FIRE ACCIDENTS IN VIRUDHUNAGAR DISTRICT – TAMIL NADU A STUDY ON COMMUNITY PARTICIPATION AND PUBLIC AWARENESS

DR.A. JOSEPH XAVIER, A. JOSEPHINE STELLA

Abstract: Fire accidents occur mostly due to human error. Every year, billions of dollars in property damage occurs as a result of fire. Victims of fire accidents can suffer serious harm, including burn injury to the entire body. Fire accidents can cause death not only from burns but also from smoke inhalation and toxic gases. Fire may be as useful as it is deadly. Although, every precaution may be taken, devastating accidents can happen. Special care should be taken to avoid fire accidents in the industrial units. This paper analyses the causes for fire accident in Virudhunagar district. Moreover based on the findings valuable suggestions are offered to mitigate the fire accidents in the study area.

Keywords: Fire Accidents, Community participation and Public Awareness

Introduction: Fire accidents are divided into two namely natural fire accidents and manmade fire accidents. Fires which are considered as natural are basically earthquake, volcanic eruption and lightning generated fires. Damage to natural gas systems during an earthquake is a major cause of large fires. Fire caused by human / machine errors are considered as manmade fires, e.g. industrial or chemical fire accidents, fires at social gatherings due to electrical short circuit fires, accidental fire and the like.

Statement of the Problem: Every year, billions of dollars in property damage occurs as a result of fire. Victims of fire accidents can suffer serious harm, including burn injury to the entire body. Fire accidents can cause death not only from burns but also from smoke inhalation and toxic gases. Fire may be as useful as it is deadly. Although, every precaution may be taken, devastating accidents can happen. Special care should be taken to avoid fire accidents in the industrial units.

As per 2013 records, in the Virudhunagar district there are 600 fireworks units, 390 printing houses, 300 match factories. Fireworks and Match Industries are labour intensive industry in nature. It provides employment opportunities to the people in and around the Virudhunagar District considerably. The development of Fireworks, Match Industry, Printing Industry and other industries raise the standard of living of the people. But these industries suffer due to fire accidents every year. Though government and concerned authorities are taking serious steps to mitigate the fire accidents in these industries the story is still continuing. Last decade 2003 to 2013 saw 282 persons getting killed in accidents at various cracker units in Sivakasi which are run as a cottage industry. 186 fatal accidents were reported from Sivakasi during the last 10 years. Fire accidents are common for fireworks, match and for other industries like paper, oil, polythene, cottage, plastic and the like. The awareness level of the employees of these industries is also one of the major reasons for fire accidents in the study area. Employees switch over from one job to another job, and one industry to another industry without gaining full knowledge about the nature of work and the processes involved in it. In fireworks and match industry the production operations are more complex, risky and chemical based.

So the researcher has undertaken the study entitled "Fire Accidents in Virudhunagar District – A Study on Community Participation and Public Awareness" with the objective of measuring the awareness level of the employees of these industries and finding the ways to mitigate the fire accidents and their impact such as loss of business, loss of property and human loss in particular. The present research work analyses the awareness level of the employees of the major industrial units like Fireworks, Match works, Printing units and other industries about fire accidents and their participation level.

Scope of the Study: In the study area both man made and natural fire accidents occur every year. Government and responsible authorities are taking a lot of serious efforts to avoid such fire

accidents to protect the business and employees in particular. But this is continuing and more damages occur for materials and goods in the major industries namely fireworks, matches, printing, paper industry and the like in the study area. It may be due to the insufficient awareness of public about fire accidents. Hence the researcher wants to measure the level of awareness of the employees of these industries in particular and their participation level to reduce the fire accidents and the loss of goods and human beings in particular in the study area.

Objectives of the Study

1. To analyse the types of fire accidents occurred in Virudhunagar District and their impact.
2. To examine the socio economic background of the respondents and their knowledge about working place and nature of work.
3. To know the association between the socio economic profile of the respondents and their awareness and participation level towards fire accidents.
4. To measure the impact of socio economic factors and knowledge about work on awareness and participation level of the respondents.

Hypotheses

To fulfil the above objectives the researcher has framed the following hypotheses.

1. There is no significant association between the socio economic factors and awareness and participation level of the respondents towards fire accidents.
2. There is no significant association between the knowledge about nature of work and awareness and participation level of the respondents regarding fire accidents.
3. There is no significant influence of socio economic factors and knowledge about nature of work on awareness and participation level of the respondents regarding fire accidents.
4. There is no relationship between various dimensions of awareness and participation level of the respondents with regard to fire accidents.

Methodology: This section is devoted to a description of the methodology, which includes sources of data, construction of interview schedule, pilot study, sampling design, collection of data, tools of analysis and the period of the study.

The present study is descriptive and analytical in nature. Designing suitable methodology and selection of analytical tools are important for a meaningful analysis of any research problem. In the present study primary data were collected from the employees of the selected industries functioning in the study area. The terms 'public' and 'community' cover the different group of people of the society such as employers group, employees group, students' community and the like. For the present study, the researcher has selected the employees' category of selected industries which is highly affected by the fire accidents in the study area.

Sources of Data: Both primary and secondary data are used for the present study. Secondary data were collected from the various books, journals, reports, unpublished records of Department of Fire and Rescue Services, Virudhunagar Division, Tamil Nadu and various websites. Primary data were collected from the respondents selected for the present study using interview schedule.

Research Instrument: Interview schedule was used by the researcher to collect primary data. The interview schedule was designed with appropriate questions to fulfil the objectives of the study. The first part captures the socio economic profile of the respondents followed by knowledge about the working industry and their nature of work. The second part gathers details about awareness and participation level of the respondents on eight dimensions of fire accidents namely, general awareness about fire accidents, awareness about identifying the fire hazards, awareness about the people who could be at risk, awareness about control the fire hazards, awareness about emergency evacuation plan, awareness about protection during fire accidents, awareness on post fire accidents and awareness level about participation to mitigate the fire accidents. The face and content validity is finalised after making consultation with the experts. Based on their feedback, changes were made and it is found that all the items developed by the researcher in the interview schedule is having adequate validity for analysing the community participation and awareness towards fire accidents.

Pilot Study: Pilot study is important to measure whether the questions in the interview schedule are adequate to gather required data or not and fulfilling the objectives of the study. After finalizing the number of items in the research instrument using face and content validity tests, a pilot study was undertaken to assess the reliability of the variables included under the eight dimensions. Since the researcher got favourable results from the pilot study, the present study has been undertaken.

Reliability Test: The variables constructed in the interview schedule were subjected to reliability test. Cronbach Alpha test is used to measure the internal consistency of the instrument

Area of Study: The present study is conducted within the Virudhunagar District of Tamil Nadu. The main reason for choosing Virudhunagar District is that more number of fireworks, match units, printing industries and other units like chemical industry, oil industry, paper industry, polythene industry are functioning with the problem of fire accidents. Moreover the researcher is a native of the District and is familiar with local places, people and their pertinent conspicuous problems.

Sample Size: The sample size for the present study is determined by using G Power 3.1. For scientific research power (1-β err prob) 0.95 and for social science research power (1-β err prob) 0.85 is applied.

Sampling Technique: The data required for the present study is collected from 500 employees of the various industries namely fireworks, match works, printing and other industries namely paper, polythene, oil, chemical and the like. The respondents are selected by using convenient sampling technique and the employees include supervisor and foreman, involved directly in making of crackers, matches, printing works and working in the dispatch section of the respective industrial units. Number of respondents for each type of industrial unit is determined based on the number of fire accidents occurred and the possibility for fire accidents. The details of the sample selected for the present study is presented in the Table 1.3.

Details of Sample Size

Nature of Industry	**No. of Respondents**
Fireworks	200
Match works	100
Printing Industry	100
Other Industries (Paper, Oil, Polythene, Plastic, Cottage etc.)	100
Total	500

Fieldwork and Collection of data: The researcher carried out the fieldwork for collection of data. The data collection period covers from November 2012 to March 2013. The researcher has used the interview schedule (Appendix) for collection of primary data from the selected employees of the concerned industries.

Data processing: After the completion of data collection, filled up interview schedules were edited and master table was prepared to incorporate all the information available in the interview schedule. The classification and analysis of data are done through SPSS.

Tools of Analysis: Since the data are normally distributed the researcher has decided to use the parametric tools for analysis of data using SPSS.

Findings of the Study: The major findings of the study are presented in the following part.

Fire accidents occurred in Tamil Nadu: It is found that highest number of 32,284 fire accidents occurred in Tamil Nadu during 2011-2012. Total number of 2,48,603 fire accidents are recorded from 2000-2001 to 2012-2013 (upto September). In total highest number of 19,342 fire accidents are recorded in Cuddalore district followed by 16,358 fire accidents in Villupuram district, 12,523 fire accidents in Vellor district. In total lowest number of 781 fire accidents are recorded in Sivagangai District.

Property and Lives lost and saved in Fire Accidents occurred in Tamil Nadu

It is found that during the year 2007-2008, highest amount of Rs. 53.17 crores of property was lost and Rs.446.56 crores of property was saved in the fire accidents occurred in Tamil Nadu. In total Rs. 315.41 crores of property was lost and Rs. 2729.04 crores of property was saved in the fire accidents occurred in Tamil Nadu during 2002-2013.It is found that during the year 2003-2004, highest number of 249 lives were lost and 619 lives were saved.

Fire Accidents occurred in Virudhunagar District: It is found that 6216 fire accidents occurred in Virudhunagar District from 2000-2001 to 2012-2013. 1579 fire accidents occurred in various industrial units and 4637 fire accidents occurred in shopping complexes, houses and public places are occurred.

Socio Economic Profile of the respondents

1. It is found that majority (65.80 per cent) of the respondents are female.
2. It is understood that majority of the respondents (59.60 per cent) are in the age group between 31 and 45 years.
3. It is found that majority (62.20 per cent) of the respondents are married.
4. It is ascertained that majority (79.60 per cent) of the respondents are living as nuclear family.
5. It is understood that most of the respondents (24.20 per cent)studied upto secondary education in the study area.
6. It is noted that most of the respondents (39.80 per cent) are residing in urban area.
7. It is crystal clear that majority of the respondents(33.40 per cent) stay in the present location for 20 – 30 years.
8. It is obvious that majority of the respondents (30.00 per cent) have four members in their family.
9. It is clear that majority of the respondents' (75.60 per cent)monthly income is below Rs. 5,000.
10. It is understood that majority of the respondents' (54.80 per cent) monthly family income is varied between Rs.5,000 and Rs.10,000.
11. It is exciting to know that majority of the respondents (59.60 per cent) have own house.
12. It gives a regretful glance that majority of the respondents (83.60 per cent) have not interested in the insurance for their family members.
13. It is obvious that majority of the respondents (13.00 per cent)have taken policy for only one member of the family.
14. It is found that majority (179) of the respondents have not taken insurance due to lack of interest.

Warning about Fire Accidents:

15. It is found that out of 500 respondents, (335) 67.00 per cent of the respondents have warned about fire accidents.
16. It is regret to note that majority of the respondents (41.49 per cent) are not satisfied with the amount of warning given to them about fire accidents in their working industries.

Gender and Awareness about Fire Accidents – Hypothesis:"There is no difference between gender and awareness about fire accidents". Independent sample 't' test is used to test this hypothesis and it is found that male and female employees differ significantly in the awareness about fire accidents in the study area. The null hypothesis is rejected.

Nature of work and Awareness about Fire Accidents – Hypothesis:"There is no significant difference between nature of work and awareness about fire accidents" Independent sample 't' test is used to test this hypothesis and it is found that employees who are involved in hot works and not involved in hot works have same level of awareness in the important factors like awareness about emergency evacuation plan, awareness about protection during fire accidents and awareness about post fire accidents. The null hypothesis is accepted.

Employees work with materials hazardous to health and Awareness about Fire accidents - Hypothesis

"There is no significant difference between the category of employees work with materials hazardous to health and awareness about fire accidents". Independent sample 't' test is used to test this hypothesis and it is found that employees who work with materials hazardous to health and who have not work with such materials have same level of awareness in the important factors like awareness about identifying the fire hazards and awareness on

post fire accidents. The null hypothesis is accepted.

Category of employees work with flammable materials and Awareness about Fire Accidents - Hypothesis

"There is no significant difference between employees work with flammable materials and awareness about fire accidents". Independent sample 't' test is used to test this hypothesis and it is found that employees who have work with flammable materials and not work with flammable materials have same level of awareness in the factors namely awareness about identifying the fire hazards and awareness on post fire accidents. The null hypothesis is accepted.

Previous experience regarding fire accidents and Awareness about Fire Accidents - Hypothesis

"There is no difference between the previous experience of the employees regarding fire accidents and awareness about fire accidents". Independent sample 't' test is used to test this hypothesis and it is found that the employees who have previous experience and not have previous experience have same level of awareness about protection during fire accidents (0.211). The null hypothesis is accepted.

Nature of residence, Gender, Age and General awareness about Fire Accidents

"There is no significant difference between nature of residence, gender, age intersection on general awareness about fire accidents". Three way ANOVA test is used to test this hypothesis and it is found that the awareness level about fire accidents differ among the respondents when they are classified on the basis of nature of residence, gender and age intersection (p=.000). The null hypothesis is rejected.

Nature of residence, Gender, Age and Awareness about identifying the Fire Hazards - Hypothesis

"There is no significant difference between nature of residence, gender, age intersection on awareness about identifying the fire hazards". Three way ANOVA test is used to test this hypothesis and it is found that the awareness about identifying the fire hazards differ among the respondents when they are classified on the basis of nature of residence, gender and age intersection (p=.000). The null hypothesis is rejected.

Nature of residence, Gender, Age and Awareness about the people who could be at risk - Hypothesis

"There is no significant difference between the nature of residence, gender, age intersection and awareness about the people who could be at risk". Three way ANOVA test is used to test this hypothesis and it is found that the awareness about the people who could be at risk differ among the respondents when they are classified on the basis of nature of residence, gender and age intersection (p=.000). The null hypothesis is rejected.

Nature of residence, Gender, Age and Awareness about control or avoid the Fire Hazards Hypothesis

"There is no significant difference between nature of residence, gender, age intersection on awareness about control or avoid the fire hazards". Three way ANOVA test is used to test this hypothesis and it is found that the awareness about control or avoid the fire hazards differ among the respondents when they are classified on the basis of nature of residence, gender and age intersection (p=.000). The null hypothesis is rejected.

Nature of residence, Gender, Age and Awareness about Emergency Evacuation Plan - Hypothesis

"There is no significant association between nature of residence, gender, age intersection on awareness about emergency evacuation plan". Three way ANOVA test is used to test this hypothesis and it is found that the awareness level about emergency evacuation plan differ among the respondents when they are classified on the basis of nature of residence, gender and age intersection (p=.000). The null hypothesis is rejected.

Nature of residence, Gender, Age and Awareness about protection during Fire Accidents - Hypothesis

"There is no significant association between nature of residence, gender, age intersection on awareness about protection during fire accidents". Three way ANOVA test is used to test this hypothesis and it is found that the awareness about protection during fire accidents differ among the respondents when they are classified on the basis of nature of residence, gender and age intersection (p=.000). The null hypothesis is rejected.

Suggestions

The researcher has offered the following suggestions based on the above findings of the study.

1. The government should improve various facilities to the fire service department and 108 emergency services than the existing level to participate in the mitigation of fire accidents activities in the study area.
2. More number of effective training program should be organised to protect the employees from the fire accidents.
3. Awareness about fire accidents should be provided to both male and female employees equally in the fire works, match industries, printing industries and other industries.
4. Equal awareness regarding general awareness about fire accidents, awareness about identifying the fire hazards, awareness about the people who could be at risk, awareness about control or avoid the fire hazards and awareness level on participation to mitigate the fire accidents should be created to all employees without considering their nature of work.
5. General awareness about fire accidents, awareness about the people who could be at risk, awareness about control or avoid the fire hazards, awareness about emergency evacuation plan, awareness about protection during fire accidents and awareness level on participation to mitigate the fire accidents should be created among all employees without considering the use of hazardous substances in their work.
6. General awareness about fire accidents, awareness about the people who could be at risk, awareness about control or avoid the fire accidents, awareness about emergency evacuation plan, awareness about protection during fire accidents and awareness level on participation to mitigate the fire accidents should be created among employees without discriminating them based on the type of materials used.
7. General awareness about fire accidents, awareness about identifying the fire hazards, awareness about the people who could be at risk, awareness about control or avoid the fire hazards, awareness on post fire accidents and awareness level on participation to mitigate the fire accidents should be ignited to the employees without differentiating them based on their previous experience about fire accidents.
8. General awareness about fire accidents should be created among the employees equally without discriminating them based on the gender, age and nature of residence.
9. Awareness about identifying the fire hazards should be caused to the employees equally without discriminating them based on the gender, age and nature of residence.
10. Awareness about the people who could be at risk should be caused to the employees equally without discriminating them based on the gender, age and nature of residence.

Conclusion: The fire accidents occur mostly due to human error like improper chemical handling. An effective emergency management with the proper training and education for the employees may prevent or control the fire accidents considerably. The strong technical measures like alarm system, chemical handling methods, adequate fire prevention and protection systems would definitely help to reduce the accidents effectively and successfully. Safety management must be established in all the fireworks, printing, match industries and other industries. Also top management commitment to prevent fire accidents will be the important one. The results indicated that the public awareness of fire prevention and control methods are low. The results also showed that awareness of fires prevention are lower than the awareness of fire control among the public. Regarding to the potential risk of fire in the operating room, it is suggested that in order to increase awareness of public, measures like educational need assessment, training workshops on fire prevention and control methods should be implemented. Mock drills could also be organized as part of training.

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Dr .A. Joseph Xavier, Assistant Professor of Commerce,
Ayya Nadar Janaki Ammal College, Sivakasi – Tamil Nadu, India.,
spss2050@gmail.com, Mobile: 08903163683
Ms. A. Josephine Stella, Assistant *Professor of Commerce,*
SFR College for Women, Sivakasi - Tamil Nadu, India,
joseva_stelle1984@yahoo.co.in