



Characteristic and Introspection of Fire Accidents in Guizhou Province, China from 2008-2012

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Abstract

Background: Fire accident is one of the serious disasters that threaten public safety and endanger people's life and property. Fire is often led to burns and disability, while the treatment of burns is difficult.

Objectives: To explore the fire frequency, injured persons, the death toll in fire accidents, the direct economic loss caused by fire in Guizhou province and China during 2008-2012, so as to give some target prevention measures.

Methods: The effective data relative to the fire accidents and burns were extracted from the official websites, and then we use epidemiological approach to conduct the analysis. The information is described in terms of composition ratio, and time point diagram.

Results: There are 676287 fire accidents, 3164 person were injured, and 6098 people were lost their lives in the fire accidents. It caused a direct economic loss of 9639.98 million RMB Yuan in China during 2008-2012. The numbers of people injured and the number of death in the fire in Guizhou province is lower in the national ranking.

Conclusion: Though the fire frequency, the numbers of injuries and death in fire accidents has decreased, however, the direct economic loss of fire has an uptrend in both Guizhou province and in whole China. Thus, we suggest that fire prevention should be paid more attention.

Keywords: Fire accidents, Fire prevention, Guizhou Province, China, Epidemiological approach

1. INTRODUCTION

In our social life, fire accident is one of the serious disasters that threaten public safety and endanger people's life and property. Fires caused over 300,000 deaths annually worldwide and leave millions more with permanent injuries [1]. The fire not only damages material property, but also causes the chaos of social order and the disastrous direct economic loss and indirect economic loss. Forest fires can cause catastrophic damage on natural resources [2]. In boreal forests, fire is an important part of the ecosystem that greatly influences soil respiration, which in turn affects the carbon balance [3]. Among the hazards of fire, the life and health hazards of the people should arouse the attention of medical and health practitioners. In hot

summer, some news had reported that the fire accidents led to burns. Eg: "A 23-year old female master student was suffered a severe burns more than 70% TBSA (total burn surface area, TBSA) due to gas leak". Another case reported that "A seven years old girl used the toilet water (a type of liquid for the mosquito repellent use), happened to meet with her brother playing fire, and got burned". Burns are among the most devastating of all injuries, with outcomes ranging from physical impairment and disability to emotional and physical consequences [4]. Many developed countries have high mortality rates for fire-related deaths in children aged 0-14 years with steep social gradients [5]. After the fire the treatment of injured personnel causes severe disease burden to families and even society, while lamenting

the tragedy, what should be done to the burns in the summer.

In this study, the details of fire accidents were described in Guizhou province (It locates in south west China with poor economic condition but its mountains are rich) and China from 2008 to 2012. We compared the fire accidents in Guizhou province with the whole nation. The number of injured, the number of deaths (death toll), and the economic losses resulting from the disaster have been analyzed to reveal the changing trends in the fire accidents. We aimed to clarify the characteristics of fire accidents in China especially in Guizhou province, so as to give some target suggestions on prevention measures in similar area as Guizhou.

2. METHODS

2.1. Data Source

The data source is from the Chinese statistical website.(<http://www.stats.gov.cn/>)and Guizhou Provincial Bureau of Statistics official website network (<http://www.gz.stats.gov.cn/>). Because much fire-related information during 2013-2015 is missing in the official websites, so in this study we only conduct a statistics and analysis based on the data from 2008-2012.

2.2. The Inclusion/Exclusion Criteria and Study Design

The inclusion criteria should not only include the fire frequency, death toll, injured people, direct economic loss about fire accidents both in China and Guizhou province, but also available and complete. The excluding criteria, including data from more than a decade ago as well as some main data were lost. A cross-sectional study combined with the time point tracking were used in our study.

2.3. Definition of Fire Levels

In our study, the fire levels were defined as following: (1) General fire refers 3 people following deaths, or less than 10 serious injuries, or the fire direct property loss of less than 10 million RMB Yuan. (2) Large fires refer more than 3 people and less than 10 people died, or more than 10 and less than 50 people injured, or more than 10 million RMB and less than 50 million RMB Yuan of the fire direct property loss. (3) Major fire caused the death of more than 11 people and under 30, or more than 51 people and less than 100 people injured, or more than 50 million RMB Yuan of less than 100 million RMB Yuan of the fire direct property loss. (4) Special large fires: more than 30 people killed or seriously injured more than 100 people, or the fire direct property loss of more than 100 million RMB Yuan ^[6].(see Table 1).

Table1. Definition of fire levels

Definition	Death toll	Injuries people	Direct property loss (million RMB Yuan)
General fire	<3	<10	<10
Large fire	3-10	10-50	10-50
Major fire	11-30	51-100	51-100
Special major fire	>30	>100	>100

2.4. Statistical Methods

The effective data relative to the fire accident and burns were extracted by the official website. Epidemiological approach was used to conduct the analysis.

3. RESULTS

The basic situation of the fire, there are 676287 fire accidents in total in our country, 3164 person were injured in the fire accidents, 6098 people were killed. The fire accidents caused a direct economic loss of 9639.98 million in China during 2008-2012. There are 135258 fire accidents, 633 injured persons, 1220 people died of fire accidents, and fire accidents caused 19279.96 million RMB Yuan property damage

each year in China during 2008-2012. (See Table 2) It can be clearly seen that the fire frequency has declined, however the direct economic loss of fire has risen. (See Fig.1) The numbers of injuries and death toll in fire accident in China have declined during 2008-2012. (See Fig. 2).

Though the reduction of the fire accidents, the direct economic loss of fire has an upward trend from 2008-2012. It may have something with the rapid development of the society. There are much wealth in society, when a fire breaks out, it cause greater damage than before. It was also found that the fire direct economic losses in Guizhou province ranking in the middle in China between 2008 and 2012 (see Table 3).

Table2. Four fire accidents related characteristics during 2008-2012 in China and in Guizhou

Year	2008	2009	2010	2011	2012
China					
Fire frequency	136835	129381	132497	125417	152157
Injured people	743	651	624	571	575
Death toll	1521	1236	1205	1108	1028
Economic loss (Million RMB Yuan)	1822.03	1623.91	1959.45	2057.43	2177.16
Guizhou					
Fire frequency	799	912	1661	1170	959
Injured people	35	29	41	10	15
Death toll	77	80	73	55	31
Economic loss (Million RMB Yuan)	3569.14	3615.6	4566.2	6625.4	5147.2

Table3. The national rank and proportion of fire accidents in Guizhou Province

Index	2008		2009		2010		2011		2012	
	Rank	Proportion(%)	Rank	Proportion(%)	Rank	Proportion(%)	Rank	Proportion(%)	Rank	Proportion(%)
Fire frequency	31	0.6	30	0.7	31	1.3	27	0.9	29	0.6
Injured people	6	4.7	8	4.0	5	7.0	22	1.8	16	3.0
Death toll	5	5.0	4	5.0	5	6.0	4	4.0	16	3.0
Direct economic loss	20	2.0	19	2.0	4	2.8	19	3.2	20	2.0

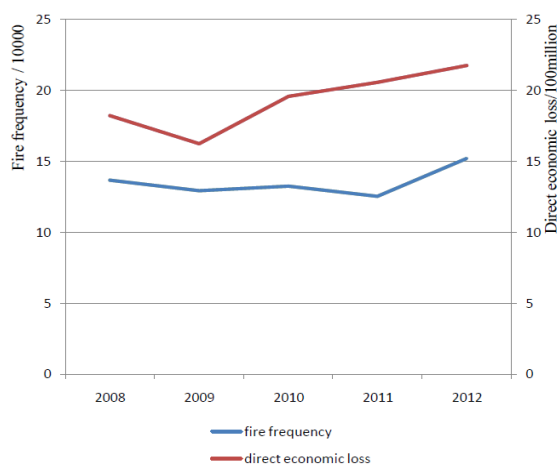


Figure1. The fire frequency and direct economic of fire in China from 2008-2012

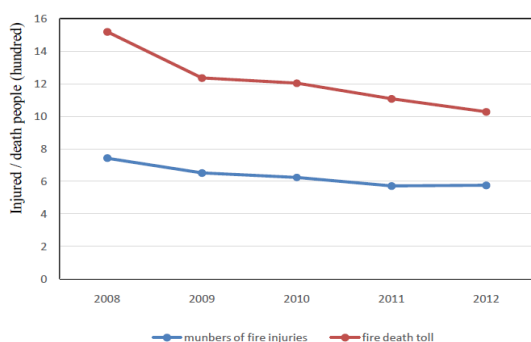


Figure2. The injured person and death toll in China during 2008-2012.

The numbers of people injured and the number of people killed in the fire in Guizhou province is lower than in the national ranking. As there are fewer general hospitals in Guizhou province (The number of hospitals in Guizhou province is 446, and it is lower than the province average in the whole nation (480) during 2008-2012.) When a fire breaks out, the injured person cannot be saved in time. Compared with Year 2010, 128 comprehensive hospitals were increased in 2012. Accordingly, the number of fire injured persons ranked from fourth in 2011 to the sixteenth in 2012 in Guizhou province.

4. DISCUSSION

Though fire frequency has declined in China, there are 633 persons in average were injured, while 1220 person died in fire accidents each year in China. Our result showed that direct economic loss of fire has increased, which means fire accidents have brought great damage in Guizhou. Not only the fires bring a heavy direct economic loss, but it also threatens people's health and lives. As fire is often accompanied by burns and disability, burn scars remain a serious physical and psychological problem for the affected people [7]. The injured person cannot work, and the treatment of burns is a great burden to families and society. It is gratifying that the number of fire accidents in

Guizhou province has been relatively low in the national ranking.

It is possible that people in mountainous areas of Guizhou have raised awareness of forest fire prevention. Another reason may be that Guizhou's population density is small, public buildings and public mall layout less relevant, and the economic loss caused by the fire is relatively less. Even so, it suggested us that fire extinguisher equipment should be improved to reduce the loss. The safety protection system has not kept up with the development needs; and the fire safety guarantee system is not perfect for the fire prevention design and the fire extinguish force and inadequate facilities.

Although large fire accidents in recent years do not appear, however, there are several major fires. When the fire occurs, accompanied by burns, people should be leaving the scene of the fire and then treated the wound, application of cold water wash the wound, and topical ointment, avoid burn skins, and prevent infection. Infectious complications in severely burned patients present serious problems^[8], which should be treated immediately.

Dense urban population in urban areas and related hidden sources of hazards such as electrical installations and power lines may lead to the occurrence of fires as described in previous studies^[9,10]. To understand the development trend of fire, complete the fire prevention work, can better guarantee the people's life and property safety. Burn wound conversion continues to remain one of the least understood and poorly treated aspects of burn care^[11]. After someone burned by fire, know how to deal with the wound, so as to shorten the treatment time of burn (especial shorten the length of hospital stay), and ease the pain of the injured.

As talk about fire prevention, there are much work to do, the recently study about fire in China showed that the higher rate of education, the lower the possibility of death in a fire^[12]. It is essential for us to improve people's education. First aid treatment of burn injuries reduces scarring and improves healing^[13]. We should improve on the fire alert, enterprises should be the safe use of electricity, and the government should be combined with the local fire situation and characteristics. For the country level, we should pay attention to revision of the fire safety regulations, establish and improve the system of fire accident prevention regulations. Hospitals and fire services should cooperate with each

other. However, if first aid treatment is administered immediately at the scene or prior to qualified medical treatment, burn patients have improved healing outcome^[14].

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