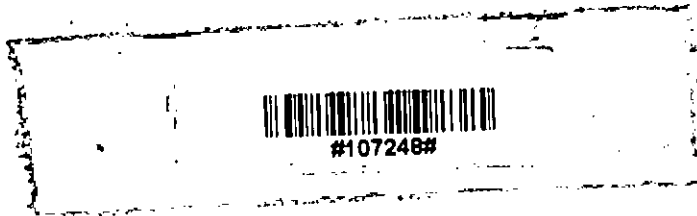
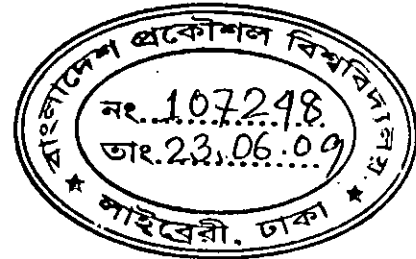


**Development of a Database and Identification of Causes of Fire in Buildings of Bangladesh from Electrical Faults**

by  
Abdul Muqtadir Muhammad Munif Ammar

A project  
submitted to the  
Department of Electrical and Electronic Engineering  
in partial fulfillment of the requirements for the  
degree of  
MASTER OF ENGINEERING IN ELECTRICAL AND ELECTRONIC  
ENGINEERING

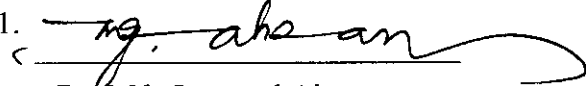
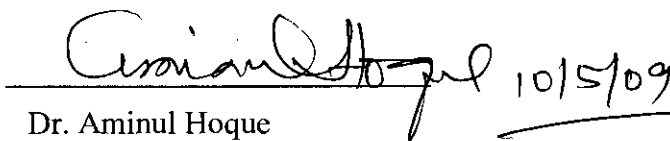
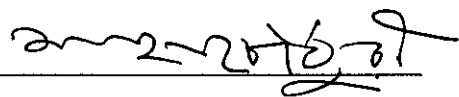


BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY  
DHAKA, BANGLADESH  
MAY, 2009

### Approval

The project titled “**Development of a Database and Identification of Causes of Fire in Buildings of Bangladesh from Electrical Faults**” submitted by Abdul Muqtadir Muhammad Munif Ammar, Roll No:100106108P, Session: October 2001, has been accepted as satisfactory in partial fulfillment of the requirement for the degree of **Master of Engineering in Electrical and Electronic Engineering** on 10<sup>th</sup> May 2009.

### BOARD OF EXAMINERS

1.   
Dr. Md. Quamrul Ahsan  
Professor  
Department of Electrical and Electronic Engineering  
BUET, Dhaka.  
Chairman  
(Supervisor)
2.   
Dr. Aminul Hoque  
Professor and Head  
Department of Electrical and Electronic Engineering  
BUET, Dhaka.  
Member
3.   
Dr. Abdul Hasib Chowdhury  
Associate Professor  
Department of Electrical and Electronic Engineering  
BUET, Dhaka.  
Member

# DECLARATION

It is hereby declared that this project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

*Abdul Muqtadir*

---

Abdul Muqtadir Muhammad Munif Ammar

# CONTENTS

<u>Title</u>	<u>Page No.</u>
DECLARATION	iii
CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	viii
ACKNOWLEDGEMENT	ix
ABSTRACT	x
CHAPTER I INTRODUCTION	1-2
1.1 INTRODUCTION	01
1.2 BACKGROUND	01
1.3 THESIS ORGANIZATION	02
CHAPTER II DATABASE OF DIFFERENT COUNTRIES	3-7
2.1 INTRODUCTION	03
2.2 PAST RECORDS ON FIRE HAZARDS	03
2.2.1 HUMAN CASUALTIES	03
2.2.2 LOSSES OF PROPERTY	05
2.2.3 CAUSES OF FIRE	06
CHAPTER III DATA OF BANGLADESH	8-26
3.1 INTRODUCTION	08
3.2 SOURCES OF DATA	08
3.3 INCONVENIENCE IN COLLECTING DATA	09
3.4 BASIC DATA	09
CHAPTER IV ANALYSIS OF DATA	27-35
4.1 INTRODUCTION	27
4.2 INFORMATION FROM DIFFERENT SOURCES	27
4.3 LOSSES IN BUILDINGS DUE TO ELECTRICAL FAULTS	30
4.4 OBSERVATION	35
4.5 PROPOSED DATABASE FORMAT	35

Contents(Continued)

CHAPTER V	CONCLUSIONS	36
	5.1 INTRODUCTION	36
	5.2 CONCLUSIONS	36
	5.3 RECOMMENDATIONS FOR FURTHER RESEARCH	36
REFERENCES		37

# LIST OF TABLES

<u>Title</u>	<u>Page No.</u>
<b>CHAPTER II</b>	
Table 2.1 Fire casualties in London during 1996-2000	04
Table 2.2 Type of persons who are the victims of fire in London during 1996-2000	04
Table 2.3 Fire deaths by month in London during 1996-2000	05
Table 2.4 Civilian casualties per million people of communities of different volume of US during 1999-2003	05
Table 2.5 Estimate of 2003 structure fire and property loss of US	06
Table 2.6 Causes of fire in London during 1996-2000	07
<b>CHAPTER III</b>	
Table 3.1 Annual report of Fire Brigade of Bangladesh of 1995	10
Table 3.2 Annual report of Fire Brigade of Bangladesh of 1996	11
Table 3.3 Annual report of Fire Brigade of Bangladesh of 1997	11
Table 3.4 Annual report of Fire Brigade of Bangladesh of 1998	12
Table 3.5 Annual report of Fire Brigade of Bangladesh of 1999	12
Table 3.6 Annual report of Fire Brigade of Bangladesh of 2000	13
Table 3.7 Annual report of Fire Brigade of Bangladesh of 2001	13
Table 3.8 Annual report of Fire Brigade of Bangladesh of 2002	14
Table 3.9 Annual report of Fire Brigade of Bangladesh of 2003	14
Table 3.10 Annual report of Fire Brigade of Bangladesh of 2004	15
Table 3.11 Human casualties from 2000 to 2004, reported in the annual report of Fire Brigade of Bangladesh	15
Table 3.12 Fire accidental report of Bangladesh Garments Manufacturer and Exporter Association, 2004	16
Table 3.13 Payment against claim from 1998 to 2004 by Pragati Insurance Ltd.	16
Table 3.14 Reported accidents due to fire in the Daily Inqilab(1995)	17
Table 3.15 Reported accidents due to fire in the Daily Inqilab(1996)	17
Table 3.16 Reported accidents due to fire in the Daily Jonokontho(1997)	18

### List of tables(continued)

Table 3.17	Reported accidents due to fire in the Daily Inqilab(1998)	19
Table 3.18	Reported accidents due to fire in the Daily Jonokontho (1999)	19
Table 3.19	Reported accidents due to fire in the Daily Dinkal(2000)	20
Table 3.20	Reported accidents due to fire in the Daily Dinkal (2001)	22
Table 3.21	Reported accidents due to fire in the Daily Dinkal (2002)	23
Table 3.22	Reported accidents due to fire in the Daily Inqilab(2003)	25
Table 3.23	Reported accidents due to fire in the Daily News papers (2004)	25

### CHAPTER IV

Table 4.1	Losses according to different sources (Fire Brigade , News paper ,BGMEA)	28
Table 4.2	Contribution of electrical fault towards total accidents	29
Table 4.3	Human casualties according to differerent sources (Fire Brigade ,paper report , BGMEA)	29
Table 4.4	Comparison of the number of accidents due to electrical faults with the total (Fire Brigade report)	31
Table 4.5	Comparison of accidents due to electrical faults with the total (News paper report)	32
Table 4.6	Property loss due to electrical faults in percent of total loss (Fire Brigade report)	33
Table 4.7	Insurance claim due to fire in percent of total claim (Pragati Insurance Ltd.)	34
Table 4.8	Standard Database format	35

# LIST OF FIGURES

<u>Title</u>	<u>Page No.</u>
Figure 4.1 Number of fire accidents due to electrical and other faults according to Fire Brigade of Bangladesh	31
Figure 4.2 Fire accidents due to electrical and other faults according to News paper report	32
Figure 4.3 Comparison of loss due to electrical faults with the total according to Fire Brigade of Bangladesh	33
Figure 4.4 Comparison of insurance claim due to fire from 1998 to 2004 of Pragati Insurance Ltd.	34



# ACKNOWLEDGEMENT

In the name of Allah, Most Gracious, Most Merciful. All praises are due to Almighty Allah who enabled me to complete this project.

The author expresses his deep gratitude to Dr. Md. Quamrul Ahsan, Professor, Department of Electrical & Electronic Engineering, BUET for his proper guidance and supervision at all stages of the project.

The author is grateful to Dr. Aminul Hoque, Head of the Department of Electrical & Electronic Engineering, BUET for his favorable co-operation from the department.

The author is indebted to Dr. Abdul Hasib Chowdhury, Associate Professor, Department of Electrical & Electronic Engineering, BUET for his encouragement during the progress of the research work.

Also thanks to officers and employees of Fire Brigade of Bangladesh, BGMEA, Dhaka Stock Exchange, PIB, National Library and library assistants of BUET who helped me in data collection and library work.

---

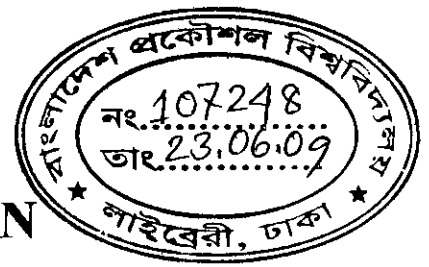
Abdul Muqtadir Muhammad Munif Ammar

# **ABSTRACT**

In this work a fire accident database format has been proposed. Data has been collected from different sources, such as, fire brigade, BGMEA, insurance company, news paper etc. An analysis of collected information is also performed. The causes behind fire accidents and the position of electrical hazard among them are detected.

# CHAPTER I

## INTRODUCTION



### 1.1 INTRODUCTION

Fire accident is one of the major causes of human casualties, property loss and environmental damage. Fire Brigade of Bangladesh has recorded over seven thousand fire accidents and more than two billion taka of economic losses and fifty two human death due to fire in the year 2004 [1]. Human casualties, property loss, environmental damage and the number of disable persons are increasing every year due to fire accidents. In recent years, fire is also used as a weapon of committing crime. The UK experience [2] shows that the rate of human casualties per million of people in a year due to fire is twelve and the USA experience [3] reports that the figure is sixteen.

In most of the cases, the reasons behind the ignition and spreading of fires can be identified and the amount of losses can also be assessed. It becomes easier to develop a preventive scheme if the usual causes of fires are known and the implementation of this scheme will reduce the human casualties and property losses.

A database of previous experiences on fire may serve the above mentioned purpose. It will contain all possible types of information relating accidents in a format that will help quick retrieve of necessary information. An in depth investigation on such type of database will ensure control of fire accidents and safe living environment.

### 1.2 BACKGROUND

In developed countries, fire accidents get proper attention. Fire brigade, London has carried out a research on classifying the victims of fire in categories of old age, disable, drug addicted etc [2]. They also tried to find out the relation among time,

season, habit of persons with fire accidents. National Fire Protection Association of USA has determined the number of accidents per million people of different community[3]. They also detected the type of structures and institutions that are affected by fire accidents. In [4], the materials which help reduce fire hazards are proposed for the construction of buildings.

Recently, the developing countries have started to put emphasis on fire problems. Hong Kong Polytechnic University researcher has tried to find out the risk of spreading fire among stores, densely packed with goods, in a small region[5].

In Bangladesh, there are different bodies working on fire problem. Fire Brigade of Bangladesh prepares its annual report on number of accidents, causes of fires, property losses, number of human casualties. Bangladesh Garments Manufacturer and Exporter Association also records the number of human casualties in garments due to fire. Insurance companies prepare their annual report showing claim against fire in balance sheets.

### **1.3 THESIS ORGANISATION**

The purpose of this investigation is to build a database to identify the causes of fire in buildings of Bangladesh from electrical faults. This thesis is organized into five chapters for presentation.

First chapter is the introductory chapter discussing the necessity of the project. Second chapter deals with the past records on fire accidents of different countries. Third chapter presents the procedure of collecting information and available data relating to fire accidents in Bangladesh. Forth chapter is organized to verify data obtained from different sources and to propose a standard database format. Fifth chapter is organized to show the position of electrical hazard among all causes of fire accidents and also give some recommendations for further research.

# **CHAPTER II**

## **DATABASE OF DIFFERENT COUNTRIES**

### **2.1 INTRODUCTION**

In recent years, fire problem becomes one of the major problems of civilized societies. Beside the property losses, fire accidents cause human casualties. Therefore, it is necessary to stop, at least mitigate, fire accidents. Developed countries pay much attention to fire problem, developing countries are also paying attention to fire problem now.

### **2.2 PAST RECORDS ON FIRE HAZARDS**

Developed countries have fire accidental database with records of human casualties and other losses. These records help them to investigate the causes behind the accidents.

#### **2.2.1 HUMAN CASUALTIES**

Fire Brigade, London has recorded human casualties due to fire accidents in London per year for the period 1996 to 2000. The recorded casualties are given in Table 2.1. National Fire Protection Association of US has determined the number of fire accidents in 2003 which is 1,584,500[3]. In this year the number of human casualties is 3925 and the total number of human injury is 18125. Fire Brigade, London has carried out a research to investigate human casualties due to fire[2]. The investigation finds the type of persons who became the victim. The result is given in Table 2.2. Table 2.3 shows casualties by month during the investigation period. Although the majority of the victims is unknown, however, the investigation shows that the disabled persons are unattended. Table 2.3 clearly shows that the casualties are higher during the winter season.

The study of National Fire Protection Association of US shows the number of civilian deaths per million people of different community. The result is presented in Table 2.4. First column of the table includes the communities whose population falls in a particular range. The study shows that the accident is more in those communities whose population are lower.

Table 2.1 : Fire casualties in London during 1996-2000 \*

Year	Number of deaths
1996	79
1997	107
1998	86
1999	82
2000	57
TOTAL	411

\* Report by London Fire Brigade

Table 2.2 : Type of persons who are the victims of fire in London during 1996-2000 \*

Type of persons	Casualties in percent (%)
Unknown	58.4
Disabled	20.8
Drug addicted	6.1
Ill health	6.1
Mentally ill	5.4
Sleeping	3.2

\* Report on dwelling fire by London Fire Brigade

Table 2.3 : Fire deaths by month in London during 1996-2000

Month	Number of deaths
January	38
February	36
March	25
April	23
May	23
June	11
July	12
August	11
September	19
October	23
November	31
December	30

\* Report on accidental dwelling fire death by London Fire Brigade

Table 2.4 : Civilian casualties per million people of communities of different volume of US during 1999-2003 .

Population range	Civilian casualties per million people
Under 2500	27.3
2500-4999	17.8
5000-9999	15.2
10000-24999	12.1
25000-49999	11.4
50000-99999	10.9
100000-249999	13.2
250000-499999	11.6
500000-999999	12.1
1000000 or more	11.3

### 2.2.2 LOSSES OF PROPERTY

National Fire Protection Association of US has recorded property loss in US in 2003 as 12307 million dollars due to 1,584,500 fire accidents [3]. They have also detected the type of structures that are affected by fire accidents in US in

2003 which is presented in Table 2.5. This table shows that residential structures are mostly affected.

Table 2.5 : Estimate of 2003 structure fire and property loss of US

Name of structure	No of fire	Percentage change from 2002	Property loss million dollars	Percentage change from 2002
Southern California wildfire			2040	
Residential (total)	402000	0.3	6074	0.3
Dwelling	297000	-1.2	5052	0.9
Apartments	91500	3.4	897	-3.1
Storage	31500	-1.6	675	7.7
Store & Office	25000	4.2	721	19.4
Special Structure	21500	-2.3	184	45.6
Public assembly	14000	0.00	302	11.7
Industry ,Utility	11500	-8	625	-5
Educational	7000	0.00	69	25
Institutional	7000	7.70	28	7.7
Other	13500	12.5	125	0.8
Total	519500	0.1	8678	-0.7

### 2.2.3 CAUSES OF FIRE

There are different reasons of fire in buildings. These reasons vary depending on the use of buildings, construction material of buildings and social condition of the users of these buildings. Cigarettes, cooking appliances, electrical appliances and electrical distribution facilities, intentionally set fires are the general causes noticed primarily responsible for starting building fires. For example, Fire Brigade of London has reported[2] a statistics of causes of fire during 1996-2000. The statistics are given in Table 2.6.



Table 2.6 : Causes of fire in London during 1996-2000 \*

Cause	Human casualties (Number)
Accidental	
a. Cigarette	132
b. Cooking appliances	37
c. Candles	25
d. Lighters	25
e. Heating appliances	22
f. Taper or other naked flames	22
g. Electrical appliances	8
h. Other and unknown	6
i. Electrical distribution and Lighting	3
Deliberate	61
Other	18
<b>TOTAL</b>	<b>358</b>

\* Dwelling fire deaths in London reported by London Fire Brigade

# **CHAPTER III**

## **DATA OF BANGLADESH**

### **3.1 INTRODUCTION**

This chapter presents the collected and formatted information relating to fire accidents. Different information has been collected from various sources. During the collection of data many organizations show cold response. Various inconvenience encountered during the collection of data is also presented in this chapter.

### **3.2 SOURCES OF DATA**

At first, the possible sources of information of fire accidents in Bangladesh are investigated. Different sources are approached and finally, data of fire accidents are collected from the following sources :

- 1 . Fire Brigade
- 2 . Garments Manufacturer and Exporter Association
- 3 . Pragati Insurance Ltd.
- 4 . Some national daily news papers of Bangladesh

Annual reports of Fire Brigade are collected from Fire Brigade, Annual reports of Garments Manufacturer and Exporter Association are collected from Garments Manufacturer and Exporter Association, Annual reports of Pragati Insurance Ltd. are collected from Dhaka Stock Exchange. News paper reports are collected from paper preserving libraries, such as, Press Information Bureau of Bangladesh and National Library of Bangladesh .

### **3.3 INCONVENIENCE IN COLLECTING DATA**

During the time of collecting data on fire hazards, Fire Brigade or Garments Manufacturer and Exporter Association had no computerized fire accidental database. Moreover, they had not special file containing hard copies of annual fire reports with reference numbers. It was a cumbersome process to find out annual reports for a long period from different files manually. Reports from different institutions were arranged in different formats. Target group of fire affected people or communities are also different. News paper reports were primary investigation reports only and had no continuity of fire accidental reports at all.

### **3.4 BASIC DATA**

Fire Brigade annual reports preserve the information of the number of incidents, major causes of fire, amount of property loss and number of human casualties. Bangladesh Garments Manufacturer and Exporter Association keeps records of number of human casualties annually and also the number of incidents. Annual reports of Pragati Insurance Ltd. provide the information of payment against claim per year. News paper reports in detail, such as, date, time, place, of accidents, type of construction affected, economic loss, human casualties, and cause of the accident. However in extreme cases the reports are incomplete.

Annual reports of Fire Brigade of Bangladesh from 1995 to 2004 are presented in Table 3.1 to Table 3.10. Each table presents the annual information of a particular year. It describes the causes of fire and the corresponding number of incidents and the resulting loss in terms of taka. The annual human casualties reported in the annual report of Fire Brigade of Bangladesh are presented in Table 3.11 for five years. This table gives the total number of deaths due to accident and also the number due to fire.

Table 3.12 presents the fire accidental report of Bangladesh Garments Manufacturer and Exporter Association. The report was published in 2004. It gives

the number of factories affected by fire and the corresponding number of human casualties.

Table 3.13 is the information obtained from the report of an insurance company. It presents the amount of money the company paid against different claims for seven years from 1998 to 2004.

Table 3.14 to 3.23 present information about accidents due to fire according to news paper reports. These tables present the place of accident, time, cause of accident. These also give the amount of property loss and human casualties.

Table 3.1 : Annual report of Fire Brigade of Bangladesh of 1995

Sl no	Cause of fire	Accident		Economic loss (Million Tk )
		Number	In percent(%)	
1	Fire of burner	1600	26.15	110.71
2	Electrical hazard	1338	21.88	1270.28
3	Unknown cause	1338	21.88	92.55
4	Cigarette	459	7.5	9.78
5	Open lamp	361	5.91	12.90
6	Burning firewood	226	3.7	13.28
7	Fire play by children	193	3.15	3.40
8	Setting fire	167	3.14	7.21
9	Breaking of law by mob	102	1.67	24.33
10	Miss fire	76	1.24	1.09
11	Friction in machine	49	0.81	5.02
12	Burning of stake	43	0.71	0.43
13	Excessive heat	33	0.53	0.97
14	Chemical process	27	0.44	29.67
15	Spontaneous	27	0.44	0.31
16	Sparkles from chimney	16	0.26	0.29
17	Static electricity	12	0.18	0.04
18	Other causes	68	1.11	2.31
	TOTAL	6135	100	1584.64

Table 3.2 : Annual report of Fire Brigade of Bangladesh of 1996

Sl no	Cause of fire	Accident		Economic loss (Million Tk )
		Number	In percent(%)	
1	Electrical hazard	1357	25.24	307.73
2	Fire of Burner	1328	24.75	73.94
3	Unknown cause	1008	18.76	84.84
4	Open lamp	333	6.2	12.80
5	Cigarette	326	6.07	23.42
6	Breaking of law by mob	205	3.82	70.45
7	Burning firewood	186	3.45	5.59
8	Setting fire	131	2.43	4.44
9	Fire play by children	107	2	1.14
10	Friction in machine	74	1.38	6.37
11	Miss fire	72	1.33	1.82
12	Burning of stake	71	1.32	1.61
13	Chemical process	54	1	19.47
14	Excessive heat	40	0.74	18.99
15	Spontaneous	24	0.44	0.03
16	Sparkles from chimney	24	0.44	0.67
17	Static electricity	20	0.38	0.26
18	Other causes	16	0.3	0.20
	TOTAL	5376	100	633.86

Table 3.3 : Annual report of Fire Brigade of Bangladesh of 1997

Sl no	Cause of fire	Accident		Economic loss (Million Tk)
		Number	In percent(%)	
1	Fire of Burner	1667	28.74	135.22
2	Electrical hazard	1434	24.72	574.22
3	Unknown cause	1035	17.85	86.03
4	Open lamp	430	7.41	21.32
5	Cigarette	328	5.57	22.33
6	Burning firewood	209	3.61	4.38
7	Fire play by children	162	2.81	2.44
8	Setting fire	117	2.01	12.14
9	Breaking of law by mob	104	1.81	17.41
10	Friction in machine	65	1.12	5.73
11	Miss fire	65	1.12	2.21
12	Excessive heat	63	1.09	2.51
13	Burning of stake	47	0.82	14.30
14	Spontaneous firing	35	0.61	0.62
15	Sparkles from chimney	15	0.26	0.53
16	Static electricity	15	0.26	0.01
17	Chemical process	11	0.19	2.01
	TOTAL	5802	100	903.49

Table 3.4 : Annual report of Fire Brigade of Bangladesh of 1998

Sl no	Cause of fire	Accident		Economic loss (Million Tk)	Economic Rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	1536	30.71	288.27	985.14
2	Fire of Burner	1391	26.23	52.79	80.33
3	Unknown cause	528	10.56	31.83	45.69
4	Open lamp	373	7.46	12.85	26.67
5	Cigarette	367	7.33	16.92	46.15
6	Burning firewood	226	4.51	8.77	17.56
7	Setting fire	153	3.05	16.48	8.55
8	Breaking of law by mob	120	2.4	4.75	20.02
9	Fire play by children	93	1.87	3.43	4.95
10	Friction in machine	78	1.55	2.98	44.44
11	Miss fire	56	1.12	1.29	1.20
12	Excessive heat	48	0.97	1.77	16.56
13	Chemical process	30	0.61	1.01	33.93
14	Burning of stake	40	0.41	2.04	3.60
15	Spontaneous firing	18	0.35	0.42	3.59
16	Static electricity	10	0.27	0.03	0.15
17	Sparkles from chimney	2	0.23	0.02	0.47
	TOTAL	5079	100	445.72	1339.08

Table 3.5 : Annual report of Fire Brigade of Bangladesh of 1999

Sl no	Cause of fire	Accident		Economic loss (Million Tk)	Economic Rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	1681	32	679.00	923.94
2	Fire of Burner	1281	25	76.35	142.69
3	Cigarette	533	10	83.51	101.20
4	Unknown cause	418	8.02	75.92	71.24
5	Open lamp	317	6.09	46.17	52.80
6	Setting fire	196	3.79	17.57	51.46
7	Burning firewood	177	3.4	39.20	21.24
8	Breaking of law by mob	148	2.86	22.88	42.84
9	Fire play by children	102	2	1.97	1.76
10	Burning of stake	78	1.51	2.84	14.08
11	Friction in machine	71	1.36	11.83	25.27
12	Miss fire	61	1.17	0.60	3.38
13	Excessive heat	56	1.08	12.14	47.49
14	Chemical process	49	0.96	2.85	7.10
15	Spontaneous firing	24	0.47	0.87	0.99
16	Static electricity	11	0.21	0.23	6.27
17	Sparkles from chimney	4	0.08	0.01	0.27
	TOTAL	5207	100	1074.04	1514.10

Table 3.6 : Annual report of Fire Brigade of Bangladesh of 2000

Sl no	Cause of fire	Accident		Economic loss (Million Tk )	Economic Rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	1720	32.36	615.56	1620.47
2	Fire of Burner	1160	21.83	75.29	137.80
3	Cigarette	500	9.41	39.98	106.88
4	Unknown cause	488	9.19	24.15	88.75
5	Open lamp	312	5.88	8.49	38.80
6	Miss fire	241	4.53	0.34	17.83
7	Burning firewood	176	3.31	9.84	11.29
8	Setting fire	167	3.14	7.21	13.90
9	Friction in machine	104	1.96	5.80	45.41
10	Fire play by children	102	1.92	1.41	7.91
11	Breaking of law by mob	96	1.8	10.98	43.17
12	Burning of stake	87	1.63	2.15	17.85
13	Excessive heat	47	0.89	0.37	12.63
14	Chemical process	44	0.83	6.99	24.24
15	Spontaneous firing	37	0.69	2.54	58.36
16	Static electricity	22	0.41	0.19	1.58
17	Sparkles from chimney	12	0.22	0.39	0.55
	TOTAL	5315	100	811.76	2247.49

Table 3.7 : Annual report of Fire Brigade of Bangladesh of 2001

Sl no	Cause of fire	Accident		Economic loss (Million Tk)	Economic Rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	1968	32.97	513.10	1466.08
2	Fire of Burner	1411	23.63	147.51	868.96
3	Cigarette	660	11.06	58.07	158.57
4	Unknown cause	519	8.7	354.53	186.00
5	Open lamp	368	6.17	73.80	82.74
6	Setting fire	202	3.39	8.82	10.76
7	Fire play by children	182	3.04	5.04	17.73
8	Burning firewood	167	2.8	12.07	18.40
9	Breaking of law by mob	138	2.31	33.63	52.81
10	Miss fire	97	1.62	0.68	2.53
11	Friction in machine	75	1.25	14.29	78.02
12	Chemical process	56	0.8	4.37	15.05
13	Spontaneous firing	37	0.61	11.75	103.05
14	Burning of stake	36	0.6	1.11	3.02
15	Excessive heat	33	0.56	1.64	4.30
16	Static electricity	14	0.23	0.99	2.12
17	Sparkles from chimney	8	0.13	0.17	5.25
	TOTAL	5971	100	1241.66	3075.46

Table 3.8 : Annual report of Fire Brigade of Bangladesh of 2002

Sl no	Cause of fire	Accident		Economic loss (Million Tk )	Economic rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	1873	34.6	843.99	1494.53
2	Fire of Burner	1249	23.05	72.69	280.12
3	Cigarette	570	11	20.59	67.39
4	Unknown cause	514	9.5	64.61	442.14
5	Open lamp	303	5.6	18.20	46.47
6	Burning firewood	173	3.2	7.01	8.85
7	Setting fire	142	2.6	9.14	31.19
8	Fire play by children	143	2.6	1.19	3.77
9	Friction in machine	84	1.5	59.66	282.40
10	Breaking of law by mob	66	1.2	4.24	19.68
11	Miss fire	63	1.1	1.94	8.90
12	Excessive heat	54	1	3.91	40.60
13	Burning of stake	39	0.7	1.24	12.68
14	Chemical process	28	0.5	1.28	6.06
15	Static electricity	17	0.3	0.14	1.08
16	Spontaneous firing	14	0.24	0.70	4.38
17	Sparkles from chimney	14	0.24	0.29	0.99
18	Other	58	1.07	11.29	47.61
	TOTAL	5404	100	1122.19	2798.90

Table 3.9 : Annual report of Fire Brigade of Bangladesh of 2003

Sl no	Cause of fire	Accident		Economic loss (Million Tk )	Economic rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	2278	36.22	804.68	2494.66
2	Fire of Burner	1505	23.94	88.12	328.46
3	Cigarette	635	10.1	21.56	128.36
4	Unknown cause	528	8.4	71.86	397.94
5	Open lamp	383	6.09	66.99	41.70
6	Burning firewood	182	2.9	7.69	19.05
7	Fire play by children	172	2.74	2.17	13.31
8	Setting fire	133	2.11	5.08	21.93
9	Miss fire	102	1.62	1.08	9.19
10	Breaking of law by mob	87	1.38	11.05	75.47
11	Friction in machine	71	1.13	12.86	130.03
12	Chemical process	58	0.93	2.02	30.06
13	Excessive heat	58	0.93	3.91	16.16
14	Static electricity	43	0.68	1.93	14.73
15	Burning of stake	31	0.48	2.94	4.84
16	Spontaneous firing	16	0.24	0.86	14.94
17	Sparkles from chimney	7	0.11	1.09	2.83
	TOTAL	6289	100	1105.98	3743.73



Table 3.10 : Annual report of Fire Brigade of Bangladesh of 2004

Sl no	Cause of fire	Accident		Economic loss (Million Tk )	Economic rescue (Million Tk)
		Number	In percent(%)		
1	Electrical hazard	2522	35.33	1645.65	3464.16
2	Fire of Burner	1739	24.35	117.91	258.82
3	Cigarette	715	10.02	27.12	152.83
4	Unknown cause	604	8.46	146.40	179.56
5	Open lamp	408	5.72	50.11	61.82
6	Burning firewood	248	3.48	14.75	33.96
7	Fire play by children	176	2.46	2.18	7.22
8	Setting fire	154	2.15	6.11	19.13
9	Breaking of law by mob	119	1.66	37.06	173.15
10	Friction in machine	95	1.34	16.46	50.19
11	Excessive heat	97	1.32	1.57	25.65
12	Miss fire	83	1.16	1.46	18.81
13	Static electricity	58	0.82	2.05	4.29
14	Burning of stake	45	0.64	1.47	5.25
15	Chemical process	43	0.61	65.84	189.94
16	Spontaneous firing	19	0.26	1.20	63.00
17	Sparkles from chimney	15	0.22	0.41	10.84
	TOTAL	7140	100	2137.82	4718.70

Table 3.11 : Human casualties from 2000 to 2004 , reported in the Annual report of Fire Brigade of Bangladesh

Sl no	Year	Number of accidents	Total number of deaths	Number of fire deaths
1	2000	1019	570	92
2	2001	1197	603	91
3	2002	1147	931	75
4	2003	1270	673	38
5	2004	1193	80	52

Table 3.12 : Fire accidental report of Bangladesh Garments Manufacturer and Exporter Association ,2004

Year	Factory affected (Number)	Human casualties (Number)
1990	1	23
1995	3	14
1996	1	12
1997	6	41
1998	4	1
1999	16	2
2000	19	12
2001	23	21
2002	9	0
2003	15	0
2004	16	7

Table 3.13 : Payment against claim from 1998 to 2004 by Pragati Insurance Ltd.

Year	Payment against claim (Million Tk)			
	Fire	Marine	Miscellaneous	Total
1998	11.49	8.96	13.76	34.21
1999	14.37	3.85	10.82	29.05
2000	20.94	16.52	14.05	51.52
2001	12.01	7.41	15.92	35.36
2002	16.75	9.55	25.03	51.34
2003	16.20	9.85	24.06	50.12
2004	6.49	6.52	34.23	47.25

Table 3.14 : Reported accidents due to fire in the Daily Inqilab (1995)

Date	Time	Place	Type of Installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss ( Installation unit number)	Injured (Number)	Cause
1/11/95	20:00	Agargao	Exhibition	Nil	N.R.*	N.R.*	N.R.*	Cigarette
1/27/95	3:00	Faridpur	N.R.*	N.R.*	1	N.R.*	N.R.*	N.R.*
1/29/95	1:00	Kachukhat	Basti	10	2	200	N.R.*	Short circuit
1/31/95	22:00	Kuril	Market	1	N.R.*	12	N.R.*	N.R.*
2/23/95	19:00	Old Dhaka	N.R.*	N.R.*	N.R.*	40	N.R.*	Unknown
2/23/95	12:00	Demra	Market	N.R.*	N.R.*	10	N.R.*	N.R.*
2/28/95	1:00	Kaoron Bazar	Market	N.R.*	N.R.*	2	N.R.*	Short circuit
3/20/95	17:00	Old Dhaka	Basti	10	N.R.*	1000	N.R.*	N.R.*
3/22/95	12:00	Madha Para	Market	6	N.R.*	100	N.R.*	Short circuit
3/23/95	20:00	Narayangonj	Residential	N.R.*	N.R.*	50	N.R.*	N.R.*
3/23/95	11:00	Narayangonj	Joot Godown	15	N.R.*	2	N.R.*	N.R.*
4/14/95	15:00	Old Dhaka	Residential	N.R.*	3	N.R.*	N.R.*	Gas burst
5/14/95	16:00	Old Dhaka	Small Industry	0.6	N.R.*	N.R.*	N.R.*	Burner
5/14/95	N.R.*	Old Dhaka	Small Industry	2.5	N.R.*	4	N.R.*	Short circuit
8/1/95	8:00	Cantonment	Garments	N.R.*	9	N.R.*	N.R.*	Short circuit
8/10/95	18:00	Mirpur	Basti	2.5	1	N.R.*	N.R.*	N.R.*
8/19/95	6:00	Polton	Office	N.R.*	N.R.*	N.R.*	N.R.*	Short circuit
8/29/95	N.R.*	Dinazpur	Office	N.R.*	N.R.*	N.R.*	N.R.*	Mob
11/28/95	7:00	Gulistan	Market	2000	25	N.R.*	N.R.*	Short circuit
12/6/95	N.R.*	Sayadabad	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Terrorism

\* N.R. in the table means not reported

Table 3.15 : Reported accidents due to fire in the Daily Inqilab(1996)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss ( Installation unit number)	Injured (Number)	Cause
1/31/96	1:00	Gulistan	Market	600	N.R.*	122	N.R.*	Terrorism
2/7/96	Night	Old Dhaka	Basti	2	N.R.*	3000	N.R.*	Short circuit
2/8/96	12:00	Dhaka	Transport	N.R.*	7	N.R.*	N.R.*	Political
2/9/96	Day	Moghbarazar	Transport	N.R.*	3	N.R.*	N.R.*	Political
2/10/96	13:00	Nilkhet	Market	N.R.*	N.R.*	10	N.R.*	Short circuit
2/17/96	17:00	Khulna	Basti	10	N.R.*	1500	N.R.*	Burner
3/19/96	12:00	Benapole	Warehouse	N.R.*	N.R.*	N.R.*	N.R.*	Burner
4/4/96	15:00	Khulna	Industry	0.1	N.R.*	N.R.*	N.R.*	Over voltage
4/13/96	7:00	Hatkhola	Chemical Godown	5	N.R.*	N.R.*	N.R.*	Excessive heat
4/22/96	Night	Sundarban	Forerst	N.R.*	N.R.*	N.R.*	N.R.*	Short circuit

Table continued to the next page

Table continued from the previous page

Table 3.15 : Reported accidents due to fire in the Daily Inqilab (1996)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss ( Installation unit number)	Injured (Number)	Cause
5/22/96	Night	Mirpur	Basti	N.R.*	6	1000	35	Over voltage
5/26/96	N.R.*	Old Dhaka	Chemical Godown	0.1	N.R.*	15	N.R.*	Gas burst
6/21/96	N.R.*	Gulistan	Market	N.R.*	N.R.*	50	N.R.*	Short circuit
6/25/96	13:30	Mirpur	Garments	N.R.*	12	N.R.*	N.R.*	Short circuit
10/1/96	17:30	Pallibi	Basti	10	N.R.*	1500	N.R.*	Terrorism
10/13/96	22:00	Narayangonj	Industry	N.R.*	4	N.R.*	N.R.*	N.R.*
12/25/96	12:00	Motijheel	Basti	N.R.*	N.R.*	250	N.R.*	Terrorism

\* N.R. in the table means not reported

Table 3.16 : Reported accidents due to fire in the Daily Jonokontho (1997)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss ( Installation unit number)	Injured (Number)	Cause
1/6/97	3:30	Nilkhet	Book Godown	50	N.R.*	N.R.*	N.R.*	N.R.*
1/22/97	12:00	Satkania	House	N.R.*	N.R.*	N.R.*	N.R.*	Burner
1/26/97	22:30	Khilgao	Basti	N.R.*	N.R.*	200	N.R.*	Short circuit
1/31/97	N.R.*	Chittagong	Basti	N.R.*	1	2000	N.R.*	Short circuit
2/1/97	8:30	Highway	Micro Bus	N.R.*	7	N.R.*	N.R.*	Mechanical
2/14/97	2:30	Old Dhaka	Basti	2	N.R.*	400	1	N.R.*
2/21/97	N.R.*	Cox's Bazar	Mill	N.R.*	N.R.*	N.R.*	N.R.*	N.R.*
2/28/97	9:00	Faridabad	Basti	N.R.*	N.R.*	300	N.R.*	N.R.*
4/2/97	Night	Narayangonj	Joot Godown	80	N.R.*	N.R.*	N.R.*	Insurance
4/12/97	15:00	Bandarbon	Residential	20	N.R.*	300	N.R.*	Burner
4/21/97	18:00	Maniknagar	Basti	N.R.*	N.R.*	300	N.R.*	Terrorism
4/21/97	1:00	Tongi	Industry	30	N.R.*	N.R.*	N.R.*	N.R.*
4/21/97	N.R.*	Bandarbon	Residential	50	N.R.*	600	N.R.*	N.R.*
4/28/97	Night	Chittagong	House	N.R.*	N.R.*	3	N.R.*	Open lamp
5/11/97	13:00	Bandarbon	Residential	N.R.*	N.R.*	300	N.R.*	Short circuit
6/19/97	N.R.*	Moulovi Bazar	Gas Field	N.R.*	N.R.*	N.R.*	N.R.*	Gas burst
7/17/97	20:00	Mirpur	Garments	50	9	N.R.*	N.R.*	Short circuit
9/22/97	N.R.*	Dhaka	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Political
10/7/97	N.R.*	Chittagong	Textile	N.R.*	N.R.*	N.R.*	N.R.*	N.R.*
10/14/97	14:00	Mirpur	N.R.*	N.R.*	N.R.*	N.R.*	1	Short circuit
10/25/97	13:00	Old Dhaka	Basti	5	2	N.R.*	N.R.*	Burner
10/28/97	20:00	Pakiza	Textile	2.5	N.R.*	N.R.*	N.R.*	N.R.*
11/22/97	8:00	Gulistan	Garments	0.003	2	N.R.*	N.R.*	Burner
11/27/97	22:00	Narayangonj	Basti	N.R.*	1	10	N.R.*	Open lamp

\* N.R. in the table means not reported

Table 3.17 : Reported accidents due to fire in the Daily Inqilab (1998)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
1/23/98	1:00	Old Dhaka	Small Industry	N.R.*	8	N.R.*	N.R.*	Open lamp
1/25/98	Night	Mirpur	Coloni	N.R.*	N.R.*	N.R.*	N.R.*	Gas leak
1/28/98	Night	Old Dhaka	Mill	0.015	N.R.*	N.R.*	N.R.*	Cigarette
2/12/98	11:00	Mirpur	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Mob
2/23/98	13:00	Old Dhaka	Basti	10	6	N.R.*	N.R.*	Terrorism
3/10/98	5:00	Khulna	Power Plant	500	N.R.*	N.R.*	N.R.*	Over run of Machine
3/10/98	N.R.*	Narayangonj	Poultry	5	N.R.*	N.R.*	N.R.*	N.R.*
3/19/98	12:00	Mirpur	Basti	N.R.*	2	N.R.*	N.R.*	Burner
3/20/98	12:00	Mahakhali	Basti	N.R.*	N.R.*	1500	N.R.*	Terrorism
4/2/98	20:00	Munshigonj	Market	80	N.R.*	175	N.R.*	Short circuit
4/14/98	N.R.*	Uttara	Bacary	1	N.R.*	N.R.*	N.R.*	Burner
4/29/98	N.R.*	Sylhet	Gas Field	N.R.*	N.R.*	N.R.*	N.R.*	Gas leak
11/8/98	N.R.*	Dhaka	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Political
12/2/98	1:00	Komolapur	Basti	N.R.*	N.R.*	300	N.R.*	Terrorism

\* N.R. in the table means not reported

Table 3.18 : Reported accidents due to fire in the Daily Jonokontho (1999)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
1/10/99	3:00	Chittagong	Poultry	0.1	N.R.*	N.R.*	N.R.*	Short circuit
1/12/99	15:00	Chittagong	Oil Mill	1.5	N.R.*	N.R.*	N.R.*	Gas burst
1/12/99	2:30	Demra	Basti	N.R.*	N.R.*	500	N.R.*	Burner
1/16/99	N.R.*	Highway	Car	N.R.*	6	N.R.*	N.R.*	Bus Accident
1/18/99	12:00	Mirpur	Market	10	N.R.*	60	N.R.*	Open lamp
1/25/99	23:00	Uttara	Basti	N.R.*	2	250	N.R.*	Short circuit
2/18/99	13:00	Narayangonj	Joot Godown	15	N.R.*	N.R.*	N.R.*	Electrical fault
2/28/99	11:00	Agargao	Basti	N.R.*	6	5000	N.R.*	Cigarette

Table continued to the next page

Table continued from the previous page

Table 3.18 : Reported accidents due to fire in the Daily Jonokontho (1999)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
4/18/99	23:00	Hatkhola	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Terrorism
5/4/99	3:00	Chittagong	Market	10	N.R.*	N.R.*	N.R.*	Short circuit
5/29/99	N.R.*	Asugonj	Gas Line	N.R.*	N.R.*	N.R.*	N.R.*	Mob
6/14/99	N.R.*	Dhaka	CNG Vehicle	N.R.*	N.R.*	N.R.*	N.R.*	Mob
7/9/99	2:00	Chandpur	Market	1.2	1	N.R.*	N.R.*	Welding
7/10/99	10:00	Gazipur	Garments	N.R.*	3	N.R.*	N.R.*	Political
11/7/99	N.R.*	Chittagong	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Political
11/26/99	N.R.*	Khilgao	Bus	N.R.*	1	N.R.*	N.R.*	N.R.*
12/18/99	21:00	Narayangonj	Commercial	10	N.R.*	50	N.R.*	N.R.*
12/18/99	N.R.*	Norsingdi	Market	1	N.R.*	7	N.R.*	N.R.*

\* N.R. in the table means not reported

Table 3.19 : Reported accidents due to fire in Daily Dinkal (2000)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
1/3/00	N.R.*	Polton	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Political
1/12/00	2:30	Mirpur	Industrial	25	N.R.*	50	N.R.*	Short circuit
1/12/00	N.R.*	Mirpur	Cloth Godown	30	1	80	N.R.*	Short circuit
1/12/00	6:00	Mouchak	Market	50	N.R.*	N.R.*	N.R.*	N.R.*
1/12/00	N.R.*	Chittagong	Residential	N.R.*	N.R.*	35	N.R.*	Short circuit
1/13/00	20:00	Old Dhaka	Market	10	N.R.*	150	N.R.*	Mob
2/24/00	N.R.*	Kaoron Bazar	Train	N.R.*	N.R.*	N.R.*	N.R.*	N.R.*
3/25/00	3:00	Mirpur	Cloth Godown	200	N.R.*	N.R.*	N.R.*	N.R.*
3/26/00	N.R.*	Agargao	Basti	20	N.R.*	2000	N.R.*	N.R.*
3/26/00	N.R.*	Mirpur	Market	N.R.*	N.R.*	56	N.R.*	N.R.*
3/26/00	15:00	Santibag	Residential	0.2	N.R.*	2	N.R.*	Short circuit
3/29/00	21:00	Gazipur	House	N.R.*	N.R.*	N.R.*	N.R.*	Terrorism
4/1/00	1:00	Tejgaon	Godown	N.R.*	N.R.*	N.R.*	N.R.*	N.R.*
4/2/00	23:00	Chittagong	Basti	N.R.*	2	200	N.R.*	N.R.*
4/6/00	14:00	Tejgaon	Basti	15	N.R.*	1000	21	N.R.*
5/1/00	21:30	Barisal	Tele Exchange	10	N.R.*	N.R.*	N.R.*	Short circuit

Table continued to the next page

Table continued from the previous page

Table 3.19 : Reported accidents due to fire in Daily Dinkal (2000)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
5/9/00	11:00	Rampura	Garments	5	N.R.*	N.R.*	N.R.*	Short circuit
6/1/00	11:00	Sitacundo	Ship Breakin g	N.R.*	16	N.R.*	N.R.*	Gas Burst
6/4/00	17:00	Narayangonj	Industrial Area	4	N.R.*	N.R.*	4	Chemical
7/27/00	14:30	Narayangonj	Industry	10	N.R.*	N.R.*	N.R.*	Short circuit
7/29/00	23:30	Sitacundo	Ship Breakin g	N.R.*	2	N.R.*	N.R.*	Gas Burst
8/28/00	3:00	Banani	Garments	N.R.*	12	N.R.*	N.R.*	Short circuit
9/2/00	12:00	Narayangonj	Industrial Area	5	N.R.*	16	N.R.*	Short circuit
11/18/00	13:00	Bogura	Market	1	N.R.*	N.R.*	N.R.*	Cigarette
11/26/00	20:00	Norsingdhi	Industry	N.R.*	47	N.R.*	N.R.*	Short circuit
11/26/00	22:30	Noakhali	Market	50	N.R.	N.R.*	35	Short circuit
12/3/00	N.R.*	Feni	Shop	N.R.*	1	N.R.*	N.R.*	Terrorism
12/5/00	N.R.*	Chittagong	Ship	4500	N.R.*	N.R.*	N.R.*	Terrorism
12/6/00	15:00	Chittagong	Basti	0.3	N.R.*	400	N.R.*	Short circuit
12/6/00	N.R.*	Custia	Basti	N.R.	N.R.*	140	N.R.*	Terrorism
12/6/00	N.R.*	Feni	Shop	0.6	N.R.*	5	N.R.*	Short circuit
12/6/00	21:30	Mohammad -pur	Basti	N.R.*	N.R.*	100	N.R.*	N.R.*
12/13/00	15:00	Dhaka University	Public Place	N.R.*	N.R.*	N.R.*	N.R.*	Mob
12/13/00	N.R.*	Faridpur	Joot Godow n	1200	N.R.*	N.R.*	N.R.*	Terrorism
12/15/00	N.R.*	Maymen -singh	House	N.R.*	N.R.*	N.R.*	N.R.*	Excessive heat
12/21/00	16:30	Malibagh	Lori	N.R.*	N.R.*	N.R.*	N.R.*	Terrorism
12/21/00	N.R.	Narayangonj	Basati	N.R.*	2	N.R.*	N.R.*	Burner
12/31/00	21:30	Karanigonj	Factory	N.R.*	N.R.*	N.R.*	N.R.*	Short circuit
12/31/00	20:00	Motijheel	Enterprise	N.R.*	N.R.*	N.R.*	N.R.*	N.R.*

\* N.R. in the table means not reported

Table 3.20 : Reported accidents due to fire in the Daily Dinkal (2001)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss ( Installation unit number)	Injured (Number)	Cause
1/3/01	12:00	Samoli	Garments	10	N.R.*	N.R.*	N.R.*	Short circuit
1/9/01	13:00	Dhaka	Train	N.R.*	N.R.*	N.R.*	20	Mechanical
1/22/01	N.R.	Tejgaon	Basti	N.R.*	N.R.*	60	N.R.*	Burner
1/25/01	16:00	Magh Bazar	Basti	N.R.*	1	1000	N.R.*	Terrorism
1/26/01	W.H.**	Narayangonj	Industrial	20	N.R.*	11	N.R.*	Overloaded machine
1/28/01	3:30	Cox's Bazar	Market	10	N.R.*	25	N.R.*	N.R.*
1/29/01	W.H.**	Tejgaon	Factory	N.R.*	1	N.R.*	N.R.*	N.R.*
2/6/01	15:00	Narayangonj	Industry	30	N.R.*	N.R.*	N.R.*	Short circuit
2/7/01	9:00	Mirzapur	Industry	12.5	N.R.*	N.R.*	N.R.*	Short circuit
2/9/01	Day	Polton	CNG	N.R.*	N.R.*	N.R.	N.R.*	Political
2/18/01	12:00	Mirpur	Basti	N.R.*	N.R.*	1000	N.R.*	Open lamp
2/23/01	3:00	Keranigonj	Residential	10	N.R.*	133	N.R.*	N.R.*
2/26/01	21:00	Chittagong	Basti	10	3	1500	N.R.*	N.R.*
2/26/01	10:00	Pirozpur	Market	10	N.R.*	50	N.R.*	Short circuit
3/1/01	12:00	Sitacundo	House	0.1	3	4	N.R.*	Burner
3/3/01	20:00	Mirpur	Basti	N.R.*	N.R.*	500	N.R.*	Unknown
3/13/01	12:00	Nakhalpara	Basti	N.R.*	1	500	N.R.*	N.R.*
3/13/01	12:00	Vasantek	Basti	N.R.*	N.R.*	500	N.R.*	N.R.*
3/18/01	20:00	Feni	School	N.R.*	N.R.*	N.R.*	N.R.*	Terrorism
3/24/01	1:00	Tangail	Basti	10	1	38	N.R.*	Open lamp
4/1/01	3:00	Old Dhaka	Basti	5	N.R.*	N.R.*	N.R.*	N.R.*
4/1/01	3:00	Sampur	Coloni	N.R.*	N.R.*	650	N.R.*	Mosquito coil
4/1/01	3:30	Old Dhaka	House	0.3	N.R.*	50	N.R.*	N.R.*
4/2/01	14:00	Old Dhaka	Industrial	5	N.R.*	35	N.R.*	N.R.*
4/7/01	N.R.*	Bandarbon	Residential	0.7	N.R.*	27	N.R.*	Accidental
4/7/01		Bandarbon	Residential	0.7	N.R.*	N.R.*	N.R.*	Burner
5/1/01	21:00	Feni	Residential	600	N.R.*	20	N.R.*	Short circuit
5/4/01	3:00	Baddarhat	Workshop	3	N.R.*	N.R.*	N.R.*	Burner
5/6/01	12:00	Khulna	Joot Godown	30	N.R.*	N.R.*	N.R.*	Short circuit
5/12/01	10:30	Barisal	Radio Station	N.R.*	N.R.*	N.R.*	N.R.*	Short circuit
5/21/01	2:00	Mongla	Market	10	N.R.*	N.R.*	N.R.*	N.R.*
6/4/01	2:30	Mirsarai	Market	0.1	N.R.*	21	N.R.*	Terrorism
6/9/01	4:00	Malibagh	Garments	30	N.R.*	N.R.*	N.R.*	N.R.*
6/19/01	N.R.*	Kakrail	CNG	N.R.*	N.R.*	N.R.*	N.R.*	Political
8/9/01	W.H.**	Mirpur	Garments	N.R.*	20	N.R.*	N.R.*	Short circuit
9/2/01	18:00	Adamji Nagar	Joot Godown	10	N.R.*	N.R.*	N.R.*	Short circuit
9/12/01	N.R.	Agargaon	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Mob

Table continued to the next page



Table continued from the previous page

Table 3.20 : Reported accidents due to fire in the Daily Dinkal (2001)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
11/14/01	12:00	Noakhali	Market	15	N.R.*	7	N.R.*	Short circuit
11/20/01	9:00	Mirzapur	Industry	200	N.R.*	N.R.*	N.R.*	Short circuit
11/30/01	Day	D University	Zip	N.R.*	N.R.*	N.R.*	N.R.*	Mob
11/30/01	6:00	Vola	Market	300	N.R.*	200	N.R.*	Short circuit
12/1/01	21:30	Bandarban	Market	10	N.R.*	80	N.R.*	Burner
12/3/01	N.R.*	Borguna	Market	20	N.R.*	100	10	Short circuit
12/10/01	3:30	Cox's Bazar	Market	5	N.R.*	N.R.*	3	N.R.*
12/25/01	9:00	Mirpur	Factori	N.R.*	1	N.R.*	N.R.*	Overloaded machine
12/25/01	13:00	Mohammad pur	Basti	2	N.R.*	300	N.R.*	Burner

\* N.R. in the table means not reported

\*\* W.H. in the table means working hour

Table 3.21 : Reported accidents due to fire in the Daily Dinkal (2002)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
1/5/02	3:00	Narayangonj	Joot Godown	5	N.R.*	N.R.*	N.R.*	Unknown
1/6/02	13:30	Mirpur	Basti	N.R.*	N.R.*	130	N.R.*	Short circuit
1/10/02	Night	Sitacundo	Ship breaking	N.R.*	Secret	N.R.*	N.R.*	Gas burst
1/15/02	3:00	Sitacundo	Poultry	0.05	N.R.*	N.R.*	N.R.*	Short circuit
1/16/02	Day	Maymensing h	University	N.R.*	N.R.*	N.R.*	N.R.*	Mob
1/27/02	19:30	Khilgao	Basti	4	N.R.*	60	N.R.*	Burner
1/29/02	Day	Motijheel	Public place	N.R.*	1	N.R.*	N.R.*	Mob
2/5/02		Gazipur	Industry	100	N.R.*	N.R.*	3	Chemical
2/6/02	8:00	Old Dhaka	Plastic godown	1	N.R.*	N.R.*	N.R.*	Short circuit
2/9/02	Day	Hilltract	Residential	5	N.R.*	40	N.R.*	N.R.*
2/16/02	2:30	Barisal	Shop	2.5	3	N.R.*	N.R.*	Burner
2/26/02	2:00	Mahakhali	Tele Exchange	0.1	N.R.*	N.R.*	N.R.*	Short circuit
2/26/02	N.R.	Chittagong	Residential	5	N.R.*	4	N.R.*	N.R.
2/26/02	10:00	Pirozpur	Market	10	N.R.*	N.R.*	N.R.*	Short circuit
3/6/02	12:00	Old Dhaka	Basti	10	N.R.*	2000	N.R.*	Unknown

Table continued to the next page

Table continued from the previous page

Table 3.21 : Reported accidents due to fire in the Daily Dinkal (2002)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
3/8/02	Day	Motijheel	Bus	N.R.*	N.R.*	1	N.R.*	Political
3/8/02	N.R.*	Narayangonj	House	N.R.*	N.R.*	1	N.R.*	Political
3/9/02	12:00	Old Dhaka	Residential	N.R.*	1	50	N.R.*	N.R.*
3/9/02	20:30	Agargao	Basti	1	N.R.*	300	N.R.*	Unknown
3/16/02	2:00	Maymensingh	Market	N.R.*	N.R.*	12	N.R.*	N.R.*
3/20/02	22:00	Khulna	House	N.R.*	1	N.R.*	N.R.*	Mosquito coil
3/20/02	2:00	Comilla	House	N.R.*	3	N.R.*	N.R.*	Unknown
3/20/02	Night	Comilla	Market	N.R.*	N.R.*	12	N.R.*	N.R.*
3/23/02	15:30	Moulovi Bazar	Market	1.5	N.R.*	8	N.R.*	Short circuit
3/23/02	N.R.*	Sylhet	House	0.05	N.R.*	N.R.*	N.R.*	N.R.*
3/29/02	Day	Motijheel	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Political
3/29/02	11:00	Sylhet	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Mechanical
3/29/02	4:00	Hobigonj	Market	2	N.R.*	15	N.R.*	Burner
3/30/02	N.R.*	Badda	Market	0.9	2	10	N.R.*	Short circuit
4/3/02	N.R.*	Narayangonj	Joot Godown	9	N.R.*	8	N.R.*	Short circuit
4/5/02	10:00	Chittagong	Factory	10	N.R.*	N.R.*	N.R.*	N.R.*
4/5/02	3:30	Sitacundo	Market	0.5	N.R.*	8	N.R.*	Terrorism
5/3/02	21:00	Old Dhaka	Tele Exchange	N.R.*	1	N.R.*	N.R.*	Terrorism
5/3/02	Night	Samolil	House	N.R.*	3	N.R.*	N.R.*	Terrorism
5/25/02	13:00	Santinagar	Market	1.5	N.R.*	N.R.*	N.R.*	Short circuit
7/3/02	N.R.	Sitacundo	Industry	N.R.*	N.R.*	N.R.*	N.R.*	Chlorine pipe burst
7/13/02	7:00	Narayangonj	Garments	120	N.R.*	N.R.*	N.R.*	Short circuit
7/27/02		Mirpur	Industry	N.R.*	N.R.*	N.R.*	N.R.*	Chemical
8/31/02	Day	Palton	Bus	N.R.*	N.R.*	N.R.*	N.R.*	Political
9/6/02		Narsingdi	House	N.R.*	N.R.*	N.R.*	N.R.*	Terrorism
9/28/02	Night	Hathazari	House	1	N.R.*	N.R.*	3	Burner
10/8/02	1:00	Fenchugonj	Power Plant	10	N.R.*	N.R.*	N.R.*	Mechanical
10/14/02	2:30	Old Dhaka	Industrial Area	7.5	N.R.*	5	N.R.*	Short circuit
11/4/02		Lalmatia	House	N.R.*	1	N.R.*	N.R.*	Burner
11/19/02	4:00	Chandpur	House	N.R.*	2	N.R.*	N.R.*	Open lamp
11/20/02	Night	Rangamati	Market	20	N.R.*	65	N.R.*	N.R.*
11/25/02	7:00	Feni	Village	2	N.R.*	10	N.R.*	Short circuit
12/22/02	3:00	Potuakhali	House	1	1	N.R.*	N.R.*	Short circuit

\* N.R. in the table means not reported

Table 3.22 : Reported accidents due to fire in the Daily Inqilab (2003)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
1/29/03	20:00	Dhaka	House	N.R.*	2	N.R.*	N.R.*	N.R.*
1/29/03	N.R.*	Mirpur	N.R.*	30	N.R.*	N.R.*	N.R.*	Gas Burst
5/10/03		Chuadanga	Field	N.R.*	1	40	N.R.*	Terrorism
8/19/03	10:50	Dhaka New Market	Sub Station	1	N.R.*	N.R.*	N.R.*	Short circuit
9/13/03	8:30	Pallabi	Sub Station	2500	N.R.*	N.R.*	N.R.*	Electrical Spark
9/15/03	N.R.*	Kachpur	Sub Station	N.R.*	N.R.*	N.R.*	N.R.*	Electrical Overload
9/18/03	N.R.*	Chittagonj	Ship	N.R.*	N.R.*	N.R.*	N.R.*	Explosive
9/22/03	5:00	Narayangonj	Tele Exchange	10	N.R.*	N.R.*	N.R.*	N.R.*
11/5/03	13:50	Khilgao	Sub Station	5	N.R.*	1	N.R.*	Mechanical
11/24/03	N.R.*	Sirazgonj	House	N.R.*	3	1	N.R.*	Terrorism

\* N.R. in the table means not reported

Table 3.23 : Reported accidents due to fire in the Daily News Papers (2004)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss (Installation unit number)	Injured (Number)	Cause
1/1/04	23:30	Barisal	Market	N.R.*	1	60	N.R.*	Short circuit
1/29/04	Night	Noakhali	Market	6	N.R.*	11	N.R.*	Short circuit
2/11/04	Night	Natore	Residential	N.R.*	N.R.*	29	N.R.*	Political
2/17/04	N.R.*	Tongi	Cloth Godown	N.R.*	1	40	N.R.*	Mosquito Coil
2/25/04	N.R.*	Old Dhaka	Industrial	1	N.R.*	N.R.*	N.R.*	Short circuit
3/5/04	N.R.*	Gulistan	Basti	5	4	5000	N.R.*	Burner
3/7/04	N.R.*	Benapol	Shop	10	N.R.*	20	N.R.*	N.R.*
5/5/04	N.R.*	Mirpur	Garments	N.R.*	7	N.R.*	N.R.*	Electric Fault
5/8/04	N.R.*	Gazipur	Train	N.R.*	N.R.*	N.R.*	N.R.*	Political
6/5/04	20:00	Sahabag	Bus	N.R.*	9	1	N.R.*	Terrorism
8/2/04	N.R.*	Gopalganj	Motor cycle	N.R.*	N.R.*	2	N.R.*	Political
9/3/04	N.R.*	Savar	Shop	N.R.*	N.R.*	5	N.R.*	Welding
9/4/04	8:40	Gazipur	Textile	400	N.R.*	N.R.*	N.R.*	Short circuit
9/7/04	N.R.*	Savar	Vehicle	N.R.*	N.R.*	6	N.R.*	Mob
9/17/04	N.R.*	Sylhet	Train	2	N.R.*	N.R.*	N.R.*	Vehicle accident
10/2/04	N.R.*	Narayangonj	House	1.4	N.R.*	9	N.R.*	Atas Bazi

Table continued to the next page

Table continued from the previous page

Table 3.23 : Reported accidents due to fire in the Daily News Papers (2004)

Date	Time	Place	Type of installation affected	Economic Loss (Million Tk)	Number of human casualties	Property loss ( Installation unit number)	Injured (Number)	Cause
10/8/04	N.R.*	Vola	Shop	2	N.R.*	10	N.R.*	Short circuit
10/22/04	N.R.*	Nilfamari	Shop	N.R.*	N.R.*	16	N.R.*	Unknown
11/22/04	N.R.*	Gulistan	Market	1000	1	1530	N.R.*	Unknown
11/30/04	23:00	Jurain	Basti	0.7	4	300	N.R.*	N.R.*
12/19/04	N.R.*	Natore	N.R.*	N.R.*	N.R.*	7	N.R.*	Burner
12/31/04	N.R.*	Sundarban	Forest	N.R.*	N.R.*	N.R.*	N.R.*	Cigarette

\* N.R. in the table means not reported

Daily Jugantor : January 2004, February 2004, March 2004, September 2004

Daily Prothom Alo : May 2004, August 2004

Daily Inqilab : October 2004

Daily Amar Desh : November 2004

Daily Ittefaq : December 2004

## **CHAPTER IV**

### **ANALYSIS OF DATA**

#### **4.1 INTRODUCTION**

This chapter presents the inconsistency and incompleteness of data obtained from different sources. It also discusses about a standard form to be filled up during fire accidental investigations.

#### **4.2 INFORMATION FROM DIFFERENT SOURCES**

Different organizations have their own objectives of keeping records. Fire Brigade is a governmental organization. It has a wide network throughout Bangladesh. However, some of the buildings are not attended by them. Bangladesh Garments Manufacturer and Exporter Association keeps records of accidents in the garment factories only. Insurance company keeps information of the accidents of its clients only. Newspapers are supposed to cover all the accidents. However, some of the accidents in the remote areas are not reported in the paper.

A comparison of accident related information from different sources is presented in Table 4.1. The table shows that there is wide range of differences in data obtained from the three sources. For example, Fire Brigade reports 6135 number of accidents, while paper and BGMEA 20 and 3 respectively for 1995. By comparing the numbers it is clear the working area of the three reporting agencies varies much.

Table 4.2 presents the number of accidents due to electrical faults. In this case too a wide variation is observed for different sources. From Fire Brigade report it is observed that ratio of electrical fault to other faults increases continuously with years. According to paper report, the percentage of electrical fault among all faults

causing fire accidents is a considerable one. BGMEA report follows a specific pattern. That is about 100 percent occurrences are due to electrical faults.

Similar observation is made from Table 4.3. This table (Table 4.3) presents the annual human casualties. Fire Brigade does not have record of casualties from 1995 to 1999. News paper reports lower number than Fire Brigade from 2000 to 2004. However, the reporting number of newspaper is higher compared to those of BGMEA. This is because BGMEA only reports the casualties of garment industries.

Table 4.1 : Losses according to different sources  
(Fire Brigade , News paper ,BGMEA)

Year	Number of accidents			Number of death			Property loss (Million Tk)	
	Information sources			Information sources			Fire Brigade	Insurance company
	Fire Brigade	News paper	BGMEA	Fire Brigade	News paper	BGMEA		
1995	6135	20	3	Not reported	41	14	158	Not reported
1996	5376	17	1	Not reported	32	12	633	Not reported
1997	5802	24	6	Not reported	22	41	903	Not reported
1998	5079	14	4	Not reported	16	1	1339	11
1999	5207	18	16	Not reported	19	2	1514	14
2000	5315	39	19	92	83	12	2247	20
2001	5971	46	23	91	31	21	1241	12
2002	5404	48	9	75	19	0	1122	16
2003	6289	10	15	38	6	0	1105	16
2004	7140	23	16	52	27	7	2137	6

Table 4.2 : Contribution of electrical fault towards total accidents

Year	Source : Fire Brigade		Source : News paper		Source : BGMEA	
	Accidents due to electrical fault (in percent of total faults)	Change from previous year (%)	Accidents due to electrical fault (in percent of total faults)	Change From Previous Year (%)	Accidents due to electrical fault (in percent of total faults)	Change From Previous year (%)
1995	22	-	35	-	98	-
1996	29	+31	35	0	98	0
1997	25	-14	21	-40	98	0
1998	30	+20	7	-66	98	0
1999	32	+7	22	+66	98	0
2000	32	0	36	+70	98	0
2001	33	+3	28	-22	98	0
2002	35	+6	27	-4	98	0
2003	36	+3	33	+24	98	0
2004	35	-3	21	-12	98	0

Table 4.3 : Human casualties according to different sources (Fire Brigade ,News paper report , BGMEA)

Year	Number of human casualties		
	Source : Fire Brigade	Source : News paper	Source : BGMEA
1995	Not reported	41	14
1996	Not reported	32	12
1997	Not reported	22	41
1998	Not reported	16	1
1999	Not reported	19	2
2000	92	83	12
2001	91	31	21
2002	75	19	0
2003	38	6	0
2004	52	27	7

### **4.3 LOSSES IN BUILDINGS DUE TO ELECTRICAL FAULTS**

Almost 100 percent of fire losses recorded in Bangladesh are associated with fires in structure. The majority of these fire accidents are due to electrical faults. Figure 4.1 depicts the number of accidents comparing accident due to electrical fault with the total number. The comparison is also made in Table 4.4. The accident in buildings due to electrical faults ranges from 22% to 36%.

Similar comparison is made in Figure 4.2 and Table 4.5 from the data obtained from the News paper. In this case, the reporting accidents are less compared to the report of Fire Brigade as in table 4.4. Table 4.5 shows that accidents due to electrical faults vary from 7% to 36% of the total.

Figure 4.3 and Table 4.6 compare the property loss due to electrical faults with the total loss in fire. This figure and the table are prepared with the data obtained from Fire Brigade. The maximum annual loss due to electrical faults is 80% of the total. The minimum value is observed as 41%.

From the data of a insurance company the annual claims of the clients due to fire are compared with the total annual claim in Figure 4.4 and Table 4.7. Annual claims due to fire are significant number among all other claims.



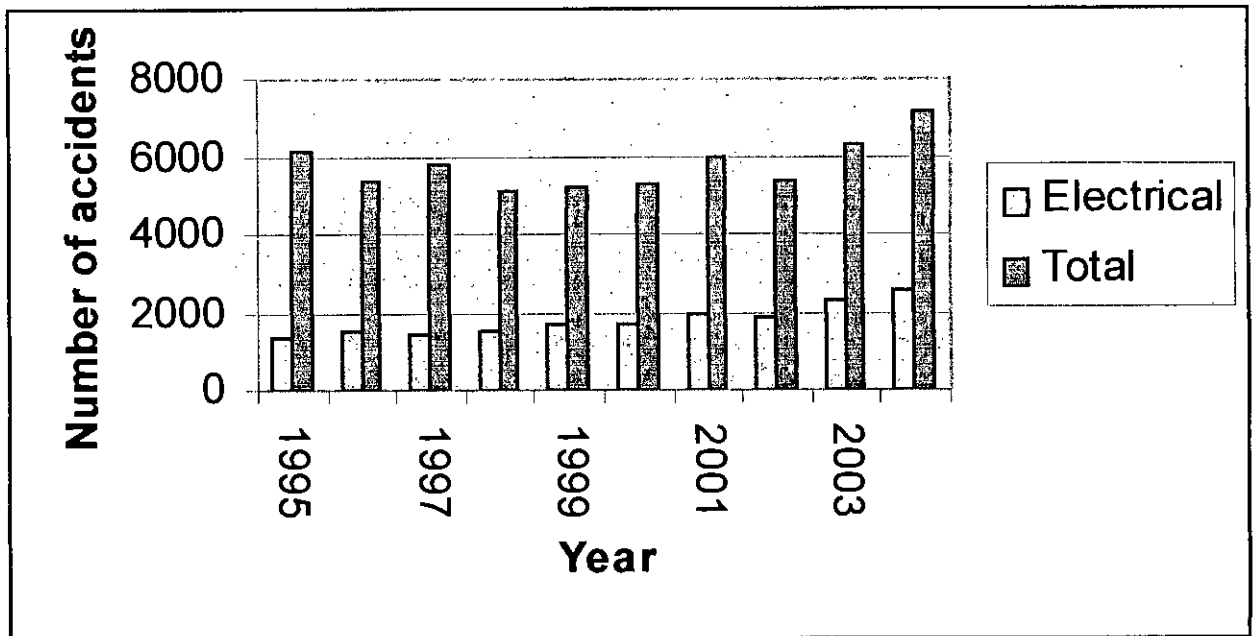


Figure 4.1 : Number of fire accidents due to electrical and other faults according to Fire Brigade of Bangladesh

Table 4.4 : Comparison of the number of accidents due to electrical faults with the total (Fire Brigade report)

Year	Fire accidents due to electrical faults (Number)	Total accidents (Number)	Percentage (%)
1995	1338	6135	22
1996	1536	5376	29
1997	1434	5802	25
1998	1536	5079	30
1999	1681	5207	32
2000	1720	5315	32
2001	1968	5971	33
2002	1873	5404	35
2003	2278	6289	36
2004	2522	7140	35

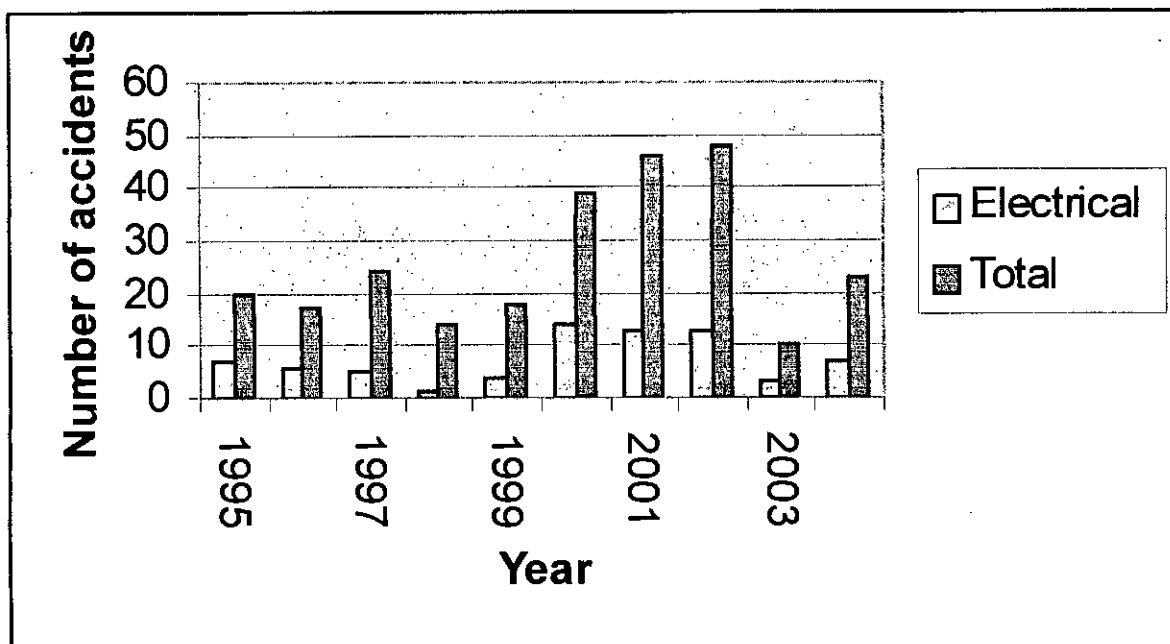


Figure 4.2 : Fire accidents due to electrical and other faults according to News paper report

Table 4.5 : Comparison of accidents due to electrical faults with the total (News paper report)

Year	Fire accidents due to electrical faults (Number)	Total fire accidents (Number)	Percentage (%)
1995	7	20	35
1996	6	17	35
1997	5	24	21
1998	1	14	7
1999	4	18	22
2000	14	39	36
2001	13	46	28
2002	13	48	27
2003	3	10	33
2004	7	23	21

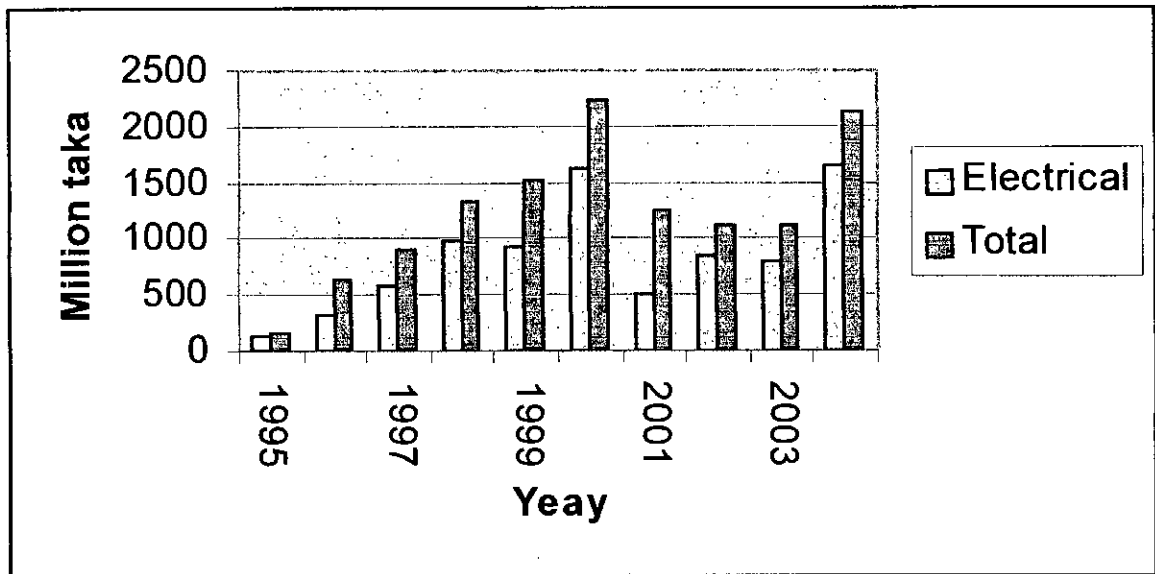


Figure 4.3 : Comparison of loss due to electrical faults with the total according to Fire Brigade of Bangladesh

Table 4.6 : Property loss due to electrical faults in percent of total loss (Fire Brigade report)

Year	Property loss		
	Total (Million Taka)	Due to electrical faults	
		Amount (Million Taka)	In percent of total(%)
1995	158	127	80
1996	633	307	48
1997	903	574	64
1998	1339	985	74
1999	1514	923	61
2000	2247	1620	72
2001	1241	513	41
2002	1122	843	75
2003	1105	804	73
2004	2137	1645	77

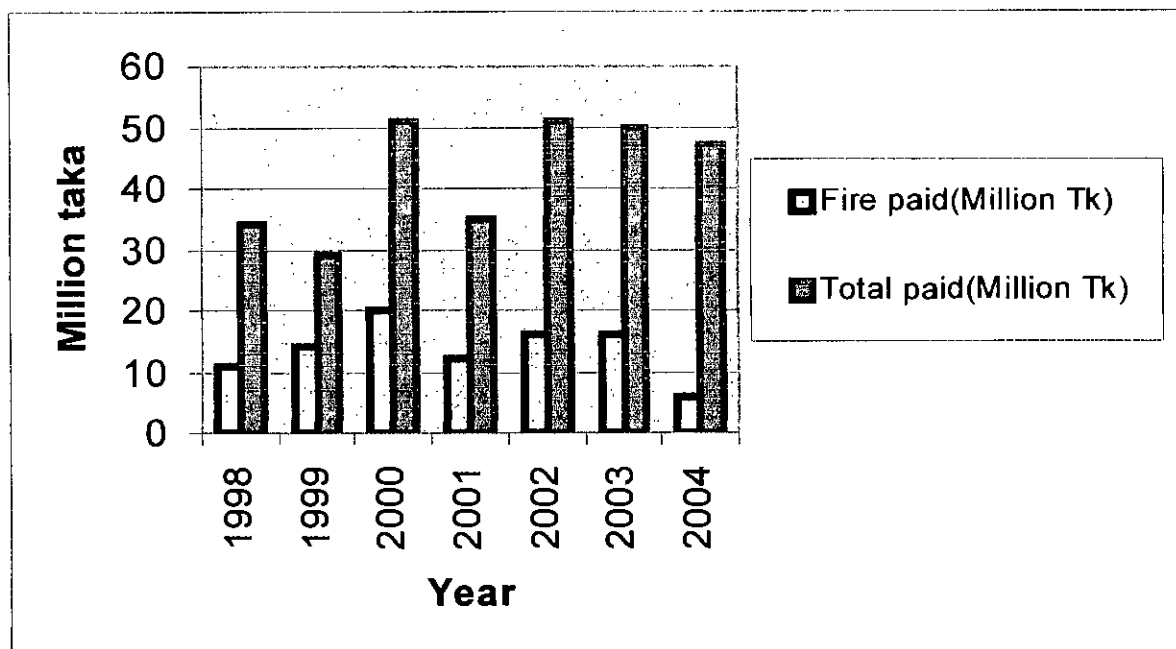


Figure 4.4 : Comparison of insurance claim due to fire from 1998 to 2004 of Pragati Insurance Ltd.

Table 4.7 : Insurance claim due to fire in percent of total claim (Pragati Insurance Ltd.)

Year	Insurance claim		
	Total (Million Tk)	Due to fire	
		Amount (Million Tk)	In percent of total(%)
1998	34	11	32
1999	29	14	48
2000	51	20	39
2001	35	12	34
2002	51	16	31
2003	50	16	31
2004	47	6	12



# CHAPTER V

## CONCLUSIONS

### 5.1 INTRODUCTION

After analyzing the results of this thesis concluding remarks are presented in this chapter. The chapter ends with recommendations for further research in continuation of this work.

### 5.2 CONCLUSIONS

The analysis and comparison of the collected data clearly shows that there are inconsistencies among information from different sources. Most of the statistics of the different sources are incomplete. Therefore, the database is not comprehensive. But from comparative analysis it can be screened out the differences.

It has been observed that fire accident occur in garments is about 100% due to electrical hazards. In other sectors electrical hazard share about almost one third of total accidents. This percentage will increase with increase of use of electricity with time .

### 5.3 RECOMMENDATIONS FOR FURTHER RESEARCH

Following are the recommendations for further works in this area :

- a . Complete information from more different and reliable sources should be collected for a period.
- b . The information should include type of structures, sectors, class of people affected.
- c . Ratio of electrical fault to other faults causing fire accidents is increasing continuously. The reason behind this fact is to be worked out.
- d . On the same event or relating the same target group, data from different sources are to be verified.
- e . Necessary changes in Building Code of Bangladesh in accordance with investigation results should be recommended.

## REFERENCES

- [1] "Annual Report, 1995-2004", Fire Brigade of Bangladesh .
- [2] Dr. Paul G. Holborn, "Fire deaths in London|1996-2000", <http://www.london-fire.gov.uk>, October 2001.
- [3] Michael J. Karter Jr. "Fire Loss in the United States during 2003", <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>, October 2004.
- [4] Joseph Zicherman, "Fire Performance of Foam-Plastic Building Insulation", ASCE Journal of Architectural Engineering, Vol-9, No-3, September 2003.
- [5] W. K. Chow, "Assessment of Fire Hazard in Small News Agents in Transport Terminal Halls", ASCE Journal of Architectural Engineering, Vol-11, No-1, March 2005.
- [6] "Fire Accidental Report, 2004", A report prepared by Bangladesh Garments Manufacturer and Exporter Association
- [7] "Annual Report : 1997-2003", Pragati Insurance Co. Ltd. , Bangladesh.
- [8] "Fire Accidental Report",
- (i) Daily Inqilab - 1995 ,1996 1998 ,2003 ,Oct 2004.
  - (ii) Daily Jonokontho - 1997 ,1999.
  - (iii) Daily Dinkal - 2000 , 2001 ,2002.
  - (iv) Daily Jugantor - Jan , Feb , Mar ,Sep 2004.
  - (v) Daily Prothom Alo - May , Aug 2004.
  - (vi) Daily Amar Desh - Nov 2004.
  - (vii) Daily Ittifaq - Dec 2004.

