. After occurrence of any accident, the personnel related to accident becomes well informed about the causes of such accident and also the safety measures were needed to prevent it. So the recommendations of the interviewed workers for prevention accidents were highly considered as they are experienced.

Negligence of wearing Personal Protective Equipment (PPE) was found one of the main cause with other causes of accidents that were analyzed during study. In spite of having PPE some workers did not use it and fell accidents. On the other hand some workers who fall accidents did not use it due to unavailability. For the first case, it is personal negligence and in second case it is organizational problem. So in some cases managers do not create facility to perform work safely and in some cases despite of having facilities the workers do not avail those and fall in danger. For accidents occurrence the negligence of workers and managers are both liable.

The workers were asked about their negligence for occurrence of accidents during interview. Who are more liable for accidents occurrence-workers or managers? Among 155 workers 121 blamed managers for accidents and the 34 workers blamed themselves.



It is seen that 78% workers blamed managers and only 22% workers blamed themselves.

4.1.8.1 Managers responsibilities for accidents prevention as per workers comments

Though accident occurs due to negligence of both managers and workers, joint efforts are essential to prevent it. During this study, it was tried to inquire about the means of accidents prevention from workers and managers separately. In this regard, the workers were interrogated to bring the limitations of managers in daylight to ensure safety. Initially some workers specially the workers of Pally Bidut Samity felt uneasy to divulge the limitations of managers, because it is a private organization and they remain under tight control of administration. When they were pursued and given courage, they opened their mouth. The workers of PBS system are under pressure of excessive workload. They are busy through whole the day and even remain engaged in works until evening. This scenario is not abnormal but as usual. When natural disaster strikes the system, the workers become so busy that they engaged in the field nearly 24 hours. For excess and extra time works, they do not get special benefits. Despite of such dedication if minor irregularities are observed, the workers are criticized or even legal actions are taken sometimes by the managers. The worker of PBS system is frustrated and is one of the causes of accident occurrence in this Organization. Activities taken for awareness building of workers like safety meeting, safety campaign, safety rehearsal etc. against accidents are rarely commenced in the organization.

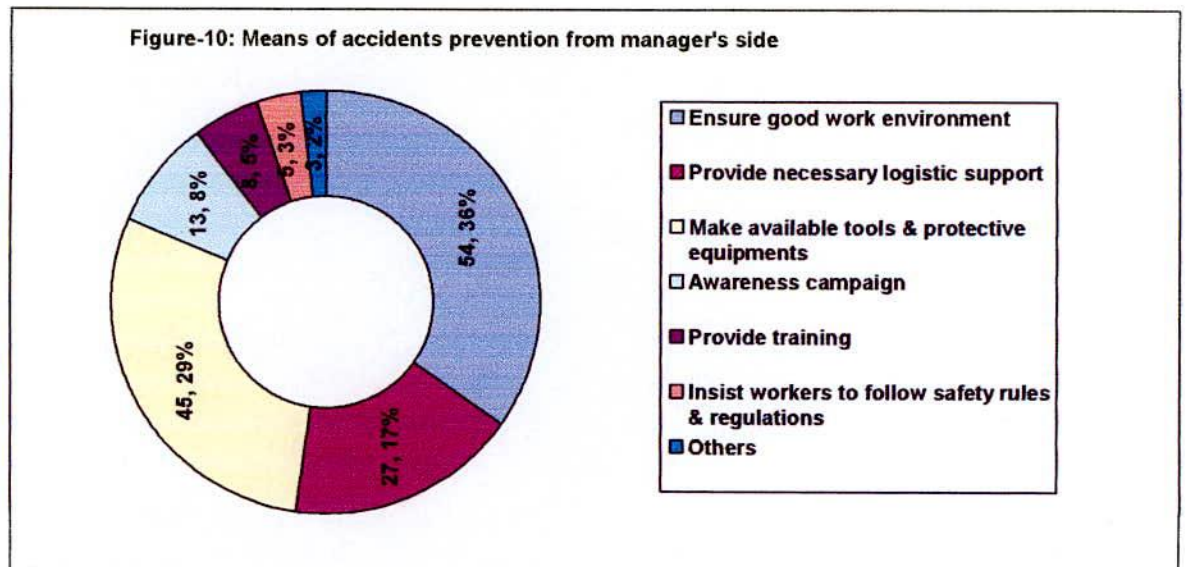
On the other hand, most of the workers of West Zone Power Distribution Company are too much aggressive to give their comments against management. As per comments of most of the workers, it was observed that no safety activities are carried out in this distribution organization. No mentionable safety tools and equipment are available in the system. Even some workers informed that they have no working tools. The record of safety tools of Division-3 under West Zone Power Distribution Company highlighted in **table-4** is very much similar with the comments of workers. From comments of workers, it was realized that there is a communication gap between the management and workers. A haphazard situation exists in the system. There is a lack of supervision of workers from management side and accidents occur here are mainly due to lack of safety practice i.e. limitations of safety tools, lack of supervision, lack of communication and absence of any safety activities.

Safety equipment	Quantity required	Existing quantity	Shortage quantity	Comment
Safety belt	25 Nos.	8 Nos.	17 Nos.	Division-3 has twenty five workers
Safety helmet	25 Nos.	Nil	25 Nos.	
Safety gloves	25 Pairs	5 Pairs	20 Pairs	
Gumboot	25 Pairs	Nil	25 Pairs	

Table-4: Records of safety tools, Division-03, WZPDCL (Source-Div.-03)

Since a large portion of the workers solely blamed manager's negligence for accidents occurrence with evidence, their opinion was invited during interview about the managers activities would be for accidents prevention. The workers suggestions are summarized below as priority basis and their percentage is shown in **figure-10**:

- 1) Ensure good work environment
- 2) Provide necessary logistic support
- 3) Make available proper and sufficient tools and necessary equipments
- 4) Awareness campaign
- 5) Provide training
- 6) Insist workers to follow safety rules and regulations
- 7) Others

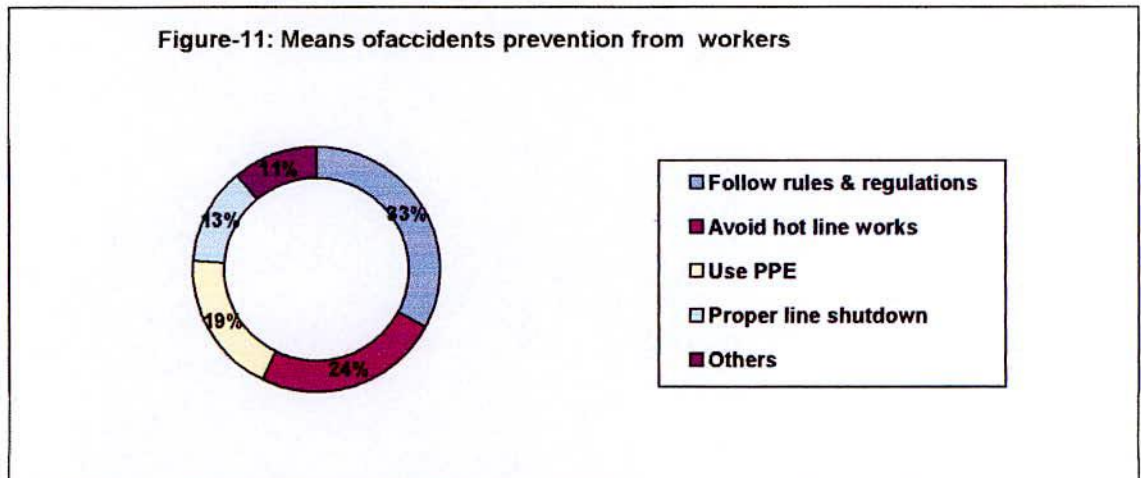


4.1.8.2 Workers responsibilities for accidents prevention

The interview questions were both open & close ended. The workers were asked about the negligence of workers for accidents. Except few, most of the workers confessed that workers are also liable as well as managers. A supplementary question was asked to the workers about the means of accidents prevention from worker's side. In total 155 workers, 143 answered this question. The means suggested by the workers are presented below as priority basis with percentage:

- 1) Follow rules and regulations
- 2) Avoid hot line works
- 3) Use PPE
- 4) Proper line shutdown
- 5) Others

Figure-11: Means of accidents prevention from workers



4.1.9 Knowledge about Electricity Act-1910

The Bangladesh Water & Power Development Boards Order 1972:

Bangladesh Power Development Board (BPDB) was established under the order, 'The Bangladesh Water & Power Development Boards Order 1972' and West Zone Power Distribution Company was originated from BPDB.

The Rural Electrification Board Ordinance 1977:

Palli Bidut Samity was established under the Rural Electrification Board (REB) ordinance. The ordinance was circulated as 'The Rural Electrification Board Ordinance, 1977' in 29th October 1977(Ordinance No-LI of 1977).

National Energy Policy, 1996:

In recognition of the importance of energy in socio economic development Bangladesh Government took the policy as to provide energy for sustainable economic growth so that the economic development activities of different sectors are not constrained due to shortage of energy.

Dhaka Electricity Supply Rules, 1990:

DESA was established under 'Dhaka Electricity Supply Rules, 1990'.

The above rules and ordinance provide the organization structure, staffing pattern, scope of activities; service area and energy handling procedure of different distribution organization exist in Bangladesh. The rules of line construction, operation & maintenance, standard clearance to be maintained from structure, rules of handling contractor, shutdown procedure, procedure of ensuring safety both for workers and public, Compensation procedures in case of injury or death both for public & workers, energy purchase and sales procedures, responsibilities of distribution organization, rights of public, criminal offense etc. are clearly mentioned in the following Act and Regulations and the distribution organization exist in Bangladesh follow these Act and Regulations for Operation & maintenance [7].

Electricity Act-1910(Act No IX of 1910, total section-58)

Electricity Rules-1937(Introduced as circular S601 in 27th March 1937, total rules-125)

Electricity Regulations -1961(Circulated in 12th January 1961, total regulations-34)

Since safety and rights of workers and public are clearly mentioned in the above Acts and regulations, it is very much essential to acknowledge about the basics of these rules for both workers and managers. In accordance with the importance, the workers were asked about their conception related to these Acts, Regulations and various ordinances at the time of interview. Most of the workers were found ignorant with these Acts and regulations but were informed about various ordinances. Though few workers were found aware of electricity Act-1910 and regulations-1937&1961, their depth of knowledge was not up to the desired level. The workers were mainly informed about the section related to revenue connection and penalty of illegal use of electricity of these Act and regulations through different departmental training. The percentage of workers has been shown in table-05 based on their conception about electricity Act-1910, regulations and other ordinances.

Respondents	Knowledge on Electricity Act-1910 and Regulations-1937 & 1961		Knowledge on different ordinances	
	Yes	No	Yes	No
Number(155)	11	144	137	18
Percentage (100%)	7%	93%	88.38%	11.62%

Table-05: Knowledge of workers on Electricity Act

4.2 Data analysis for worker's accident based on the questionnaire prepared for managers

4.2.1 Level of education of managers

If the causes of accidents that happen in distribution system are classified. These are mainly of two types- technical causes and non-technical causes (managerial & administrative). Accidents due to lack of using PPE, not following safety rules & regulations, unsafe work environment, lack of awareness towards safety etc. are example of non technical causes. Where as accidents due to lack of technical knowledge, improper maintenance of distribution line, defective safety tools, improper inter coordination among safety devices etc. are technical causes. Both types of causes are highly influenced by the attitude of managers. While visiting the field, two types of managers were found - managers with technical education background and managers with non-technical education background. In West Zone Power Distribution Company (WZPDCL), the managers are of technical education background. But in Palli Bidyut Samity the managers are mainly of non-technical education background. The technical managers normally give emphasis on the technical improvement of the system like proper maintenance of distribution line, proper maintenance of safety equipment, activities for voltage level improvement etc. where as the non-technical managers give emphasis on such activities like bill collection, system loss reduction, attending to public complain etc. As a result, in case of non-technical managers technical sides become infirm than managerial sides and vice versa. This infirmity is the direct reflection of manager's background of education. Since the educational background has a great influence on the accidents in distribution system, the level of education of managers were considered during study. The level of education of manager's is shown in **Table-06**:

Serial No.	Level of education	Number(Technical)	Number(Non-technical)
1.	Up to S.S.C	0	0
2.	H.S.C/ Diploma Engineering	8	0
3.	B.Sc/M.Sc/B.Sc engineering	8	4

Table-06: Level of education of managers

4.2.2 Hazards involved in distribution system

Even after being knowledgeable about hazards, the workers are not capable to remove them from system in most of the cases. Money and executive power are related with hazards removal. So, workers try to avoid hazards rather than remove them. Managers are the legal authority for removal of hazards. Managers also supervise the works of workers, so to keep the system hazards free in possible cases, the managers should have deep knowledge about hazards involved in distribution system. Based on that idea, the managers were asked whether they had knowledge on hazards. It was found that the managers with technical background have sound knowledge on hazards. On the other hand, the intensity of knowledge on hazards of the managers with non-technical education background is comparatively dim. Whatever is the intensity, every manager was found more or less knowledgeable about hazards. A supplementary question was asked to managers to mention some hazards. The session was open-ended and among twenty managers most of the managers mentioned more than one hazard. The names of hazards mentioned by managers are presented in **Table-07**:

Sl. No.	Name of hazard	No. of managers mentioned	Percentage
1.	Works on live line	11	25.58%
2.	Overhead line works	5	11.63%
3.	Improper clearance of line	4	9.30%
4.	More than one feeder on same pole	4	9.30%
5.	Dual source on same pole	3	6.98%
6.	Hazards involved in heavy materials handling	3	6.98%
7.	Side connection	3	6.98%
8.	Capacitor bank installed on line	2	4.65%
9.	Defective working tools	2	4.65%
10.	Others	6	13.95%
Total		43	100%

Table-07: Hazards involved in distribution system (As per manager's view)

4.2.3 Knowledge about Electricity Act-1910 & other ordinances

The activities of distribution system are regulated by Electricity Act-1910 and different ordinances. While performing different activities management get into various types of trouble. Management has to take legal action against consumers/public in different times to keep them ceased from illegal activities like side connection, meter tempering, hooking etc. Public also take legal action against management when they fail to preserve their right either legal or illegal. Management faces such situations according to Electricity Act.

In Electricity Act-1910, clear guidelines are provided for both management and consumers. The rules to be obeyed for each activity are discussed section wise. Rules related to accidents and inquiries are given in section 33 of this act, Requisition for police assistance are given in section 54B, criminal offences and procedures are mentioned in section 39 to 50. Line construction rules, safety clearance, rules for building public awareness are also provided in this act.

When accidents occur in case of workers or public due to fault of authority, management has to give compensation. The provision for compensation is also included in this act.

The post of legal advisor exists in every distribution organization. Normally legal advisor proceeds for most of the cases. The legal advisors are not technical person. Since all the activities of distribution system are technical, sometimes-legal advisor could not understand the technical sections of this act. Management has to support legal advisor in such situations. So, for smooth operation of distribution system managers have to acquire a sound knowledge on electricity act.

During interview managers were asked about Electricity Act-1910 and other ordinances.

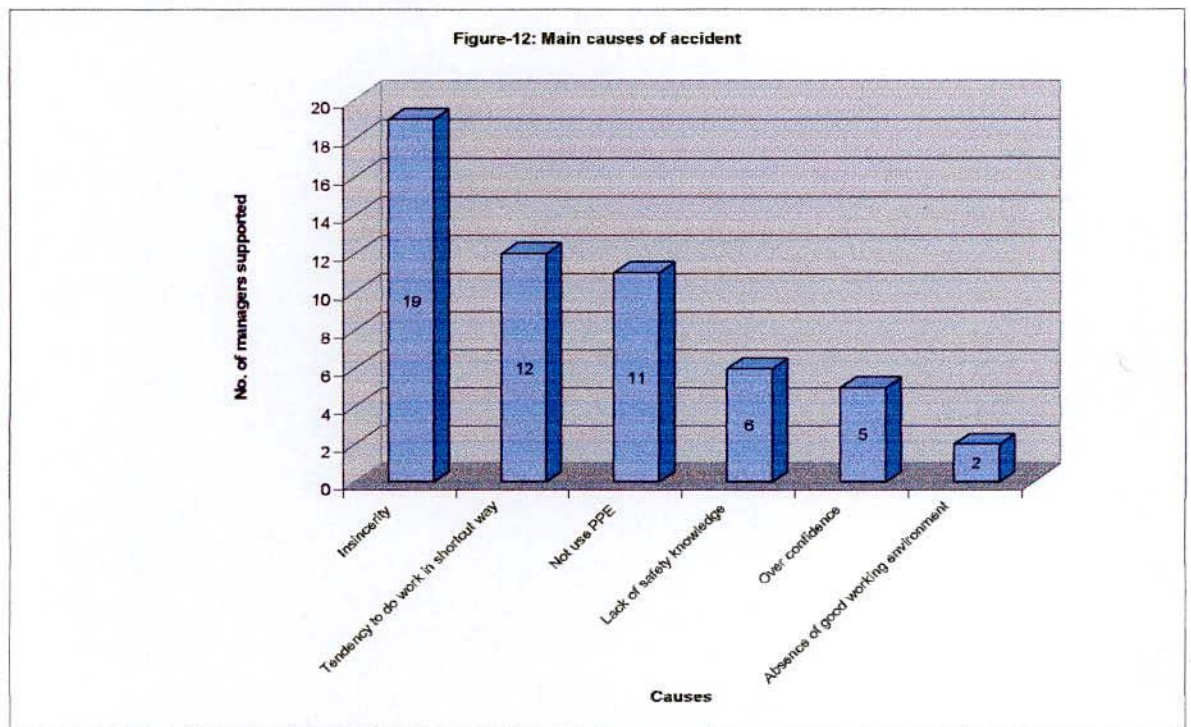
Respondents	Knowledge on Electricity Act-1910 and Regulations-1937 & 1961		Knowledge on different ordinances related to distribution organization	
	Yes	No	Yes	No
Number(20)	14	6	20	20
Percentage (100%)	70%	30%	100%	0%

Table-8: Knowledge of Manager's on electricity act and other ordinances

4.2.4 Main causes of accidents in distribution system

Occurrence of accident is uncertain. It is not possible to reduce the frequency of accidents at zero level. Accidents can be controlled up to a minimum level by following the safety rules & regulations properly. Negligence to follow rules & regulations are from behavioral attitude of human being. The tendency is severely observed in case of illiterate and less educated people. Since workers belonged to this group, the rules breaking tendency are as usual from workers. The workers can be made bound to follow the safety rules & regulations if they are supervised properly by the managers. For proper supervision the managers should have a sound knowledge about the causes of accidents.

In this session, managers were asked different types of question to verify their knowledge level about causes of accidents. The session was kept open ended. When the managers were asked to mention some causes of accidents, most of the managers mentioned more than one cause. The mentioned causes liable for accidents occurrence are listed in **figure-12**:



It is seen from figure-12 that nineteen managers mentioned insincerity as the cause of accident. The causes mentioned by managers are almost similar with the cause mention by workers.

4.2.5 Means of prevention accidents

In this session, the means to prevent accidents as per manager's view was identified. The session was open ended. A question was asked to verify the manager's knowledge about the means of accidents prevention. Most of the managers mentioned more than one means. Most of the managers insisted on to increase the sincerity of workers for accidents prevention.

The Managers were asked about the way to increase worker's sincerity. In reply to the question, the managers gave emphasis on awareness campaign like safety meeting, motivation meeting, safety exhibition etc. Some managers gave emphasis on safety training to develop the skillness and technical knowledge of the workers. Few managers suggested to give the workers justified workload daily. The managers especially in executive level emphasized to increase continuous monitoring of the workers by the lower class managers.

The suggestions provided by the managers are summarized in Table-09:

SL. No.	Means of prevention accidents	No.of managers supported	Percentage
1.	Use personal protective device	16	30.76%
2.	Continuous supervision	11	21.15%
3.	Awareness campaign	9	17.30%
4.	Provide training	7	13.46%
5.	Ensure good work environment	5	9.61%
6.	Provide justified work load	4	7.60%
Total		52	100%

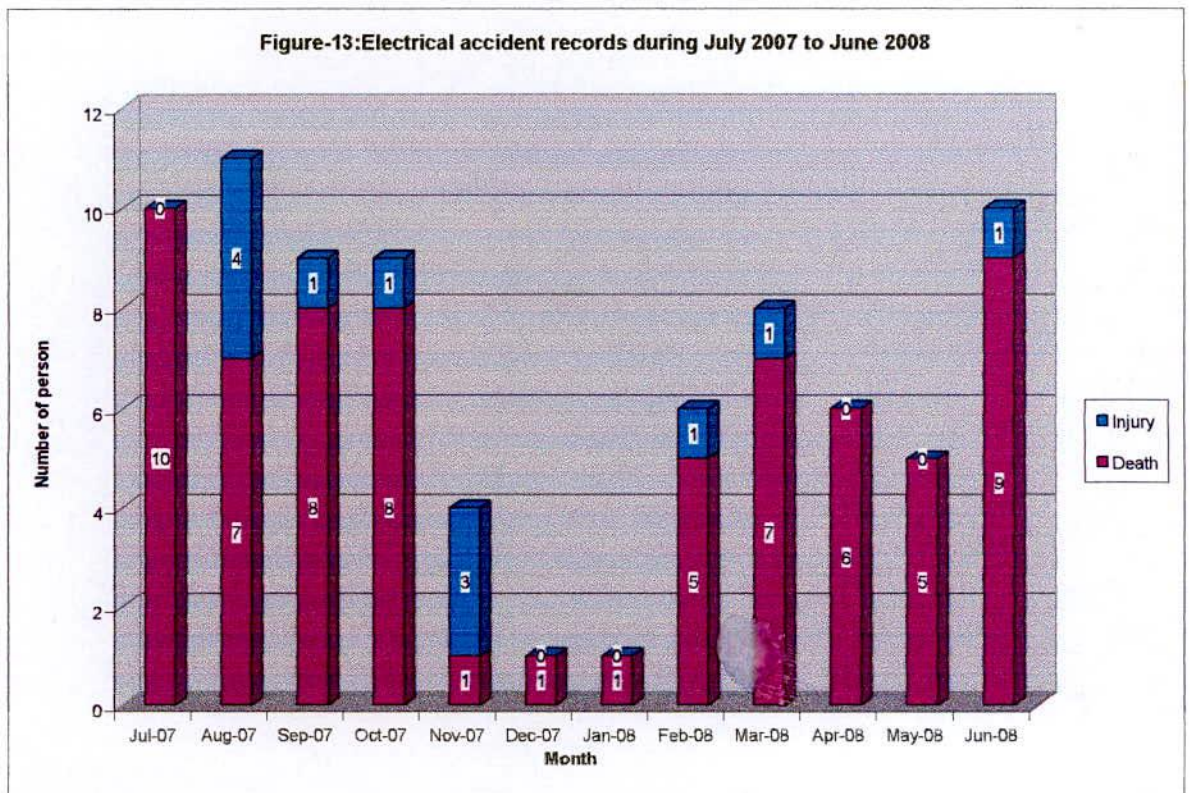
Table-09: Means of accident prevention

It is seen from table-10 that nearly 31% managers emphasized on use of PPE. The total weight given to use PPE and continuous supervision in combine is above 52%. This figure shows on which measure to be emphasized for accidents prevention.

4.3 Data analysis for public accident based on the questionnaire for workers

4.3.1 Month wise accidents record since July/07 to June/08.

The records of electrical accidents published in The Daily Newspapers (Purbanchal, Probaho & Loksamaz) for the period July/2007 to June/2008 (**Appendix-P**) has been collected. As per records, 67 persons died and 13 persons injured in total of 80 persons fell in accidents during the period. 'The newspapers cover the news of south-west (Mainly Khulna & Jessore Region) zone of the country. Again lack of information the newspaper cannot cover all news of accidents. Obviously, in such a short period the number of accident occurrence is abruptly high. The number of accidents has been segregated month wise and is shown in **figure-13**:



It is seen from figure-12, the frequency of accidents is minimum for the period November/2007 to December/2007 and maximum from June/2008 to July/2008. November to December is winter in respect of our country and June to July is rainy season.

In total five persons fell in accidents in winter where as twenty persons fell in accidents in rainy season. Though number of accidents is the highest in rainy season but it is almost high through out the year except winter. The secret of variation in the number of accidents occurrence with variation of seasons was tried to give out through analyzing the collected records.

While analyzing the collected records it was found that a significant number of public fell in accidents in contact with the trees adjacent to distribution line. In rainy season, the trees grow up rapidly and those nearer to distribution line get touch with the line. When people go in contact of such trees get electric shock and die or become injured.

The main two causes were found out of going in contact with trees by public are highlighted below:

- 1) In rainy season (June to July) most of the pasturelands go under water in rural areas and there is a crisis of cattle foods. The village people get on the trees to collect cattle foods and sometimes they get electric shock in case of trees are in contact with electric line.
- 2) April to May is summer season in our country and in this period different types of fruits are available. People get on fruit trees to pick up fruits and get electric shock in case of distribution line is very close or in contact with line. For this reason the number of accidents occurrence is too much high from April to July.

During the period from March to October the weather becomes rough & stormy in our country. Due to storm trees fall massively on distribution line and wires of line disconnect. Even the line is disconnected and falls on ground, sometimes for the improper settings or coordination of safety equipments the feeder does not trip. When insincere people go in contact in such line fall in accident and die in most of the cases.

In winter the duration of day is shorter than night. Again in this period the weather remains so cool that normally public goes out from house in delay at morning and returns home

earlier at evening. As a result, working hours of public is limited during winter. Due to fewer activities the number of electrical accidents in winter is less.

During winter pasturelands remain dry and there is no crisis of cattle foods. Village people need not to be dependant on trees for cattle foods. So they do not get on trees nearer the electric line and can avoid electrical accidents in this period.

The weather remains calm in winter. Due to storm, distribution line wire does not disconnect and fall on the ground. Electrical accidents are also limited in this period due to disconnection of electric line. These are the main causes of less electrical accidents in winter than other period of the year.

4.3.2 Hazards available in distribution system

The workers remain close to the doors of public most of their working time. They are well informed about the hazards involved in distribution system liable for accidents occurrence in case of public. The interview was open ended in this session. With the aim to inform about hazard the workers were requested to mention some hazards exist in distribution system especially liable for public accidents. Out of 155 workers, most of the workers mentioned more than one hazard. The names of hazards mentioned by the workers are summarized in **Table-10** with weight given by the workers:

SL. No.	Name of Hazard	Number of workers	Percentage
1.	Side connection	55	26.82%
2.	Illegal use of electricity	46	22.43%
3.	Tree adjacent to distribution line	34	16.58%
4.	Existence of installation under the line	27	13.17%
5.	Improper clearance	25	12.20%
6.	Others	18	8.80%
Total		205	100%

Table-10: Hazards exist in distribution system liable for public accidents

4.3.3 Main causes of accidents

The causes for which public fall in accidents were tried to find out through the study. This interview session was open ended. In this session, the workers were requested to give their comments about the causes of accidents related to public. Most of the workers were found aggressive against the public while taking interview. They blamed the deficiency of the public for accident occurrence. They mentioned illegal use of electricity through meter tempering or hooking, taking side connection in unsafe condition as the main causes of accidents. In addition with the causes, few of them mentioned other causes like- trees adjacent to distribution line, existence of installation under distribution line, improper clearance of line etc. but they gave emphasis on illegal connection & side connection.

When the activities of workers go against public, public criticize them or even assault physically. This is the main cause of the excitement of workers against public. Since the workers were excited to public, their mentioned causes may be influenced with their feelings. Considering this, the causes mentioned by workers were filtered by analyzing the collected accidents record from The Daily Newspapers [9]. Eighty accidents were sufficient enough to get a picture on the causes of occurrence. The collected records were categorized as on their causes of occurrence and have been shown in **Table-11**:

SL. No.	Cause of accident	Number of occurrence	Percentage
1.	Insincere use of electricity	35	43.75%
2.	Tree adjacent to Distribution line	18	22.55%
3.	Using electricity through side connection	07	8.75%
4.	Defective distribution line	06	7.5%
5.	Illegal use of electricity	06	7.5%
6.	improper clearance of line	03	3.75%
7.	Existence of installation under line	02	2.5%
8.	Others	03	3.75%
Total		80	100%

Table-11: Main causes of accidents as per worker's view (in case of public)

4.3.4 Means of prevention accidents

After analyzing the records of accident published in The Daily Newspapers the causes of accidents have been listed in **Table-11**. When the workers were asked about the causes of accidents their mentioned causes were almost similar with the causes in **Table-11**. From the table-12, it is seen that public fall in accident mainly due to side connection in unsafe condition, using electricity illegally through hooking, construction works under line with improper clearance, insincere use of electricity and trees are very close or in contact with line etc.

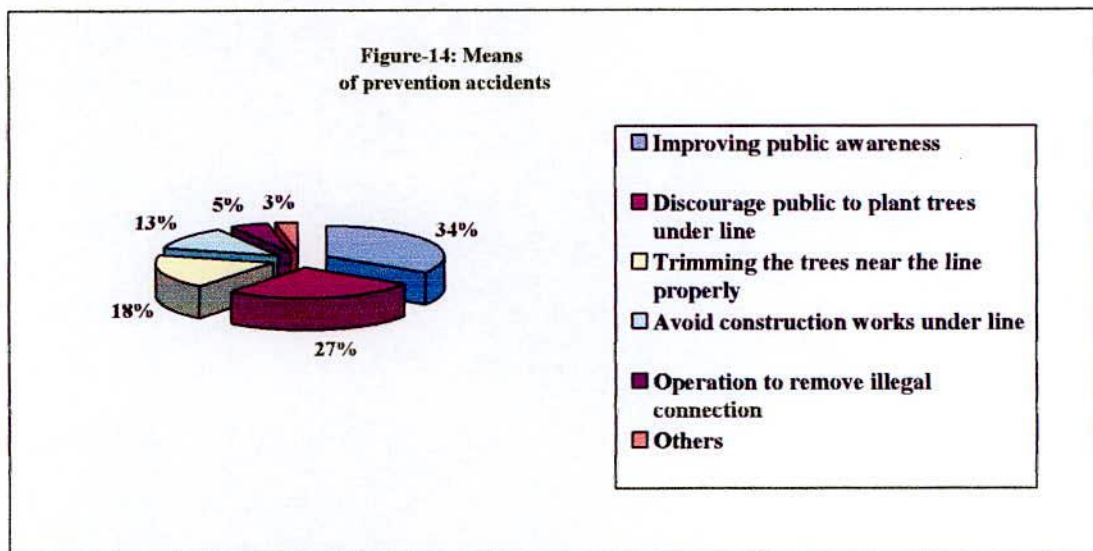
During visit to the different distribution organizations the above situations were found present in the field nakedly. It was frequently observed that public had taken side connection from the nearer legal consumers to use electricity. In some cases the side connection was taken with low quality flexible wire and the distance of connection was found not less than thousand feet. Most of the side connections were found in unsafe condition at a man height. Somewhere the connections were found to cross public passage with improper clearance.

The trees near the distribution line must be trimmed to follow a standard clearance (**Appendix-B**). During visit most of the distribution lines under all distribution organizations were found with improper clearance. So many trees were found in contact with line where children plays and public moves frequently.

A proper clearance must be maintained as per **Electricity Act-1910** to construct any installation near the distribution line to avoid accidents (**Appendix-C**). During field visit, uncountable number of structures was found very close to distribution line in risky condition.

Such illegal activities cause accidents sometimes. Mentioning these activities the workers blamed the deficiency of public for occurrence of accidents during the cause finding session. The session of finding the ways for accidents prevention was also open ended. In this session the workers were requested to give some suggestions related to accident prevention. Reply to such invitation, most of the workers gave their opinion as; public should abstain from such illegal activities to keep them safe.

The workers were reminded that as per Electricity Act-1910, to trim trees near the distribution line, carry out operation to remove illegal connection, taking activities to build public awareness for using electricity is the responsibility of respective distribution system. The workers confessed the truth. Then the workers were further requested to provide some recommendations for accidents prevention. Total 155 workers were taken under this study. Except few, most of the workers gave more than one suggestion. In total 191 suggestions were provided for accidents prevention. The names of activity to prevent accident are summarized below with their percentage:



The ways for prevention accidents as per recommendations of workers are mentioned below:

Improving public awareness for using electricity

Trimming the adjacent trees properly

Operation to remove illegal connection

Avoid construction works with improper clearance

Discourage public to plant trees near distribution line

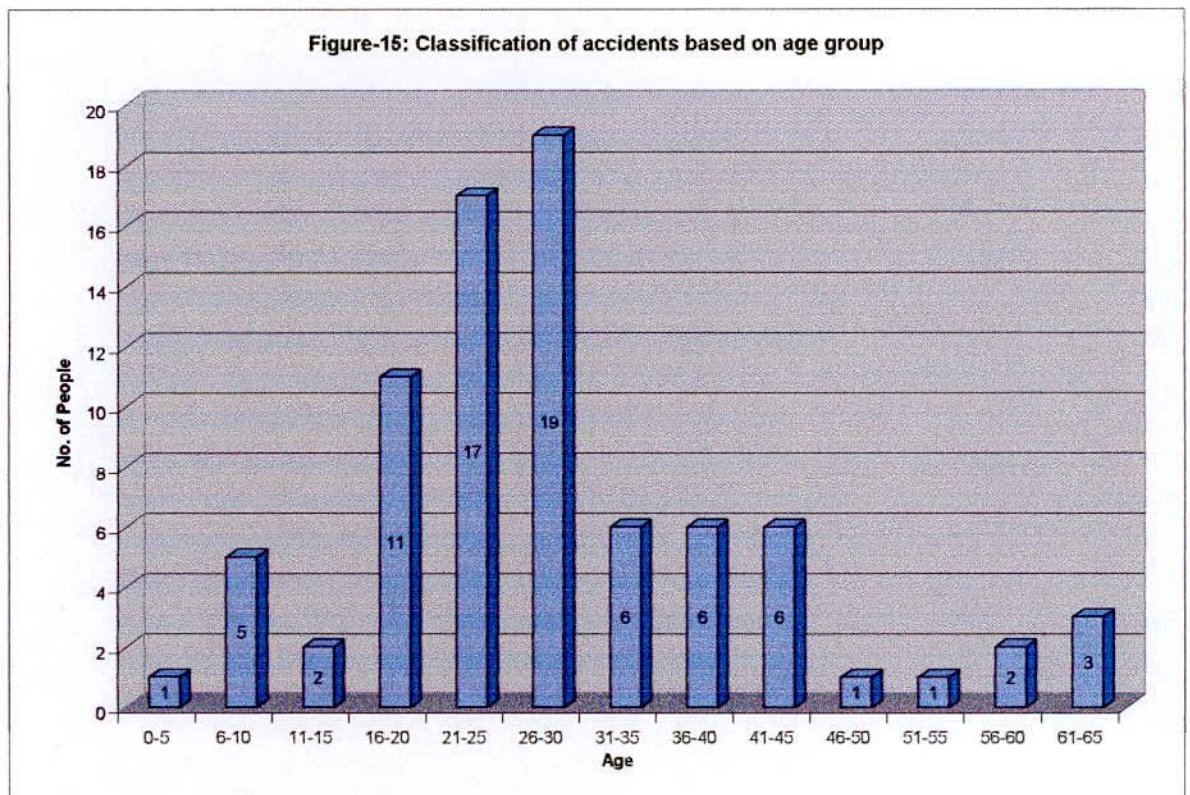
Others

4.4 Data analysis for public accident based on the questionnaire prepared for Public

4.4.1 Classification of accidents based on age group

Reviewing accidents collected from The Daily Newspapers, it is seen that except few mainly, the rural people fell in accidents. In total 80(eighty) accidents, 73 (seventy-three) are from rural areas and 7 (seven) are only from urban areas. Electricity is extensively used in urban areas than the rural areas. Most activities of urban people are electricity based. So, the above figure should be reverse. The rural people are illiterate and insincere in comparison to urban people and this is the main cause of the dissimilarity.

From **Table-11** it is seen that 66.3 percent of total accidents are due to tree adjacent to line and insincere use of electricity. This high percentage can be reduced if it is possible to make the village people sincere. It is needed to motivate the village people to increase sincerity. For motivation which age group should be emphasized must be identified first.



Considering the importance, the collected accidents have been classified based on age group and are shown in **figure -15**. Total eighty accidents were classified in thirteen different age groups. From figure it is seen that maximum accidents occurred for age group 26-30 and next maximum is for age group 21-25.

4.4.2 Main causes of accidents

Field visit was conducted to find out the causes of accidents as per public view. In total 175 (One hundred and seventy five) number of general public and consumers were covered in this study. While visiting the field, most public were found not accustomed with such type of interviews. So they were inexperienced and found fearful. Since most of the people were illiterate, they had no eagerness in giving comments in written condition. Finding no way, the session was kept open ended. The respondents were requested to mention some causes of accidents. A major portion of the respondents blamed the negligence of distribution system workers for accidents occurrence. A supplementary question was asked about such comment. In reply to the question, they mentioned that distribution system workers do not attend complain timely even in case of risky situation of distribution line or equipments. As a result accidents occur. Some people mentioned the tree adjacent to distribution line, side connection and illegal use of electricity as the causes of accidents. A significant portion mentioned the insincerity of village people as a cause of accident occurrence. They mentioned that village people are illiterate and they are ignorant about the safe use of electricity. The causes mentioned by public are listed in **Table-12**:

SL. No.	Name of cause	No. of People	Percentage
1.	Negligence of distribution system workers	73	31.06%
2.	Insincere use of electricity	65	27.66%
3.	Tree adjacent to distribution line	45	19.14%
4.	Side connection	31	13.20%
5.	Illegal use of electricity	13	5.53%
6.	Others	8	3.40%
Total		235	100%

Table-12: Main causes of accidents as per public view (in case of public)

4.4.3 Means of prevention accidents

Different types of causes were mentioned by the public for accidents occurrence. The public were requested to give some recommendations for accidents prevention. Most of the respondents gave emphasis to follow safety rules and regulations properly. The respondents were informed about the illegal activities that they perform in distribution system- such as plantation of trees near distribution line, illegal use of electricity through meter tempering or hooking, taking side connection for using electricity etc. and due to such wrong activities accidents mainly occur. Most of the interviewee informed that distribution authorities are also liable for such activities. How the distribution authority is liable. In reply to the question the respondents described each of the activity in following way:

Most of the village people do not have any cultivable land. They are the owner of small piece of land on which they build houses. Near houses they also plant fruit trees. They sell the fruits in market to earn. Few families are solely dependant on these earnings. So village people do not plant trees near the line willingly rather than being pressurized. How this problem can be solved. In reply to the question, they mentioned, the distribution authority should choose the route of line keeping a safe distance from foundry land. Where it is impossible to maintain safe distance, the distribution authority should trim frequently the small portion of the trees near line throughout the year.

In case of side connection and illegal use of electricity, they mentioned that such activities are carried mainly by the people who are not the consumers of distribution system. During field visit the fact was found true. The public who took side connection were asked about such illegal activity. They informed that they communicated with the respective distribution system for several times but the authority does not give them electric connection. Electricity is essential for their children's education and other purposes. So being bound, they took side connection for using electricity. Some respondents showed documents against their comments. For few cases, the existing rules of distribution system do not cover to give them connection. Insufficiency of electrical materials is also a cause of not giving connection. They mentioned that if they are facilitated electricity, not a single one will take side connection and possibility of accidents will be reduced.

4.5 Data analysis for public accident based on the questionnaire prepared for managers

4.5.1 Main causes of accidents

The causes of accidents were tried to identify in this session. The session was open ended. The managers were asked to mention some causes liable for public/consumers accidents. The managers were found very much sincere and attentive to give the answer. They were tactful to give answer so that their answer would not go against them or the organization. The tendency of every manager was to lay the blame upon consumers/public. In total twenty managers, almost every manager blamed the public insincerity for accidents.

Which types of insincerity are as usual from consumers? In reply to the question, the managers mentioned activities like-public operate household electric apparatus/switch in wet condition, spread cloths over electric wire to dry under sun, perform different activities with improper clearance of distribution line, get on trees near line etc. Initially, not a single manager mentioned the causes like side connection, illegal use of electricity, defective design of line etc. because the authority's liability is involved with such causes.

The managers were informed about existing side connections that was found during field visit and the classification of accidents based on causes collected from The Daily Newspapers. The managers agreed with the documents. Then the managers were further asked to mention at least two causes which they considered as the major causes of accidents.

Total forty-three causes were mentioned by the managers which are listed in **table-13**:

SL. No.	Cause of accident	Number of occurrence	Percentage
1.	Insincere use of electricity	19	44.18%
2.	Using electricity through side connection	08	18.60%
3.	Tree adjacent to Distribution line	05	11.62%
4.	Existence of installation under line	04	9.30%
5.	Illegal use of electricity	03	6.97%
6.	Others	04	9.30%
Total		43	100%

Table-13: Main causes of accidents as per manager's view (in case of public)

4.5.2 Main obstacles to follow rules & regulations

From the analysis of previous section, it is clear that accidents happen due to not obey safety guidelines properly. While visiting the field negligence to follow safety rules was observed in every distribution organizations. In this session, the obstacles to follow safety rules and regulations were tried to find out. Obstacles to follow safety guidelines are not limited to root level of distribution system only but spreaded up to the supreme authority of the system. So to discuss all the obstacles openly was problematic. Considering the problem, the session was kept both open and close ended.

While visiting Palli Bidyut Samity, safety tools were found available. To monitor the conditions of tools monthly there is a tools record form (**Appendix-F**). The administration of Palli Bidyut Samity is very tight since it is a private organization. The management provides necessary logistic support to perform the system activities. Despite of having sufficient safety tools, good work environment safety guidelines are not followed here properly. So accidents rate in Palli Bidyut Samity is significant. The limitations related to safety keeping were found in PBS are as follows:

1. There are no standard safety manual or proper safety guidelines.
2. Activities to improve workers sincerity towards safety like safety training, safety meeting, motivation meeting, safety exhibition etc. are rarely commenced here.
3. To build up public awareness towards safety, the activities needed like motivation meeting in the field, safety meeting, circulation of safety leaflets among consumers/public, safety advertisement in press media to increase public sincerity, miking etc. are nearly absent.

Finding these limitations the managers were asked about the obstacles to follow safety guidelines properly. Discussing with different managers the obstacles to follow safety rules in PBS are found as the following

1. Unavailability of standard safety manual

Rural Electrification Board provides technical & financial support to Palli Bidyut Samity for its operation. There are three instruction series 100, 200 & 300 termed as operating manual.

All the guidelines related to each activity are clearly specified here except standard safety guidelines. Palli Bidyut Samity system has no standard safety manual.

2. There is no provision for training specially on safety

The training courses for employees of PBS are designed and organized by Rural Electrification Board. Most of the courses are job oriented but training courses specially on safety are not included in schedule courses.

3. Excessive work load for workers

The staffing pattern of PBS is as per guidelines of Rural Electrification Board. The volume of work was found excessive than workers during field visit. Beside this lineman has to perform daily activities with the help of motorcycle. Sometimes a working group consisting of two linemen has to carry 8-10 single-phase energy meters, necessary service drops, personal tools, safety tools, line tools etc. on a motor cycle. The practice is very dangerous because the load is too excessive that the vehicle rules do not cover it. To drive a motor cycle in such condition is normally a hard work, even after they have to perform activities on pole top several times in a day. Such risky situations are liable for accidents.

4. Some adverse rules for line construction

PBS has some adverse rules for line construction. The length of service drop is 100 feet in PBS system and it can be extended up to 110 feet with the special permission of REB. Connection procedure for a single consumer beyond this limit is very much complex. Finding no way such consumers take side connection from the nearer legal consumer and due to unsafe condition sometimes accidents happen.

5. Insufficient line construction materials

Shortage of line construction materials is a normal phenomenon in PBS. The public who have applied for electric connection and are being delayed due to shortage of materials normally takes side connection and fall in accidents sometimes.

6. Less budget for tree trimming

Since the location of PBS is in rural areas normally the electric line passes though densely forest. To keep clear these lines are too much difficult. Besides this due to limited budget the difficulty increases.

While visiting West Zone Power Distribution Company Limited workers were found in civil dress. Normally, they do not put on uniform. During work, they put on sandal rather than lineman boot. After all, their attitude was not found smart which should be as a lineman. Different limitations which were found during visit to WZPDCL are summarized below:

1. Lineman attitude was not positive and smart as a lineman.
2. There is too much shortage of safety tools, line tools and lineman tools. Even few linemen do not have any working tools (**Table-4**).
3. Safety activities like safety meeting, motivations meeting etc are absolutely absent.
4. There is a lack of supervision of workers from management level.
5. There is a lack of coordination among managers and staffs.
6. Both the managers and employees were found too much insincere towards safety.
7. Chain of command, which is very much essential for safety keeping, has been broken down completely.
8. No activities related to public awareness building are fully absent.
9. Necessary forms which are too much essential for safety practice like tools condition monitoring form, line maintenance form, daily service order form, shut down form etc. are unavailable or available in non-standard format.
10. Line tools were insufficient and found most of the tools in bad condition.

The managers were asked about the obstacles faced by them to follow safety rules and regulations. Discussing with different managers the following obstacles were found out:

1. Unavailability of standard procedures for each activity
2. There is on safety guide lines available
3. Cultural barrier towards safety
4. Bureaucratic complexity to collect necessary safety and other tools
5. There is insufficient budget to purchase tools.
6. There is no financial allocation for safety activities like safety meeting, motivation meeting etc.

4.5.3 Means of prevention of accidents

Among twenty managers most of the managers have been working in distribution system for long period. During their tenure of service they have observed many accidents related to public. As a result they are acquainted with the causes of accident. In this session managers opinion was taken for accidents prevention. The session was kept open ended. Almost every manager mentioned their opinion as, 'Accidents prevention is possible if public is kept away from illegal activities'. They also gave their opinion to increase public sincerity to prevent public from illegal activities. Then the managers were informed that to increase public sincerity belongs to the responsibility of distribution organization.

Most of the managers mentioned that a social movement is essential against illegal activities. They also added effort only from distribution organization is not sufficient to increase public sincerity. How such like movement may be initiated. In reply to the question some managers mentioned that public representative can play an important role for building public awareness. Public representatives remain close to the public most of the time during their daily activities. They can suggest public to use electricity safely, to avoid illegal use of electricity, not to plant trees distribution line etc. Some managers gave their suggestions as, 'Cautioned notice may be served, cautioned leaflets may be distributed among public, cautioned posture may be hung on walls in public gathering places like- court, UNO office, school college & universities, near play ground, hat, bazaar, shopping mall, different public offices etc. to increase public sincerity'.

Some managers mentioned, Bangladesh government and other social non-government organization can provide financial support to print & electronic media to focus drawbacks of illegal activities related to electricity for public awareness building. The means for accident prevention highlighted by the managers during the interview are summarized below:

1. Awareness campaign
2. Continuous operation against illegal activities by distribution authority
3. Trees near line must be trimmed properly specially before rainy season
4. Action to be taken against plantation & construction of structure near line
5. Prompt action to be taken by law enforcement authority against illegal activities

CHAPTER 05

DISCUSSION & RECOMMENDATIONS

5.1 Discussion

Many people died due to accident in distribution system every year and thousands of workers got injured and many of them lost their working capacity due to various accidents reported in the newspapers. The records of electrical accidents that happened in the southwest region of the country for the period July/2007 to June/2008 have been collected. It is found from the records that 67 persons died and 13 persons injured in total of 80 persons fell in accidents during the period. The number of PDB employees fell in accidents during the year from 2001 to 2005 is 97 and the number of public is 76 as per records collected from PDB (**Appendix-N**). The compensation given for accidents was taka 41, 34,728.00. From the data above, it is seen that the accident causes not only loss of valuable lives but also economic loss. Rural Electrification Board (REB) does not accumulate the total accident records for their workers or public of the whole country. Due to unavailability of accident records from REB, data was collected from PBS. Twenty fatal and minor accidents (in case of workers) records were collected from Palli Bidyut Samity (PBS) for the period 2000 to 2008 and analyzed.

It is alarming that after accidents, the distribution organization authority tried to hide the actual information of the accident to avoid legal complexity. As a result, due to lack of correct information, precautions needed to avoid further accidents become tough. Not finding the actual information of an accident, the expert groups are also unable to provide suggestions for accident prevention. This is the common picture for all distribution system. To ensure the workers' right as well as to change the scenario of distribution system government intervention and strong monitoring mechanism is necessary.

While carrying out the research work, it was found that every distribution organization has a limited safety rules & regulations in a standard or non-standard format. But, most of the organizations do not follow even these rules and regulations properly. The activities needed

to motivate the workers and the public to follow safety rules and regulations are nearly absent in most of the distribution organizations. Moreover, there is a tendency to avoid safety rules & regulations from both the workers and the managers.

From the study, it is found that knowledge about hazards and risks, safety awareness of managers and workers are inadequate. In most of the distribution organizations, training and awareness-building programs are extremely limited and not institutionalized.

For the interest of the study, the entire workers are classified into four clusters, such as high skilled, skilled, semi skilled and unskilled. It is observed from the study that among the total accidents, 10% accidents faced by high skilled workers, 20% accidents faced by skilled workers, 55% accidents faced by semi-skilled workers and 15% accidents faced by unskilled workers. Almost all the workers experienced with accidents, except 2% as they joined the system recently. Total 75% accidents faced by skilled and semi-skilled workers. The workers and managers were asked about the high percentage of accident occurrence in case of these two groups. It was informed from both the workers and managers that these two groups perform most of the daily activities of a distribution system. As a result, accident occurrence of these groups is high. Unskilled workers are not engaged in risky works because of insufficient technical knowledge and high skilled workers mainly supervise the works. So, for accident prevention, emphasis must be given for unskilled and semi-skilled workers.

During field visit, it is found that the workers are aware about the specific causes of accident like personal negligence, lack of work experience, not to use personal protective equipment (PPE), absence of good working environment, over confidence, excessive work load, insincerity, improper shutdown, defective tools, lack of technical knowledge, lack of safety guide lines, do not obey the safety regulations and tendency to do work on live line etc. Though the workers knew the preventive actions that could save them from accidents but the managers undid them to prevent the same due to lack of initiative.

The managers were also asked about the causes of accidents during interview. Like workers, the managers mentioned more or less the same items as the causes of accident like insincerity, not use PPE, lack of safety knowledge, absence of good working environment, over confidence and tendency to do work in short cut way etc.

When the managers and workers were asked about the way of prevention accident, they claimed that no effective monitoring by the govt. departments made yet. Moreover they provided some suggestions that include the use of PPE, awareness campaign, continuous supervision, training, good work environment, justified work load etc.

Workers, managers and the general public mentioned more or less the same causes of accident in case of public accidents like illegal use of electricity, defective distribution line, illegal use of electricity, improper clearance of line and tree adjacent to distribution line etc. The workers and managers also provided some suggestions for public accident prevention like awareness campaign, trimming of trees near distribution line, continuous operation against any types of illegal activities by distribution system authority and law enforcing authority.

Age plays a vital role to control behavioral attitude of human being. So, in the study, the collected accident records (public accident) were classified according to age group. It is observed from the results that amongst the different age group of public, most vulnerable group is 26-30 and this group faced about .24% of the total accidents. This group is followed by 21-25 age group and there after 16-20 age group. As a result, for accidents prevention, more victimized group must be emphasized when any types of awareness building campaign is taken.

In open discussion about safety, the employees & managers of different distribution organization were asked various types of questions on keeping safety in distribution works. From discussion it was realized that most of the employees have at least minimum sense about safety in distribution line works. By discussing, collecting data and reviewing of past accidents it is concluded that the only limitation to keep safety is the lack of safety practice.

Though accident occurs due to negligence of both managers and workers, joint efforts are essential to prevent it. It was come out from the discussion with the workers and the managers that they do not follow the safety rules and regulation as per electricity acts. As a result of unsafe practice many workers died and lost their earning capacity. Moreover, a systematic approach mentioned in the ILO guidelines could be replicated in Bangladesh to assess risk and which enable to control the accidents.

5.2 Recommendations

From discussion with the employees and managers of different distribution organizations, analyzing collected data and reviewing previous accidents, the following recommendations are made to prevent accident:

a) Establish a safety department in every distribution system

During field visit, it is found that in every distribution system, there is no safety department. In distribution system every department is busy in every one's respective work. So, it is not possible to give more attention for a department in safety keeping. Discussing with both the employees and managers, it is highlighted that a safety department is very much essential that will carry out the safety activities to prevent accident. If the department works properly with involving both the employees and managers as per following suggestions, the frequency of accidents must be reduced at a minimum level.

- Periodic inspection of distribution lines, substations, line equipment, lineman tools and personal protective devices etc.
- Carrying out safety activities like-Safety meeting, awareness campaign, motivation meeting to be held regularly to build awareness of both employees and the public.
- Insist employees to put on safety dress and use personal protective devices.
- Make available of protective tools and equipment.
- Check line inspection form, maintenance form, monitoring shutdown procedures, using of necessary tags, using of temporary grounding while taking line shutdown, line and lineman tools condition inventory form regularly.
- Collection and hanging the important telephone on the wall of complain centers.
- Check tree trimming works after the end of work as per standard (**Appendix-C**).

- Arranging training program in such a way that no employee attempts any task without proper training.

b) Standard Practice to be followed for distribution system activities

- Distribution system performs various daily activities, most of the activities are to be performed in very close to the distribution line which is very dangerous. So, it is wise to do all activities over distribution line in shut down condition.
- Normally before starting distribution line work, a tailboard briefing shall be held so that all members of the crew may thoroughly understand the job to be done and the foreman's method of accomplishing it.
- The work location must be temporarily grounded.
- At least two skilled or qualified men shall be used on all hazardous work. Men should not work alone in hazardous locations.
- All lines and equipment shall be considered energized unless it is known positively that the line and equipment are dead.
- In cases where hot work is authorized on circuits or apparatus, PPE(rubber gloves, linemen's protector shields, hose and rubber blankets or approved hot line tools) shall be used.
- Safety belts shall be used when working on poles over eight feet from the ground, and on steel towers.

c) Reschedule the tree-trimming program

From study, it was found that the contact of trees adjacent to distribution line is one of the main causes of public accidents. So, to prevent accident, the trees close to the distribution line must be trimmed. In rainy season, the trees grow up rapidly and those nearer to distribution line get touch with the line. When people go in contact of such trees, they get electric shock and die or become injured. During field visit, it was found that most of the distribution organization trims the trees, near a distribution line, three times in a year with equal time duration. The schedule of tree trimming should be in such a way that before rainy

season the tree must be trimmed properly. As a result, in rainy season, the trees will not grow sufficient to get touch with distribution line and accident occurrence will be reduced.

d) Assign appropriate work load

The volume of work was found excessive especially in PBS during field visit. It is a private organization and the workers remain under control of tight administration. The workers of PBS system perform excess works daily. Lineman of PBS system has to perform daily activities with the help of motorcycle. Sometimes a working group consisting of two linemen has to carry 8-10 single-phase energy meters, necessary service drops, personal tools, safety tools, line tools etc. on a motor cycle. To drive a motor cycle in such condition is very dangerous. Even after that they have to perform activities on top pole several times in a day. For excess and extra time works, they do not get special benefits. Despite of such dedication, if minor irregularities are observed, the workers are criticized or even legal actions are taken sometimes by the managers. The worker of PBS system is frustrated and is one of the causes of accident occurrence in this system. It is necessary to employ workers in PBS as per work volume and work volume must be distributed logically for accident reduction.

e) Allocating more budget for line construction materials

The public who have applied for electric connection and are being delayed to get connection due to shortage of materials normally takes illegal side connection and fall in accidents sometimes. If they are facilitated electricity, tendency to take side connection will be reduced and there by accident also. So, to procure sufficient construction materials, more budgets should be allocated.

f) Sufficient budget for tree trimming and procuring PPE

The location of PBS is in rural areas. Normally, the electric line passes though densely forest. To keep these lines clear are too much difficult. Beside this, during field visit, the budget for tree trimming was found insufficient. More budgets should be allocated to clear the trees properly. When visited WZPDCL, it was found that insufficient safety tools and equipment were available in the system. Even some workers informed that they have no

working tools. Lack of safety tools is one of the cause of accidents in WZPDCL. During field visit, it was informed that the crisis of PPE is due to shortage of budget. If it is possible to ensure sufficient safety tools by allocating more budgets and if the workers can be made bound to wear PPE through proper supervision, the frequency of accidents will be reduced.

g) Monitoring & keeping records of accidents

Accidents are not adequately monitored and recorded by any one of the concerned department/agency or even by the distribution organizations. For future research, forecasting, policy implications this sorts of incident reports have to be recorded as well as proper investigation of that accidents should ensured by the competent authority decided by the government.

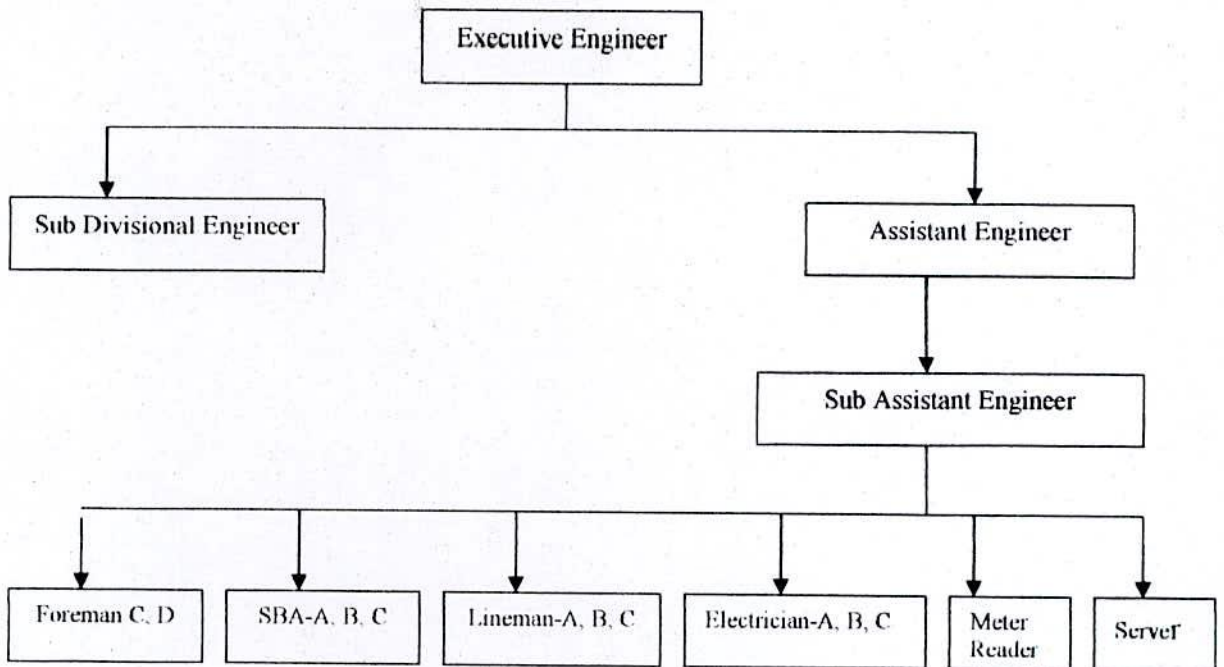
h) Awareness campaign

To build up public awareness towards safety the activities needed like motivation meeting in the field, safety meeting, circulation of safety leaflets among consumers/public, safety advertisement in press media are necessary by distribution system for accident reduction. Awareness campaign on occupational safety and health (OSH) issue is required to organize by the distribution organization and from the concern government departments as the worker is frequently changing.

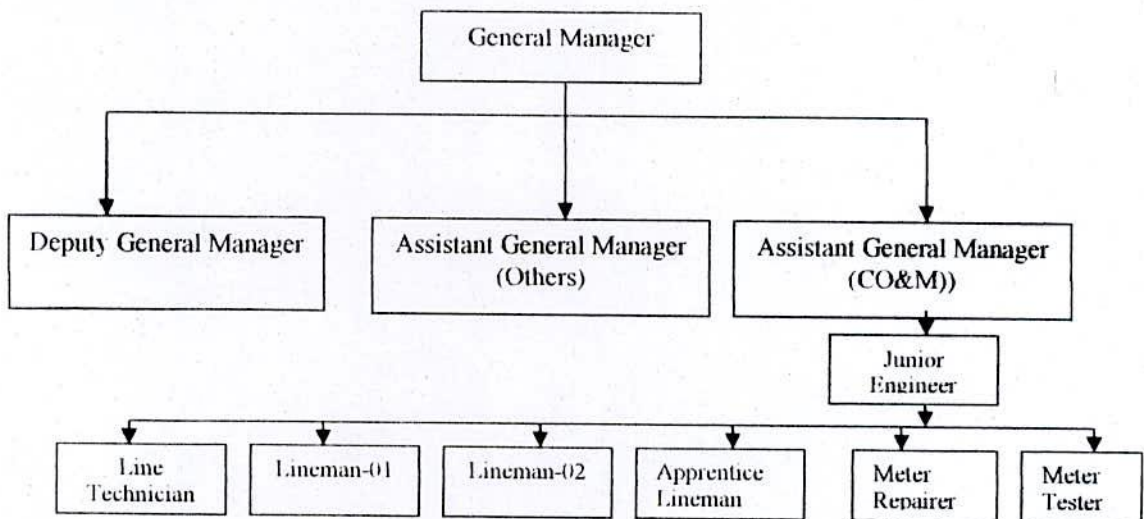
REFERENCES

- [1] An Orientation to Palli Bidyut Samity Distribution System, *Safety & First Aid- Line Crew Training Part-1.*
- [2] Palli Bidyut Samity Operating manual- *100 Instruction Series.*
- [3] General Regulations and Standard Operating Code [1978] of *Power Development Board, Bangladesh.*
- [4] Safety & Environmental General Safe Working Practices- *WartsilaBangladesh Ltd.*
- [5] Principles of Power System- *V.K Metha [1992], S. Chand & Company Ltd.*
- [6] Annual Report [2005-2006 & 2006-2007], of *Bangladesh Power Development Board.*
- [7] Electricity Act Manual- *A.K.M Tofazzel Hossain[2004], Shamsu Publications, Dhaka*
- [8] Distribution Construction Manual [November-1998], *Bangladesh Power Development Board, Volume-1[Specifications] & Volume-2[Drawings]*
- [9] The Daily Purbanchal, a regional news paper [July/07-June08]
- [10] Electrical Safty & the Law[2002]- *Ken Oldhan Smith (UK) and John Madden (UK)*
- [11] Electrical System Safety Manual- Compiled and Prepared by Resident Engineer's Office, Karnafuli Hydro Station, Kaptai, Rangmati.

Staffing Pattern (PDB):



Staffing Pattern (Palli Bidyut Samity):



Minimum Clearance of Distribution Line

SL. NO.	Types of line	Clearance from the installation	Clearance
1	33KV, 11KV & LT	Crossing over street/road	Phase-19' & Neutral-18'
2	33KV, 11KV & LT	Running over street/road	Phase & Neutral both-17'
3	33KV, 11KV & LT	Over rail road	Phase-25' & Neutral-23-6'
4	33KV, 11KV & LT	Over pedestrian way(also paddy field)	Phase & Neutral both-15'
5	33KV, 11KV & LT	Over building roof	Phase & Neutral both-8'
6	33KV & 11KV	Communication wires and cables	Phase & Neutral both-6'
7	33KV & 11KV	Secondary or neutral	Phase & Neutral both-4'
8	33KV & 11KV	33KV or 11KV	Phase & Neutral both-4'
9	33KV or above	Over navigable river	From 35' to 70'
10	Open wire (secondary or neutral)	Communication wire	Phase & Neutral both-4'
11	Open wire (secondary or neutral)	secondary or neutral	Phase & Neutral both-2'
12	Open wire (secondary or neutral)	33KV or 11KV	Phase & Neutral both-2'
13	Service drop	Communication wire	2'
14	Service drop	Secondary or neutral	2'
15	Service drop	Over commercial drives	15'
16	Service drop	Over non commercial drives	12'
17	Service drop	Over pedestrian ways	10'

Safe Distance of Human Body from Live Electric Line:

700 volts	to	3500 volts	30 cm (1 ft)
3501 volts	to	10000 volts	60 cm (2 ft)
10001 volts	to	50000 volts	1.0 m (3'-4")
50001 volts	to	100000 volts	1.6 m (5'-4")
100001 volts	to	250000 volts	3.0 m (10'-0")

Current Flow and its Effect on Human Body:

No sensation	less than 0.5 mA
Slight sensation	0.5 mA to 2.0 mA
Muscular contraction	2 mA to 10 mA
Painful shock, inability to walk	5 mA to 25 mA
Violet muscular contraction	over 25mA
Paralysis of breathing	over 200 mA

The Standard Specification of Tree Trimming (Distance of trees from live line):

<u>Types of Line</u>	<u>Trimming Distance From Both Sides of the Line</u>
11/33/6.35kv	10 feet.
0.4/24kv	5 feet
Service drop	2.5 feet

Complains Record of Jessore Palli Bidyut Samity-02 (Year 2007):

Serial No.	Month	Nature of complains and quantity (year 2007)										
		Service drop related	Meter related	L T/HT line disconnected	Section fuse burnt	Transformer fuse burnt	ROW related	L T jumper disconnected	Pole broken	Transformer damage	OCR liver trip	Others
1	Jan/07	89	49	58	152	303	14	104	07	29	25	45
2	Feb/07	141	76	87	206	355	21	176	09	60	14	76
3	Mar/07	87	62	46	161	304	22	155	03	41	15	76
4	Apr/07	183	83	202	440	627	23	125	13	62	84	123
5	May/07	127	47	142	377	588	22	156	01	60	24	66
6	Jun/07	178	76	153	391	637	23	151	05	62	34	97
7	Jul/07	188	96	128	441	673	30	244	06	64	31	110
8	Aug/07	134	83	98	291	501	41	108	03	39	19	111
9	Sep/07	154	97	120	324	531	48	117	07	45	37	113
10	Oct/07	103	91	113	251	432	28	77	05	43	27	113
11	Nov/07	206	150	261	324	475	60	96	71	42	42	107
12	Dec/07	107	75	101	169	314	15	81	03	32	18	94

Work Plan for the Year 2007-2008(Head Quarter Jessore Palli Bidyut Samity-02):

(As an Example of Distribution System Activities)

Serial Number	Particulars	July/07	August/07	September/07	October/07	November/07	December/07	January/08	February/08	March/08	April/08	May/08	June/08
1.	Complain Attend	450	400	400	350	300	300	300	350	350	450	450	450
2.	New Connection	100	200	200	250	250	300	350	350	350	200	200	200
3.	Re-connection	250	250	250	250	250	300	450	450	450	400	400	400
4.	Meter Change	200	200	200	200	200	200	200	200	200	200	200	200
5.	Meter Disconnection	250	300	300	300	300	400	400	450	450	450	400	400
6.	Permanent Disconnection	50	100	100	100	50	50	50	50	100	100	100	50
7.	Meter Report Investigation	150	150	200	200	200	200	250	250	250	200	150	150
8.	Meter Test at Field	200	400	400	400	400	450	450	450	450	400	400	300
9.	Meter Test at Laboratory	300	300	300	300	350	350	350	350	350	300	300	300
10.	Meter Repair at Laboratory	50	50	50	100	100	100	100	100	100	100	50	50
11.	Line Inspection	--	30	40	50	50	50	50	--	--	--	--	--
12.	Line Maintenance	--	30	40	50	50	50	50	50	--	--	--	--
13.	Tree Trimming	20	250	250	240	240	200	200	200	200	200	200	200
14.	Transformer Installation	5	5	5	5	5	15	20	20	20	10	5	5
15.	Transformer Change	10	10	10	10	10	10	15	20	25	20	20	15
16.	Transformer Remove (mm.)	--	--	--	--	--	--	--	--	--	100	300	100
17.	Transformer Reinstallation	--	--	--	50	200	200	50	--	--	--	--	--
18.	Pole Change (Damaged)	10	15	20	20	20	10	10	10	10	15	15	15
19.	Transformer Repair (Workshop)	50	50	50	50	50	50	50	50	50	50	50	50
20.	Transformer Maintenance (Workshop)	--	20	30	30	30	30	20	20	20	20	--	--
21.	Line Construction	0	0	0	0	0	0	0	0	0	0	0	0
22.	Line Electrification	5	--	--	--	--	--	--	--	--	--	--	--
23.	System Loss	10.5	10.5	10.4	10.4	10.3	10.3	10.2	10.2	10.1	10.1	10.0	10.0
24.	Load Factor	40	40	45	45	45	45	50	50	50	45	40	40
25.	Operation for Disconnection (Team)	50	50	50	50	100	100	100	100	100	100	100	100
26.	Night Operation	5	5	5	5	5	5	5	5	5	5	5	5
27.	Tools Maintenance	1	1	1	1	1	1	1	1	1	1	1	1
28.	Safety Day	1	1	1	1	1	1	1	1	1	1	1	1
29.	Consumer Outage (Hours)	2.0	2.0	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.5	2.5

REB Form No. 461

Name of PBS-

Record of Lineman Tools

NAME:

DESIGNATION:

Sl.No	Item No.	Description of Tools	Date	Quantity Allocated	Signature of Lineman Receiving Tools	Signature of Line Supervisor	Counter Signature of AGM(CO&M)
1	2	3	4	5	6	7	8

REB Form No- 462

Name of PBS-

List of Tools In Complain Centre

NAME OF RECIPIENT:

DESIGNATION:

Sl No.	Item No.	Description of Tools	Date	Quantity Allocated	Signature of the Line Supervisor Receiving the Tools	Counter Sign of AGM(CO&M)
1	2	3	4	5	6	7

REB Form No. 458

Name of Palli Bidyut Samity:

Serial:-----

Date: -----

REQUEST FOR OUTAGE

1. To----- AGM(CO&M) of ----- Palli Bidyut Samity
2. Outage is request for the following section: -----
 a) Sub-station----- b) Feeder-----
 b) From Pole----- To Pole -----
 Including all laterals tape in between these poles.
3. Outage required on ----- From----- Hrs----- to-----
 Hrs-----
4. Purpose-----
5. Mr.----- Having signature
 Is Authorized to received the outage and
 give clearance after completion of work.

Requested by
Contractor

Recommended by
S.A.E REB

Countersigned by
AE/XEN(REB)

6. Name and location of device by which the line section with be put out of service.
 Substation----- Circuit----- Village-----
 Name of Equipment ----- Poles-----
7. Ground required 3ph----- 1ph-----
8. No. of Consumer effected (approximate)-----
 a) Domestic----- b) Industrial-----
 b) Agriculture-----

Approved by ----- AGM(CO&M)

Clearance is hereby given for re-energization of the above line section with immediate effect.

Authorized signature----- Date----- Time-----

1. Copy to AGM (CO&M) -----
2. Contractor-----

Photographs showing different activities and tags used in works



Picture-1: Different tags used in distribution system

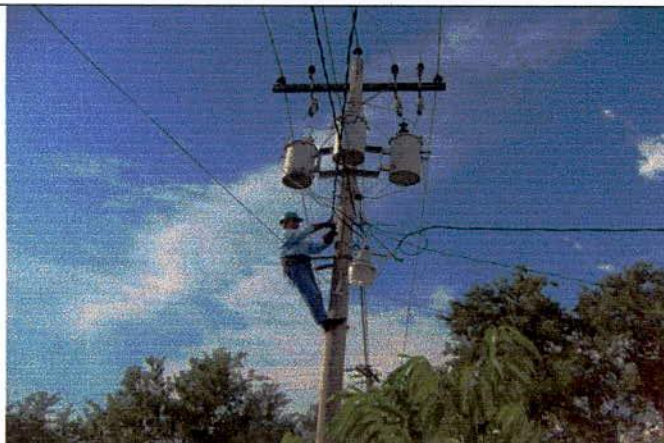
Picture-2: Safety Sign



Picture-3: Lineman working tools



Picture-4: Lineman safety equipment



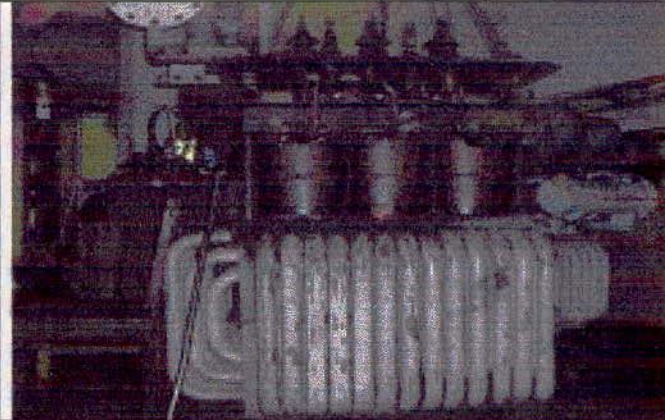
Picture-5: Lineman is working on distribution line with proper safety



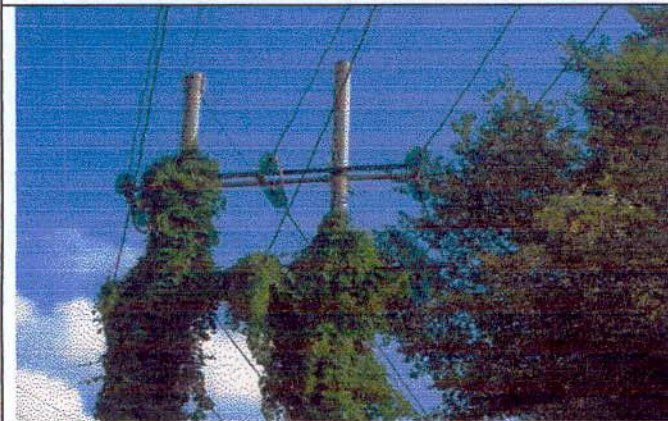
Picture-6: Line is operating a substation with proper safety



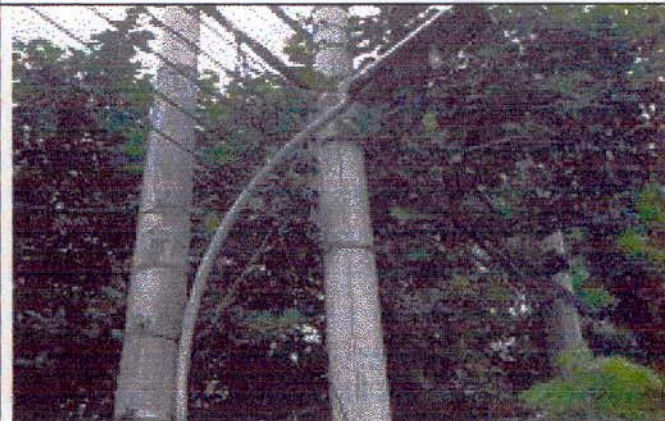
Picture-07: Technician are repairing distribution transformer



Picture-08: Transformer repairing workshop



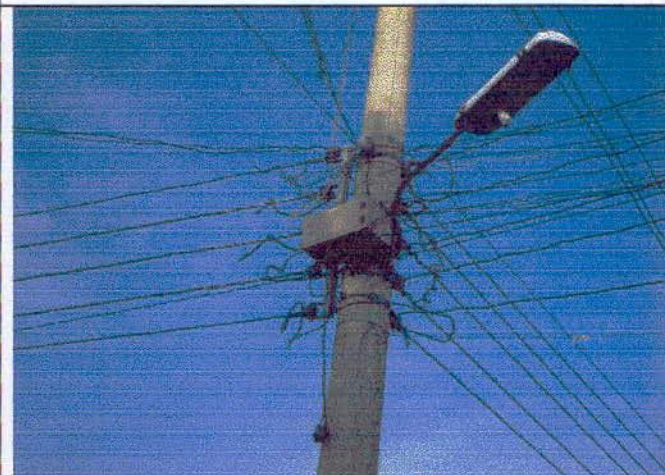
Picture-09: Distribution line is covered with trees



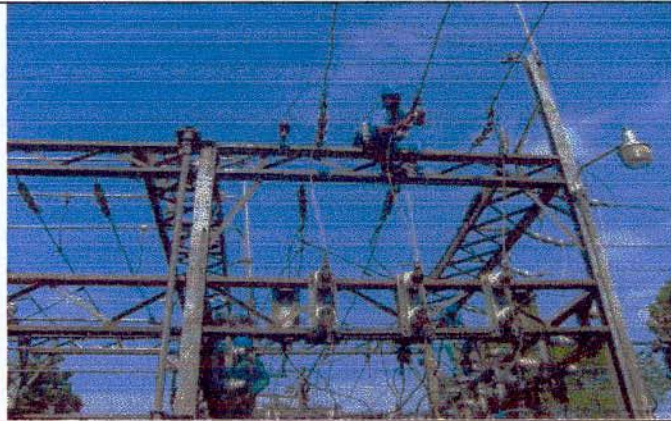
Picture-10: Line passes through trees



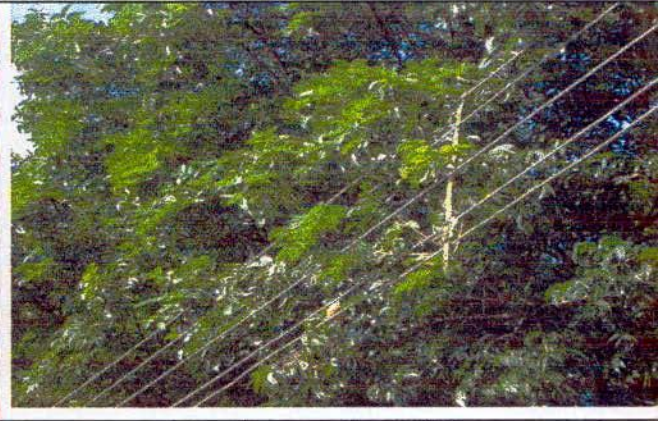
Picture-11: Line with improper clearance



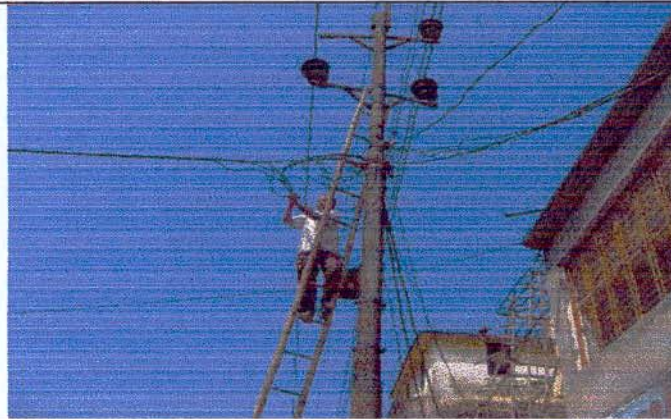
Picture-12: Amplifier of cable TV antenna installed on distribution line



Picture-13: Lineman is working on substation with proper safety



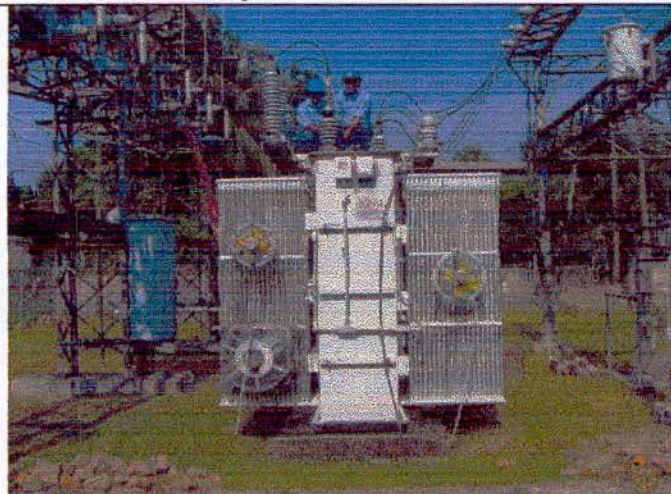
Picture-14: Line is very close with trees



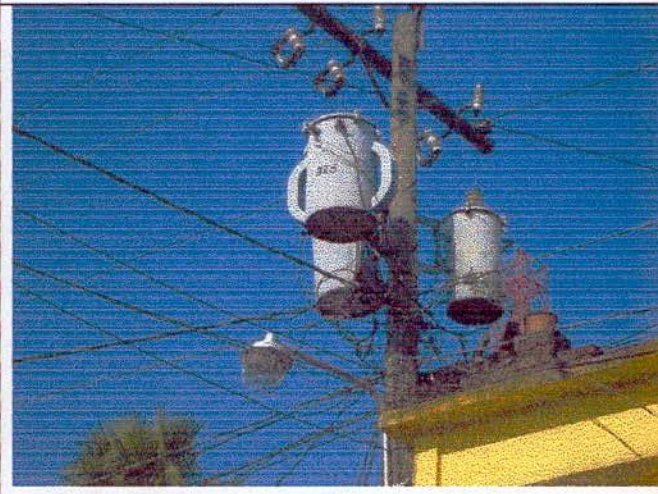
Picture-15: Linemen are working on distribution Line without safety.



Picture-16: Line with improper clearance



Picture-17: Linemen are working on power transformer with safety



Picture-18: Line with improper clearance

Survey Data Sheet

Prepared for the Project Work for M.Sc. Engineering Degree

Instrument for the Workers

1. Name of the Organization :
2. a) Name of the Interviewee :
- b) Designation :
- c) Level of Education :
- d) Age :
3. Category of the Employee :

High Skilled	Skilled	Semi Skilled	UN Skilled
-----------------	---------	-----------------	---------------
4. Working Experiences in this job(Years) :
5. Involvement with this accident :

Victim	Witness	Others
--------	---------	--------
6. Did you take the line shut down properly? Yes/ No
7. Did you temporarily ground the line after shutdown? Yes/ No
8. Did you hang safety tag from where you take line shutdown? Yes/No
9. Did you/ Victim use safety tools? Yes/ No
10. Did you/ Victim use Personal Protective Devices? Yes/ No
11. What are the main causes of this accident?
12. How this specific accident may be avoided?
13. Did you (those for whom, question 5 is not applicable) observe any accident as yet?
14. If yes, is the accident - minor or major?
15. Did you face any accident as yet?
16. If yes, is it minor or major?
17. Do you have any idea about the hazards involved in distribution system liable for worker's accidents? Yes/ No
18. If yes, mention few of them.
19. What do you think about the main cause of worker's accidents?

- a) Insincerity
- b) Over Confidence
- c) Lack of Safety Knowledge
- d) Do not obey the safety rules and regulations
- e) Lack of technical knowledge
- f) Tendency of not using PPE
- g) Personal negligence
- h) Using of defective tools
- i) Lack of safety guide line
- j) Unsafe work environment
- k) Excessive work load

20. Do you know about Electricity Act-1910 or other necessary ordinances?
21. Is safety training held regularly in the organization? Yes/ No
22. Is safety meeting held in the organization regularly? Yes/ No
23. Is safety Rehearsal commenced regularly? Yes/ No
24. Do you have any safety tools list in the organization?
25. Is the condition of the tools checked properly as per guidelines? Yes/ No
26. Is there any line maintenance schedule of the organization? Yes/ No
27. Is line maintained properly according to guidelines? Yes /No
28. What are the responsibilities for accidents prevention from both the managers & workers side?
29. What are your recommendations for accidents prevention in case of workers?
30. Do you have any idea about the hazards involved in distribution system liable for public accidents? Yes/ No
31. If yes, mention few of them.
32. What do you think about the main cause of public accidents under distribution system?
- a) Ignorance about of any kind of hazard
 - b) Tendency of using illegal electricity
 - c) Lack of Safety Knowledge
 - d) Lack of technical knowledge
 - e) Installation near distribution line with improper clearance
 - f) Un planned distribution line in crowded area
 - g) Personal negligence
 - h) Defective design of distribution line

- i) Improper maintenance of distribution line
 - j) Tree trimming is not performed accurately
 - k) Safety equipment installed in the distribution line with improper coordination
 - l) Natural disaster affect the distribution line
 - m) Others(If any)
33. How public accidents may be prevented?
34. Is any activity carried out by distribution organization in the field to make public conscious?
35. If yes, what types of activities are carried out?
36. Is side connection disconnected regularly? Yes/ No
37. Is penalty imposed on consumers for side connection? Yes/ No
38. Is operation carried out in field to remove illegal connection? Yes/ No
39. Are safety/ motivation meeting held in the field to make public conscious? Yes/ No
40. Are basic rules of using electricity supplied to the consumers while taking connection? Yes/ No
41. Are public informed about the clearance of trees from the distribution line? Yes/ No
42. Are public conscious about the clearance of distribution line from any installation near the line?
43. Is tree trimming performed regularly? Yes /No
44. What are your suggestions to minimize the number of public accidents held under distribution system?

(Signature of the interviewer)
Md. Siful Islam
M.Sc Engineering student, KUET

(Signature of the interviewee)
(Optional)

Note:

High Skilled :Foreman C&D, Line technician
Skilled :Lineman grade C, Electrician grade C, SBA- C, Lineman grade-01 & Meter repair
Semi-Skilled : Lineman-02, Electrician-A&B, Lineman-A&B, SBA-A&B, Meter reader, Server & Meter tester
Unskilled : Apprentice lineman, Labor

Survey Data Sheet

Prepared for the Project Work for M.Sc. Engineering Degree

Instrument for the Managers

1. Name of the Organization :
2. a) Name of the Interviewee :
- b) Designation :
- c) Level of Education :
- d) Age :
3. Category of the Employee :

Executive Engg. or equivalent	Sub Divisional Engg. or Euival.	Assistant Engg. or Equivalent
----------------------------------	------------------------------------	----------------------------------
4. Working Experiences in this job(Years) :
5. Do you have any idea about the hazards involved in distribution system liable for worker's accidents? Yes/ No
6. If yes, mention few of them.
7. Do the Employees use personal protective device? Yes/ No
8. If No, Why they do not use?
9. Do the Employees follow the safety rules and regulations? Yes / No
10. If No, Why they do not follow?
11. Do the Employees have available safety tools and personal protective device?
12. If No, Why have not?
13. Are safety activities like- safety meeting, safety training, and safety rehearsal commenced regularly?
14. If No, why not happen?
15. Do you have any safety guideline or manual?
16. If No, why don't have?
17. Do you have any guideline for distribution line maintenance?
18. Do you have any guideline for tools maintenance?
19. Please mention the activities performed in your organization related to safety.

20. How accidents related to workers may be prevented?
21. Do you know about Electricity Act-1910?
22. Is safety training held regularly in the organization? Yes/ No
23. Is safety meeting held in the organization regularly? Yes/ No
24. Is safety Rehearsal commenced regularly? Yes/ No
25. Do you have any safety tools list in the organization?
26. Is the condition of the tools checked properly as per guidelines? Yes/ No
27. Is there any line maintenance schedule of the organization? Yes/ No
28. Is line is maintained properly according to guidelines? Yes /No
29. What do you think about the main cause of worker's accident?
 - a. Insincerity
 - b. Over Confidence
 - c. Lack of Safety Knowledge
 - d. Do not obey the safety rules and regulations
 - e. Lack of technical knowledge
 - f. Tendency of not using PPE
 - g. Personal negligence
 - h. Using of defective tools
 - i. Lack of safety guide line
 - j. Unsafe work environment
 - k. Excessive work load
30. What are the obstacles to follow safety rules and regulation, you think?
31. Please give your recommendations for accidents prevention in case of workers?
32. Do you have any idea about the hazards involved in distribution system liable for public accidents? Yes/ No
33. If yes, mention few of them.
34. Please mention the activities performed in the field by your organization related to public safety.
35. How can you prevent public accidents?
36. What do you think about the main cause of public accidents under distribution system?
 - a. Ignorance about of any kind of hazard
 - b. Tendency of using illegal electricity
 - c. Lack of Safety Knowledge
 - d. Lack of technical knowledge

- e. Installation near distribution line with improper clearance
 - f. Un planned distribution line in crowded area
 - g. Personal negligence
 - h. Defective design of distribution line
 - i. Improper maintenance of distribution line
 - j. Tree trimming is not performed accurately
 - k. Safety equipment installed in the distribution line with improper coordination
 - l. Natural disaster affect the distribution line
 - m. Others(If any)
37. Is side connection disconnected regularly? Yes/ No
 38. Is penalty imposed on consumers for side connection? Yes/ No
 39. Is operation carried out in field to remove illegal connection? Yes/ No
 40. Are safety/ motivation meeting held in the field to make public conscious? Yes/ No
 41. Are basic rules of using electricity supplied to the consumers while taking connection?
Yes/ No
 42. Are public informed about the clearance of trees from the distribution line? Yes/ No
 43. Are public conscious about the clearance of distribution line from any installation near
the line?
 44. Is tree trimming performed regularly? Yes /No
 45. What are the obstacles to follow safety rules and regulation, you think?
 46. What are your suggestions to minimize the number of public accidents held under
distribution system?

(Signature of the interviewer)
Md. Siful Islam
M.Sc Engineering student, KUET

(Signature of the interviewee)
(Optional)

Survey Data Sheet
Prepared for the Project Work for M.Sc. Engineering Degree
Instrument for the Public

1. Name of the Organization (Electricity Supply Authority):
2. Victim's Name :
- 3.a) Name of the Interviewee :
- b) Father' Name :
- c) Village :
- d) Post Office :
- e) Thana/ Upazilla :
- f) District :
- g) Level of Education :

Illiterate

Up to SSC

Up to SSC

Up to SSC

Graduation and above

- h) Age :
4. Category of the interviewee :

Victim

Witness

Neighbors

5. Give a description of the accident. :
6. What is the cause of this accident, you think?
7. Do you know about the hazard involved in distribution liable for public accidents?
Yes/ No
8. If yes, mention some of them?
9. Do you think that distribution organization is partially liable for public accidents? Yes/
No
10. If yes, how it is?
11. Do you have technical knowledge about electricity?
12. Do you know the safe distance of a tree from distribution line?
13. Do you know the minimum clearance of a structure from distribution line?
14. Do you know that construction of any installation near distribution line is punishable
offense? Yes/No

15. Do you know about Electricity Act?
16. Does distribution organization carry out any activities to make public conscious?
17. What do you think about the main cause of public accident?
 - a. Ignorance about of any kind of hazard
 - b. Tendency of using illegal electricity
 - c. Lack of Safety Knowledge
 - d. Lack of technical knowledge
 - e. Installation near distribution line with improper clearance
 - f. Un planned distribution line in crowded area
 - g. Personal negligence
 - h. Defective design of distribution line
 - i. Improper maintenance of distribution line
 - j. Tree trimming is not performed accurately
 - k. Safety equipment installed in the distribution line with improper coordination
 - l. Natural disaster affect the distribution line
 - m. Others(If any)
18. How accidents may be prevented?
19. Give your suggestions for the improvement of the situation.

(Signature of the interviewer)
Md. Siful Islam
M.Sc Engineering student, KUET

(Signature of the interviewee)
(Optional)

Accident records under BPDB

The numbers on vital accidents in between 2001 to 2005 collected by BPDB are summarized below (Source of information- Regional training centre, BPDB, Tongi, Gazipur):

Year	No. of accidents	No. of death		No. of injured		Compensation given
		Male	Female	Male	Female	
2001	12	6	-	6	6	-
2002	14	12	-	2	-	4,92,275.00
2003	13	10	-	3	-	2,99,185.00
2004	11	7	-	4	-	25,24,574.00
2005	10	4	-	6	-	5,94,694.00

Number of workers fall in accidents under PDB's distribution system (2001-2005):

Year	No. of accidents	No. of death				Compensation given
		Male (adult)	Female (adult)	Male (under aged)	Female (under aged)	
2001	12	4	4	4	6	1,12,000.00
2002	52	3	-	2	-	46,000.00
2003	80	3	-	-	-	38,000.00

Number of public fall in accidents under PDB's distribution system (2001-2005):

Record of accidents (In case of distribution workers), Duration: 2000-2008

SL. No	Name, Designation & Organization	Condition after accident	Source of information
1.	Md. Shahidul Islam, Lineman-2, Shatkhira Palli Bidyut Samity	Death	Through field visit
2.	Md. Kawsar Ali, Lineman-2, Shatkhira Palli Bidyut Samity	Death	Through field visit
3.	Abu Sadeq Md. Ershad Ali, Lineman-2, Shatkhira Palli Bidyut Samity	Disable	Through field visit
4.	Abdul Ayual, Lineman-2, Shatkhira Palli Bidyut Samity	Disable	Through field visit
5.	Md. Shirajul Islam, Junior Engineer, Jessore Palli Bidyut Samity-01	Disable, Lost left hand	Through field visit
6.	Md. Ariful Islam, Lineman-02, Jessore Palli Bidyut Samity-01	Disable	Through field visit
7.	Md. Mossebber Hossain, Lineman-02, Jessore Palli Bidyut Samity-01	Seriously burnt	Through field visit
8.	Md. Shafiqul Islam, Lineman-02, Jessore Palli Bidyut Samity-02	Disable	Through field visit
9.	Md. Amirul Islam, Line Technician, Jessore Palli Bidyut Samity-02	Disable	Through field visit
10.	Md. Azizur Rahman, Lineman-01, Jessore Palli Bidyut Samity-02	Disable	Through field visit
11.	Md. Mahbabur Rahman, Lineman-02, Jessore Palli Bidyut Samity-02	Disable, Lost three fingers of hand	Through field visit
12.	Md. Fazar Ali, Lineman-01, Jessore Palli Bidyut Samity-02	Disable	Through field visit
13.	Md. Rafiqul Islam, Lineman-02, Jessore Palli Bidyut Samity-02	Head injured	Through field visit
14.	Md. Nazrul Islam, Lineman-01, Jessore Palli Bidyut Samity-02	Fell down from pole top	Through field visit
15.	Md. Ayub Ali, Lineman-A, Division-02, West Zone Power Distribution Company	Death	Through field visit
16.	Md. Didar Sheikh, Helper, Division-02, West Zone Power Distribution Company	Death	Through field visit
17.	HM Habibur Rahman, Helper, Division-02, West Zone Power Distribution Company	Death	Through field visit
18.	Md. Shahidul Islam, Helper(Master Roll), Division.-1 West Zone Power Distribution Company	Disable	Through field visit
19.	Abul Hossain Hawlader, Electrician-C, Div.-3 West Zone Power Distribution Company	Seriously burnt	Through field visit
20.	Md. Nurul Islam, Electrician-B, Division-3 West Zone Power Distribution Company	Shocked seriously	Through field visit

APPENDIX-P

Name of the Month: July 2007				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Md. Faruq Hossain Age: 25 Years Village: Ranjitpur Upazilla: Bagerhat Sadar Distreict: Bagerhat	04/07/07 (Wednesday)	Death	The Daily Purbanchal, Date:05/07/07
2.	Bashir Ali Age: 60 Years Village: Jangalia Sailkupa, Jeneidah	08/07/07 (Sunday)	Death	The Daily Purbanchal, Date:09/07/07
3.	Shara Khatun Age: 65 Years Village: Jangalia Sailkupa, Jeneidah	08/07/07 (Sunday)	Death	The Daily Purbanchal, Date:09/07/07
4.	Md. Shahazan Age: 25 Years Village: Bangshipur Shamnagar, Shatkhira	08/07/07 (Sunday)	Death	The Daily Purbanchal, Date:10/07/07
5.	Md. Younis Ali Age: 25 Years Father: Entaz Ali Village: Alka Phultola, Khulna	13/07/07 (Friday)	Death	The Daily Purbanchal, Date:14/07/07
6.	Md. Anawar Mollah Age: 45 Years Village: Kalora Narail Sadar, Narail	15/07/07 (Sunday)	Death	The Daily Purbanchal, Date:16/07/07
7.	Md. Shafiar Rahman Age: 32 Years Father: Nafar Ali Village: Bhandarkhola Keshobpur, Jessore	18/07/07 (Wednesday)	Death	The Daily Purbanchal, Date:19/07/07
8.	Md. Mozahar Sardar Age: 32 Years Father: Gafur Sardar Village: Bolovadrapur Konchua, Bagerhat	21/07/07 (Saturday)	Death	The Daily Purbanchal, Date:22/07/07
9.	Md. Moslem Ali Age: 40 Years Father: Meher Uddin Village: Laizini Jikorgasha, Jessore	21/07/07 (Saturday)	Death	The Daily Purbanchal, Date:22/07/07

10.	Md. Al-Amin Age: 24 Years Father: Hannan Sheikh Village: Mirzapur Narail	26/07/07 (Thursday)	Death	The Daily Purbanchal, Date:27/07/07
Name of the Month: August 2007				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Name: Unknown Age-22 years Village: Bahura, Kolaroa Shatkhira	01/08/07 (Wednesday)	Death	
2.	Md. Abul Bashar Fakir Age:50 Years Father: Abdul Kader Fakir Mativanga Bazar, Nazirpur, Pirozpur.	03/08/07 (Friday)	Death	The Daily Purbanchal, Date:10/08/07
3.	Akash Age: 7 Years Father: Solaiman Village: Kamlapur Upazilla: Kaligonj District: Jeneidah	12/08/07 (Sunday)	Death	The Daily Purbanchal, Date:14/08/07
4.	Md Habibur Rahman(22) Md. Ataur Rahman(22) Md. Nizam Uddin(30) Md. Saiful Islam(30) Jessore Sadar, Jessore	16/08/07 (Thursday)	Serious Injured	The Daily Purbanchal, Date:17/08/07
5.	Md Saiful Gazi Age: 22 Years Father: Faruq Gazi Kosrota, Kaukhali, Pirozpur	18/08/07 (Saturday)	Death	The Daily Purbanchal, Date:19/08/07
6.	Refeza Begum Age: 35 Years Koirā, Khulna	22/08/07 (Wednesday)	Death	The Daily Purbanchal, Date:25/08/07
7.	Md. Rabiul Islam(Rubel) Age: 18 Years Father: Abdul Khaleque Village: Chaugasha Upazilla: Narail Sadar District: Narail	27/08/07 (Monday)	Death	The Daily Purbanchal, Date:28/08/07
8.	Md. Rabiul Islam Village: Lota Upazilla: Dumaria, Khulna	29/08/07 (Wednesday)	Death	The Daily Purbanchal, Date:31/08/07

Name of the Month: September 2007				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Dalim Mina Age: 26 Years Father: Ruhul Amin Village: Gondorvo Khali Upazilla: Narail Sadar District: Narail	13/09/07 (Thursday)	Death	The Daily Purbanchal Date:14/09/07
2.	Anima Rani Age: 65 Years Village: Lutia Upazilla: Lohagora District: Narail	13/09/07 (Thursday)	Death	The Daily Purbanchal Date:14/09/07
3.	Anup Kumar Gosh Age: 40 Years Village: Lutia Upazilla: Lohagora District: Narail	13/09/07 (Thursday)	Death	The Daily Purbanchal Date:14/09/07
4.	Chandi Podo Age: 28 Years Father: Dulal Das Village: Fotepur Upazilla: Jessore Sadar District: Jessore	22/09/07 (Saturday)	Death	The Daily Purbanchal Date:23/09/07
5.	Mossraf Age: 28 Years Father: Mostafa Fakir Village: Alka Upazilla: Phultola District: Khulna	23/09/07 (Sunday)	Death	The Daily Purbanchal Date:24/09/07
6.	Md. Atikur Rahman Age: 25 Years Village: Jamira Upazilla: Phultola District: Khulna	24/09/07 (Monday)	Death	The Daily Purbanchal Date:25/09/07
7.	Md. Hasanuzzaman Age: 25 Years Tuzalpur, Satkhira	26/09/07 (Wednesday)	Death	The Daily Purbanchal Date:28/09/07
8.	Md. Shirajul Islam Junior Engineer, JPBS-1, Jessore	18/09/07 (Tuesday)	Disable	The Daily Purbanchal Date:25/09/07

9.	Md. Alamgir Hossain Age: 18 Years Father: Md. Rabiul Islam Village: Goalda Upazilla: Jessore Sadar District: Jessore	29/09/07 (Saturday)	Death	The Daily Purbanchal Date:30/09/07
Name of the Month: October 2007				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Md. Rafiqul Islam Age: 25 Years Father: Md. Abdul Halim Village: Hatvila Upazilla: Jessore Sadar District: Jessore	05/10/07 (Friday)	Death	The Daily Purbanchal Date:07/10/07
2.	Md. Abdus Sobur Village: Hatvila Upazilla: Jessore Sadar District: Jessore	05/10/07 (Friday)	Seriously Injured	The Daily Purbanchal Date:07/10/07
3.	Md. Bassu Mia Father: Md. Haidar Ali Village: Voizora Upazilla: Moralganj District: Bagerhat	14/10/07 (Sunday)	Death	The Daily Purbanchal Date:17/10/07
4.	Md. Hossain Age: 18 Years Father: Md. Khaleque Scikh Village: Kalinagar Upazilla: Noragati District: Narail	12/10/07 (Friday)	Death	The Daily Purbanchal Date:17/10/07
5.	Md. Rezaul Islam Father: Md. Mokshed Ali Village: Barandipara Upazilla: Jessore Sadar District: Jessore	16/10/07 (Tuesday)	Death	The Daily Purbanchal Date:17/10/07
6.	Md. Ashad Hawladar Village: Pargobindopur Upazilla: Rampal District: Bagerhat	20/10/07 (Saturday)	Death	The Daily Purbanchal Date:21/10/07
7.	Name: Unknown Village: Srikantopur Upazilla: Paikgasha District: Khulna	19/10/07 (Friday)	Death	The Daily Purbanchal Date:22/10/07
8.	Md. Sagir Sikdar Age: 26 Years Ziangapur, Pirozpur	07/10/07 (Sunday)	Death	The Daily Purbanchal Date:24/10/07

9.	Sanjay Sarkar Village: Kushkhali Upazilla: Satkhira Sadar District: Satkhira	22/10/07 (Monday)	Death	The Daily Purbanchal Date:24/10/07
Name of the Month: November 2007				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Md. Bellal Hossain Age: 23 Years Father: Md. Bahauddin Village: Tekerbazar, Rupdia District: Jessore	11/11/07 (Sunday)	Seriously Injured	The Daily Purbanchal Date:12/11/07
2.	Amit Rai Age: 17 Years Father: Sukumar Rai Village: Gorihor Danga Botiaghata, Khulna	30/11/07 (Friday)	Death	The Daily Purbanchal Date:01/12/07
3.	Sopon Rai Village: Gorihor Danga Botiaghata, Khulna	30/11/07 (Friday)	Injured	The Daily Purbanchal Date:01/12/07
4.	SAttojit Rai Village: Gorihor Danga Botiaghata, Khulna	30/11/07 (Friday)	Injured	The Daily Purbanchal Date:01/12/07
Name of the Month: December 2007				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Puronjay Age: 27 Years Father: Ajit Kundu Village: Maltia Chuknagar, Khulna	08/12/07 (Saturday)	Death	The Daily Purbanchal Date:09/12/07
Name of the Month: January 2008				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Khokon Age-22 years Father: Md. Nur Islam North Zone Khalishpur Thana, Khulna	16/01/08 (Tuesday)	Death	The Daily Purbanchal Date:16/01/08
Name of the Month: February 2008				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Hoshne ara Age-26 years Husband: Md. Shahidul Islam Village: Talbaria	03/02/08 (Sunday)	Death	The Daily Purbanchal Date:05/02/08

	District: Narail			
2.	Abdus Salam Age-27 years Father: Meher Ali Biswas Village: Baroipara Upazila: Tala District: Satkhira	10/02/08 (Sunday)	Death	The Daily Purbanchal Date:11/02/08
3.	Md. Rezaul Karim Age-32 years Village: Titabazitpur Upazila: Keshobpur District: Jessore	15/02/08 (Friday)	Death	The Daily Purbanchal Date:16/02/08
4.	Md. Sawkat Hazi Age-65 years Father: Kalachan Gazi Village: Rajarhat Upazila: Jessore Sadar District: Jessore	20/02/08 (Wednesday)	Death	The Daily Purbanchal Date:21/02/08
5.	Md. Abdul Alim Age-40 years Village: Kullapara Upazila: Mohespur District: Jeneidah	27/02/08 (Wednesday)	Death	The Daily Purbanchal Date:28/02/08
6.	Md. Md. Shirajul Islam Age-45 years Village: Kullapara Upazila: Mohespur District: Jeneidah	27/02/08 (Wednesday)	Disable	The Daily Purbanchal Date:28/02/08
Name of the Month: March 2008				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Suzon Age-16 years Father: Siddique Mollah Village: Baliadanga Upazila: Jessore Sadar District: Jessore	05/03/08 (Wednesday)	Death	The Daily Purbanchal Date:06/03/08
2.	Shahazan Age-06 years Village: Nagkhati Upazila: Shamnagar District: Shatkhira	07/03/08 (Friday)	Death	The Daily Purbanchal Date:08/03/08
3.	Ayub Ali Lineman, Division-02 WZPDCL Daulatpur, Khulna	11/03/08 (Tuesday)	Death	The Daily Purbanchal Date:12/03/08

4.	Bellal Hossain Age-18 years Village: Vogoti Upazila: Keshobpur District: Jessore	14/03/08 (Friday)	Death	The Daily Purbanchal, Date:15/03/08
5.	Md. Azmir Hossain Age-12 years Village: Agarghata Upazila: Paikgasha District: Khulna	14/03/08 (Friday)	Disable	The Daily Purbanchal, Date:15/03/08
6.	Md. Ramjan Ali Age-40 years Basundia Upazila: Jessore Sadar District: Jessore	19/03/08 (Wednesday)	Death	The Daily Purbanchal, Date:20/03/08
7.	Md. Mahbub Alam Age-40 years Student of Kustia Islami University I&C Engineering Dept. Kustia	24/03/08 (Monday)	Death	The Daily Purbanchal, Date:25/03/08
8.	Md. Nurruzaman Age-30 years Jhikorgasha Gazir Dorga Upazila: Jikorgasha District: Jessore	25/03/08 (Tuesday)	Injured	The Daily Purbanchal, Date:26/3/08

Name of the Month: April 2008

SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Liton Age-30 years Village: Gangulia Upazila: Monirampur District: Jessore	03/04/08 (Thursday)	Death	The Daily Purbanchal, Date:05/04/08
2.	Md. Firoz Model School Road, Noapara Upazila: Abhynagar District: Jessore	04/04/08 (Friday)	Death	The Daily Purbanchal, Date:05/04/08
3.	Hazi Ismail Hossain Age-60 years Village: Borai Khali Upazila: Morolganj District: Bagerhat	09/04/08 (Wednesday)	Death	The Daily Purbanchal, Date: 12/04/08
4.	Zamal Hossain Age-30 years Village: Kolaran	19/04/08 (Saturday)	Death	The Daily Purbanchal, Date:20/04/08

	Upazila: Morolganj District: Bagerhat			
5.	Samid Age-2 years Village: Nichintopur Upazila: Kaligonj District: Jeneidah	23/04/08 (Wednesday)	Death	The Daily Purbanchal, Date:24/04/08
6.	Kamruzzaman Age-25 years Village: Khanpur Upazila: Satkhira Sadar District: Satkhira	28/04/08 (Monday)	Death	The Daily Purbanchal, Date:30/04/08
Name of the Month: May 2008				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Md. Shamsul Islam Age-06 years Shoilkupa District: Jeneidah	15/05/08 (Thursday)	Death	The Daily Purbanchal, Date:16/05/08
2.	Md. Habibur Rahman Age-43 years Village: Voberhar Benapol District: Jessore	19/05/08 (Monday)	Death	The Daily Purbanchal, Date:20/5/08
3.	Md. Zahidul Islam Age-20 years Village: Koertola Jessore Sadar District: Jessore	21/05/08 (Wednesday)	Death	The Daily Purbanchal, Date:23/5/08
4.	Nur Mohhammod Age-26 years Village: Narandropur Jessore Sadar District: Jessore	23/05/08 (Friday)	Death	The Daily Purbanchal, Date:24/5/08
5.	Md. Insaf Ali Age-40 years Village: Borodal Satkhira sadar District: Satkhira	24/05/08 (Saturday)	Death	The Daily Purbanchal, Date:25/5/08
Name of the Month: June 2008				
SL. No	Particulars	Date of occurrence	Condition after accidents	Source of information
1.	Md. Baharul Islam Age-27 years Village: Poddobila Jessore sadar District: Jessore	11/06/08 (Wednesday)	Death	The Daily Purbanchal, Date:12/6/08

2.	Abdul Kader Age-53 years Chairman, Atulia Union Parishad, Shamnagar, Satkhira	12/06/08 (Thursday)	Death	The Daily Purbanchal, Date:14/6/08
3.	Salim Age-25 years Dumdia, Jessore Sadar, Jessore	12/06/08 (Thursday)	Disable	The Daily Purbanchal, Date:13/6/08
4.	Md. Mashudur Rahman (Monthu) Age-25 years Kotchandpur, Kustia	13/06/08 (Friday)	Death	The Daily Purbanchal, Date:14/6/08
5.	Md. Habibur Rahman Age-10 years Shonkorpur, Jessoe town, Jessore	15/06/08 (Sunday)	Death	The Daily Purbanchal, Date:28/6/08
6.	Md. Tariqul Islam Age-30 years Village: Jhanjhanian Upazila: Kaliganj District: Jeneidah	27/06/08 (Friday)	Death	The Daily Purbanchal, Date:28/6/08
7.	Md. Miskat Seikh Age-12 years Village: Borfa Upazila: Gopalganj Sadar District: Gopalganj	27/06/08 (Friday)	Death	The Daily Purbanchal, Date:28/6/08
	Particulars	Date of occurrence	Condition after accidents	Source of information
8.	Md.Nazrul Islam Age-45 years Village: Satiantola Upazila: Jessore Sadar District: Jessore	30/06/08 (Monday)	Death	The Daily Purbanchal, Date:01/7/08
9.	Shona Age-8 years Village: Vatparaa Upazila: Mohespur District: Jeneidah	30/06/08 (Monday)	Death	The Daily Purbanchal, Date:03/7/08
10.	Md. Abdul Kader Village: South Pabla Upazila: Daulatpur District: Khulna	30/06/08 (Monday)	Death	Public information