MANAGEMENT OF MAN-MADE DISASTERS IN SECONDARY SCHOOLS IN RANCHI DISTRICT, WITH SPECIAL REFERENCE TO PREVENTION AND PREPAREDNESS

Doctoral Thesis

Submitted

In partial fulfillment of the requirements

for the award of the degree of

DOCTOR OF PHILOSOPHY

IN

MANAGEMENT

BY

SUMEET KUMAR GUPTA

Under the guidance of

Research Co-Supervisor

Dr. Sudeep Kumar
Assistant Professor
Department of Research
And Publication
Xavier Institute of Social
Service, Ranchi, Jharkhand

Research Supervisor

Prof. ORS Rao
Professor
ICFAI University
Jharkhand
Ranchi, Jharkhand

ICFAI UNIVERSITY JHARKHAND

RANCHI

August, 2018

THESIS COMPLETION CERTIFICATE

This is to certify that the thesis **"Management of Man-made Disasters in Secondary Schools in Ranchi District, with Special Reference to Prevention and Preparedness"** by Mr. Sumeet Kumar Gupta in partial fulfillment of the requirements for the award of the Degree of Doctor of Philosophy is an original work carried out by him under our joint guidance. It is certified that the work has not been submitted anywhere else for the award of any other Degree or Diploma of this or any other University. We also certify that he complied with the Plagiarism Guidelines of the University.

Research Co-Supervisor

Dr. Sudeep Kumar
Assistant Professor
Department of Research
And Publication
Xavier Institute of Social
Service, Ranchi, Jharkhand

Research Supervisor

Prof. ORS Rao
Professor
ICFAI University
Jharkhand
Ranchi, Jharkhand

Declaration of AUTHORSHIP

I declare that this research thesis titled **"Management of Man-made Disasters in Secondary Schools in Ranchi District, with Special Reference to Prevention and Preparedness"**, submitted by me in partial fulfillment of the requirements for the award of the degree of Doctor of Philosophy in Management by the ICFAI University, Jharkhand, Ranchi is my own work. It contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institutes of higher learning, except where due acknowledgment has been made in the text. I further state that I complied with the Plagiarism Guidelines of the University while preparing the thesis.

(Sumeet kumar Gupta)

ID NO. 14JU11300024

Acknowledgments

The completion of my research would not have been possible without the support of many people.

Firstly, I am thankful to the ICFAI University Jharkhand (IUJ) for enabling me to pick up my academic pursuits and giving me the opportunity to complete Ph.D work.

I thank Prof. ORS Rao, Research Supervisor, for providing encouragement throughout the research period. His review comments added value to my studies. I thank him for standing by me all through my efforts to steer towards meaningful research studies. His encouragement and guidance helped me reach the destination without getting lost.

I am grateful to Dr. Sudeep Kumar, Co-Supervisor, for providing encouragement throughout the research period. I thank him for his persistent support and constructive feedback in keeping me on track of my Ph.D journey. I thank for his inspiring comments, encouragement, regular monitoring of progress in my research and sessions to improve my research work. I consider myself very privileged to have worked under their guidance and support.

I am indebted to the Research Board of the ICFAI University Jharkhand headed by honorable Vice-Chancellor of the University that contributed in enabling a quality research by way of its suggestions in the various half-yearly progress reviews and would like to specifically thank our respected Dr. Sukanta Chandra Swain for his constant support and encouragement.

I would like to thank Dr. B. M. Singh, Dr. K. K. Nag and Dr. Hari Haran for their constant support. I would also like to thank all the staff members of ICFAI University, Jharkhand, my colleagues and my fellow research scholars for their help all throughout the journey of my Ph.D.

And Special Thanks to Dr. Sudipta Majumdar and Prof. Dr. Rumna Bhattacharya for their persistent support and constructive feedback in keeping me on track of my Ph.D journey.

I am particularly grateful to all my relatives, especially my Parents, Brother, Sister and, wife. I would not have been able to do this without their constant encouragement and support.

Last but not the least; I am extremely grateful to all my respondents for their active co-operation and participation in my research.

(Sumeet Kumar Gupta)

Date:

Place:

EXECUTIVE Summary

Man-made Disasters also termed as human-induced disasters or of anthropogenic origin are man-made events, of sudden or progressive nature, which impact the affected community adversely. School students suffer mostly from various types of disasters, whether naturally occurring or man-made, which result in injuries, deaths, disruption of normal lives, trauma, stress and adversely affect their overall development. They are future generation citizens of the society.

School Safety is very essential, as school is the center of major academic and community activities and a system of disaster preparedness and approaches for disaster prevention can be created in case of various disasters. A disaster resilient society can be created by educating children in schools on different types of disasters and their prevention.

Disaster Management consists of two components, the preparedness to face any disaster and relief during and after any disaster. In the pre-disaster stage, efforts are made to reduce potential loses to lives and properties when disaster actually strikes.

Jharkhand is an Indian state, with 4226 Primary and Secondary schools as per data till 11/06/2018 retrieved from the official website of Education, Ranchi out of which 2369 are Government schools and 1857 are Private schools. The state has nearly 1235 secondary schools which have marked differences with respect to infrastructure, and preparedness to deal with various man-made disasters.

Ranchi district houses 85 Government secondary schools affiliated to Jharkhand Academic Council (JAC) and 63 Private Secondary Schools which are approved by affiliating body namely, Central Board of Secondary Education (CBSE).

The research is designed for students of secondary schools as they can be more easily oriented and trained on the preparedness and prevention activities of disaster management than the students of kindergarten or primary schools.

Both Government and Private secondary schools of Ranchi district face major disaster threats due to manmade causes. Moreover, some additional factors like the Naxalite attacks, quality related issues in mid-day meals, safety issues in schools etc. increase the risk many fold.

Existing school safety plans need a major up gradation in strategies in the form of effective preventive measures and from conventional to the modern approach. This can be done by identifying the gaps in the existing disaster management policies and replacing it by modern approaches in disaster management. The conventional system was based on post-disaster management, rehabilitation, and relief, but the modern strategy is focused on prevention and preparedness about the incoming disaster.

This is done by early warning system, response and human resource management, the formation of a school disaster management committee and task action force with clear roles and responsibilities and monitoring of alerts given by government sites and experts would form the basis for modern strategies.

The research has been motivated by losses due to man-made disasters in schools. Children are the major sufferer of the various events of man-made disasters in terms of their lives and health. There has not been much research in the field of man-made disasters especially in Ranchi district of Jharkhand. If the students and other stakeholders know about disaster preparedness and prevention, then it would be easy to save precious lives of students as well as other stakeholders of schools.

The present study focuses on the man-made disasters that affect secondary Government and Private schools and their stakeholders such as students, teachers, non-teaching staff, parents and the overall society. The different types of man-made disasters affecting schools include building fire, road accidents, transport safety, midday meal disasters, theft, Naxalite attacks, building collapse, electrical short circuits etc.

The research compares the responses of stakeholders of schools related to the disaster preparedness and prevention as well as the perceptions and psychological behaviour of respondents for various man-made disasters in Government and Private schools in Ranchi district of Jharkhand.

The present research focuses on the qualified man-made disasters for Government and Private secondary schools. It shows their existing disaster management plans and approaches.

The Literature survey includes 30 Government reports, 10 research thesis, 09 news articles, 52 research papers, 36 books, internet sources etc. on disaster management from all over the world. The reports of Government agencies like National Institute of Disaster Management, Ministry of Home Affairs, UNICEF, UNISDR, CAG reports etc. have been referred.

It was noticed from the literature survey that there is not much research on man-made disasters in secondary schools in India. The second research gap pertains to the formulation and planning of disaster management Strategies and its implementation in Government and Private schools.

Another research gap is a comparison of Prevention and Preparedness activities in Government and Private schools in Ranchi district, with special reference to man-made disasters. The Psychological preparedness, psychological behavior aspects and response strategies of school students at the time of man-made disasters is another research gap and finally root cause analysis of man-made disasters in government and private secondary schools in Ranchi district of Jharkhand through Fish-Bone diagrams, Case-Studies, Focused-Group discussions, In-depth interview of the respondents etc. is identified as research gap.

The study is aimed at bridging the research gaps identified after a literature survey of various documents related to disaster management.

The objectives of this research are to identify the types of man-made disasters in Government and Private secondary Schools in Ranchi district of Jharkhand, to identify the possible origin sources of man-made disasters in Government and Private secondary Schools, to analyze different approaches for Prevention and Preparedness for identified man-made disasters, to collect the perceptions of the school head, students, and teachers with regard to disaster management, to analyze the Psychological behavior of School students with regard to management of man-made disasters and to analyze disaster preparedness planning for man-made disasters by parents, experts, staffs, and school management.

The present research is a qualitative study which deals with immeasurable aspects of prevention and preparedness in case of man-made disasters. The present study follows a concept of deduction which implies a process of reasoning in which conclusion is drawn from the stated objectives with the help of evidence as provided by the respondents and the case studies in the related events.

Other aspect of present study follows inductive approach of qualitative study which involves drawing conclusions about all members of community such as school management, school staffs, students etc by examining a few members of the community (a small sample) by means of conducting personal interviews with the respondents, asking open ended questions, focused group discussion etc.

The subsequent steps for the research design include asking questions to the respondents about the management of man-made disasters, collecting data from the respondents by means of questionnaire, open ended questions, case studies which were done by personal interview, recording and processing information which was done through bar diagrams for different types of man-made disasters, analyzing the information which was done through fish bone analysis for the root and cause analysis of man-made disasters, giving report or recommendations which were done by drawing conclusions from the data analysis, giving intellectual contributions from the research study about management of man-made disasters in secondary schools and highlighting limitations about the study.

The primary sources of data include primary stakeholders of schools such as school management, Principal, teaching staffs, non-teaching staffs, supporting staffs, students, disaster management experts etc. The secondary sources of data include research papers, Government reports related to disasters, Thesis related to disasters, newspapers citations, books, online reports related to various disasters related to school safety.

In order to achieve research objectives, primary data were collected using structured questionnaires. The respondents included school management head, teachers, non-teaching staff, students, parents, disaster management experts etc.

A pilot study in the line of the subject has been conducted for testing the research design as well as the feasibility of application of data collection techniques of a small sample say 2 Government schools i.e. Jawahar Navodaya Vidyalaya, Mesra, Ranchi and Kendriya Vidyalaya, Hinoo, Ranchi and 2 Private Schools i.e Cambrian Public School, Ratu, Ranchi and Taurian World School, Dundigarah in Ranchi area of Jharkhand where respondents included School head, teaching and non teaching staffs, students etc.

A sample of 5 Government schools in Ranchi district was selected include Rajkiya-Krit Utkramit Ucch Vidyalaya, Dundigarha, Kasturba High School, Kharsidag, Rajkiya-Krit Utkramit Madhya Vidyalaya, Gundu, Rajkiya-Krit Utkramit Madhya Vidyalaya, Kochbong, Rajkiya-Krit Utkramit Madhya Vidyalaya, Tupudana etc.

The sample size in Government schools includes 137 students, 15 staff members and 5 schools heads i.e. total 157 respondents out of total population size of 1513.

A sample of 5 Private schools in Ranchi district were selected include Sachidanand Gyan Bharti Model School, Kusai, ST. Xavier's School, Doranda, DAV Hehal Public School, Hehal, ST. Thomas Public School, Kathitand, Calcutta Public School, Ormanjhi .

The sample size in Private schools includes 142 students, 19 staff members and 5 schools heads i.e. total 166 respondents out of total population size of 1390.

The data items captured include details of man-made disasters that occurred in the school in last five years, the identified threats or possible sources of disasters in schools or the disaster-prone areas of the school or the disaster that can occur in future. They also included strategies, availability of infrastructure and procedures adopted by the schools for disaster management. Perceptions of the stakeholders, students, school management, faculty and non-teaching staff on various aspects were also captured. The behavior of students was analyzed in terms of psychological perspectives, stress management, panic management, disaster preparedness measures in man-made disasters, strategies for community-based disaster management planning, latest technologies for disaster preparedness and disaster preparedness planning in case of man-made disasters in government and private secondary schools in Ranchi district of Jharkhand.

An analysis of the data shows that 20% of Private Schools reported school fire while no Government School reported School fire accident in last 5 years. About 40% Private Schools reported Kitchen fire while 100% Government Schools reported Kitchen fire as a disaster prone area in their schools. About 60% Private Schools reported Electric Room while 20% Government Schools reported Electric room fire as a disaster prone area in their schools. About 60% Private Schools reported Laboratory while 40% of Government Schools reported Laboratory fire as a disaster prone area in their schools. About 20% Private Schools reported Entry-Exit while 20% Government Schools reported Entry-Exit fire as a disaster prone area in their schools. About 40% Private Schools reported Storeroom while No Government Schools reported Storeroom fire as a disaster prone area in their schools. No Private School reported Vegetation as disaster-prone area while 40% Government Schools reported it as a disaster-prone area in their schools.

Approaches taken for prevention and preparedness for man-made Disasters in Government and Private schools include Fire Drill exercises, Fire Evacuation

map, Disaster Awareness through act and plays, Training by professionals, the quality check of Mid-day meal, warning by Indian Meteorological Department etc.

The various community-based disaster management teams identified by school management include Police, Military, Fire Brigade, Dispensary, NGO and Locals as Disaster Management Team identified by school management.

Resources and Technologies used for disaster management include the Alarming system, use of Experts, monitoring using Guards and CCTV, knowledge of first aid, availability of Ambulance, the presence of doctors and nurses in Dispensary, training to all school staffs regarding firefighting, first aid treatment etc.

It was found that use of poor quality of water in preparation of midday meals leads to water-borne diseases that deteriorate the quality of health.

The study also analyzed different approaches adopted in schools of Jharkhand like Disaster Management Plan, Disaster Response Plan, Capacity Building, Training, Standard Operating Procedure, Review and update, budgeting etc.

As per the perceptions of school heads 80% Private Schools while 60% of Government Schools reported Available Resources are important for management of various man-made disasters, About 60% Private Schools while 40% Government Schools reported Training for disaster management are important for management of various man-made disasters, About 60% Private Schools while 40% Government Schools reported Alertness is important for management of various man-made disasters, About 20% Private Schools while 40% Government Schools reported First Aid are important for management of various man-made disasters, About 40% Private Schools while 40% Government Schools opined that Monitoring is important for effective management of various man-made disasters.

About 20% Private Schools and 40% Government Schools feel that review of policies is important for effective management of various man-made disasters.

Disaster response strategies suggested during the man-made disaster include alarming systems, expert's opinions, guards, first aid kit, availability of ambulance, the presence of dispensary in the school premises etc.

As per the perceptions of school students, 40.20 % students from Private Schools and 15.00% from Government Schools felt that Self help is the best way of managing a disaster effectively. Self help includes escape from disaster site, use of fire extinguisher; water resources etc for themselves and others are required for the management of man-made disasters. 29.30% Private Schools while 49.00% Government Schools felt that calling for help from others is the best for the management of man-made disasters. 30.50% Private Schools while 36.00% Government Schools reported informing Authority which includes principal, teachers, disaster management team etc. are required for the management of man-made disasters.

The psychological responses of school students during disaster phase may result in the feeling of anger towards the incident, helplessness for self and others, blame to people such as self, parents, authorities, god etc. During Post-disaster phase is over, the psychological responses of children result in Nightmares about various disasters, depression of various intensities, loss of appetite, hyperactivity and mood swings in various situations.

The stress management responses of school students during disaster phase include development of healthy food habits to provide necessary energy to the body to manage stress. Regular exercise helps a person to manage stress, deep relaxation methods include meditation, yoga etc. while prayer increases hope and optimism, manages stress through awareness of self direction.

The panic management responses of school students include making priorities what to save first whether goods, wealth or lives. The regular practice of skills like drill exercises, drowning exercises etc. to handle the panic situation.

Other responses include imagination of worst situation like any disaster where the losses could be evaluated and creates a situation that does not cause blind panic.

Strategies of the School management for disaster preparedness and prevention include mapping of various man-made disasters to calculate the effects of them on school students and creation of awareness to providing them with several alternatives by application of various approaches.

The responses of school staffs for Community Based Disaster Preparedness Plan strategies include analyzing the root causes of vulnerability to disaster, generating awareness amongst community members regarding risks involved in several types of disasters.

The responses of disaster management experts for latest technologies in disaster preparedness include remote sensing which reads and analyzes satellite images and helps in proper assessment of various disaster through graphical representation of physical location in geographic terms.

The responses of Parents for Disaster Preparedness Planning for Man-made Disasters include generation of information about various man-made disasters, strengthening of infrastructures such as buildings etc. Responses include identification of safer areas and evacuation in case of disasters, provision of food, shelter, medical aids to sufferers, and arrangement of security for the rescuers and sufferers and rescue operations for the children in various man-made disasters.

The responses to the case study related to School Fire as Man-made disaster include responses from the respondents who claim that they have all the facilities and infrastructures in their premises, but on physical verification it was found that fire extinguishers were present in the school but refilling on due date was not done in most of schools. Training to teachers and students were not given as to how fire extinguishers are used, hose pipes are used, mock fire drills etc. Fire exits are not marked in most of the schools for exit in case of fire accidents, first

aid training are not given, building codes are not followed in most of the schools which could lead to future man-made disasters of school fire in various schools.

The responses to the case study related to Transport disaster as Man-made disaster include responses from respondents who claim that they have all the preparedness for transport disaster but on physical verification it was found that schools do not take care of fitness certificates of vehicles, they don't perform the alcohol testing of drivers while some schools involve their vehicle staffs in works of gardening, painting, taking care of children etc so that they don't involve in drunken driving cases, first aid kits in schools vehicles are not up to date with all items, fire extinguishers are not refilled after due date, driving staffs are not trained, overloading is done in buses which could lead to future transport disaster.

The responses to the case study related to Mid-day meal disaster as Man-made disasters from respondents on physical verification, it was found that the kitchens of most government schools did not meet infrastructural requirements for examples hygienic condition was not maintained in kitchen, proper drainage was not present, fuel for cooking were not stored in proper way, cleanliness while preparation and serving was not maintained, pest control was not done due to which rodents, lizards etc could be seen in kitchens and chances of Mid-day meal disaster was evident in those situations.

The responses to the case study related to school building disaster as man-made disaster from respondents on physical verification, it was found that most schools were constructed in congested areas, provisions for exits were not properly designed, fire exits were not marked, fire fighting alarms were installed but they were not working, due to poor maintenance there has been incidences of falling of some portions of building over students, approval and permissions have been taken by school management on document basis. Safe points are not marked in schools as to where students should gather after any disaster. The maintenance work is not done in most of schools, cracks are seen in the walls, ceilings etc. Drainage facility is most of the schools are not up to the mark, causing seepage

and damage to the building infrastructure. In some schools the waste water and sewerage opening is on the road outside the school which may spread water and land pollution and also weakens the school building.

Suggestions for preventing school fire include arrangement of sand bags outside labs and classrooms, periodic refilling of fire extinguishers, periodic cutting of vegetation in nearby areas of schools, installation of fire alarms in laboratories, kitchen, electric rooms etc. Display of emergency contact numbers and disaster management plans in the notice boards and other prominent places of the schools also serve major help in preventing school fire as man-made disaster in schools. The periodic of the organization of expected and unexpected fire drills in schools, periodic inspection of fire exits of schools, preparation of fire exit maps by students themselves showing the route of fire exit and safety point. The periodic check of fire fighting equipments, electrical circuits etc.

Suggestions for preventing road accident include display of traffic rules on notice board and other prominent places in the schools, road safety education to children, display of emergency number and numbers of parents or guardians with students, safety audit of school routes, monitoring of students by school safety committee, formation of walking clubs with the involvement of students, parents and local people.

Suggestions for preventing transport disaster include identification of safest route for buses, alcohol testing for drivers and cleaners, fitness test for vehicles, engagement of drivers and in cleaners in works of schools such as gardening, cleaning, taking care of students etc so that they do not get involved in drinking alcohol or playing cards etc. Display of rules for riding a bus, entering a bus and exiting a bus in notice board or in school bus, periodic check of fire extinguishers, their refilling date and first aid kits could prevent transport disaster in schools.

Suggestions for preventing mid-day meal disaster include non-washing of plates with soil, using quality raw materials for cooking foods, maintenance of

cleanliness and hygiene for cooking food, regular inspection of whole procedure at a regular interval, maintenance of infrastructure for the kitchen, use of LPG in place of coal or wood log for cooking, use of fresh and pure water for cooking and drinking purpose. Use of wall painting for measures to provide safe mid-day meal could be used, maintenance of daily register about who has cooked the food and who has tasted the food before giving to children etc.

Suggestions for preventing on theft and naxalite attack as man-made disaster include the provision of regular inspection by means of CCTV with recording facility, provision of a locker in school in which valuables are kept, using of warning signs, by controlling access to the school building, watching financial statements regularly etc. The measures for preventing naxalite attacks in schools include fencing of the schools, supervision by means of CCTVs, community-based approach involving villagers, police and school safety committee.

Suggestions for preventing on school building disaster include locating schools in non-congested areas, building schools with codes, following architect's plan, taking permission with competent authorities, display of laminated blueprints of schools in prominent places of schools, maintenance of existing structures etc.

Present research work is a qualitative one, which captured the perceptions and psychological behavior of respondents. The Scope of future research could include a quantitative study taking a larger sample size so that data can be analyzed using statistical tools. Studies can be conducted in other districts of the state and in other states where most of private and Government schools are vulnerable to various manmade disasters. The research can be further extended to cover the adoption of specific technologies for better prevention of manmade disasters. Future research can also cover comparative analysis of disaster management for manmade disasters between schools of different geographical areas.

The other limitation of the present research is that the research covers only Man-made disasters that are applicable to Secondary Schools. Issues in managing man-made disasters in other types of schools like kindergarten, primary, and senior secondary schools could be different. The research does not take cover Natural disasters which are more destructive in comparison to Man-made disasters. The research is qualitative perception analysis and psychological behavior of different respondents and can be quantified with different statistical tools in the form of quantitative study.

The research work serves as value addition to the society in terms of understanding the preparedness of the school students, teachers, staffs and school heads related to the management of man-made disasters. The research work also presents the disaster management approaches adopted to respond to various disaster situations like traditional approaches, modern approaches and community-based approaches. The research work presents perception and behavior analysis of students, teachers, school staffs, parents and disaster management school heads related to causes of various man-made disasters, which can help in upgrading the existing system of disaster management.

Table of Contents

List of Tables

List of Figures

CHAPTER 1- INTRODUCTION

1.1 Overview

Man-made Disasters also termed as human-induced disasters or of anthropogenic origin is a Man-made event of sudden or progressive which impacts the affected community adversely. It is referred as emergency situation in which there is probability of loss of lives and properties due to natural or man-made causes. They disrupt the normal pattern of life, affect people, impact on social structure and wreak economic damage. In most cases of natural disasters, the hazard is directly attributable, however, Man-made disasters have a slow onset and causes are complex and sometimes may result from natural disasters. Human-induced disasters could arise from indiscriminate industrialization, overpopulation, overpopulation, use of the hazardous substance, accidents, negligence on the part of professionals, ignorance or unintentional activity (Carter, 2008).

The Hyogo Framework for Action has declared 2005-2015 while the United Nations Decade of Education for Sustainable Development has declared the decade for disaster reduction and its incorporation in education system involving the climate change as one of its major part. It aims at the promotion of "The World Disaster Reduction Campaign" and slogan of 'Disaster Risk Reduction Begins at School'. The good practices under this campaign include awareness generation in the schools for disaster preparedness, disaster prevention and generation of various approaches and strategies for making school safer (Goyet, Marti & Osorio, 2006).

The present study is divided into eight chapters starting from introduction which comprises of definitions of disaster, prevention, preparedness and description of various terminologies used in the research study, types of disasters, disaster management, disaster management acts, school safety programs, school disaster management planning, unsafe schools of Ranchi district, schools of Ranchi district facing Man-made disasters and summary including scheme of presentation of the overall study described in the chapter.

1.2 Disasters

Disaster is also described as "A catastrophic situation in which normal pattern of life or ecosystem has been disrupted and extraordinary emergency interventions are required to save and preserve lives and environment" (Pal & Ghosh, 2018).

United Nations Office for Disaster Risk Reduction (UNISDR) defines disaster as "A Disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, economic, environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins".

As per Indian Disaster Management Act 2005, Disaster is defined as "A catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made cause, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area" (DM Act, 2005).

1.3 Man-made Disasters

Man-made Disasters or Human Induced Disasters or Disasters of anthropogenic origin are sudden or progressive Man-made events which disrupt the normal pattern of life affect people, impact on social structures and also cause economic damage (Carter, 2008). In most cases of natural disasters which are sudden and intense, except for accidents, Man-made disasters have a slow onset; as the underlying cases would be growing over the period of time.

Man-made disasters could also result from natural disasters, For example, Building fire may result in the stampede. Natural disasters like droughts and floods are also related to indiscriminate industrialization, overpopulation, increased use of hazardous substances or processes, negligence etc (Lima, Borba, Pinheiro, Lima & Almeida, 2013).

Human-induced disaster could arise from the unintentional activity as poor maintenance, low quality work or human error, or from the intentional activity like sabotage, mischief, revenge, riots, mob fury, enemy attack etc. Sometimes they are related to industrial and technological causes a result of system or process malfunctioning as in case of nuclear or chemical disaster, gas leakage, explosion or fire. For example, accidents like fires, boat and road accidents, railway accidents, railway accidents, air crash etc cannot be predicted, and only after they occur they can be attended to and managed as they belong to different categories and dealt differently. Sometimes, Man-made disasters are the results of system or process malfunctioning as in the case of nuclear radiation, gas leak, explosion and fire, ignorance, accidents, human-induced activities, terrorism, wars etc. System failures or accidents occur due to technical malfunction or human error and activities (Perrow, 2011).

Man-made disasters can be broadly classified as:

A. Industrial Disasters

They are caused due to malfunctions, failures, or unanticipated side effects of technological processes. Damage usually occurs in the form of explosions, fires, spills, leaks or wastes. A technological disaster may result from the toxic chemical spill, radiation fallout, explosion and fire, structural failure or transportation failure, toxic poisoning, radiation contamination, air degradation, industrial emission, water pollution etc. An example of hazardous material disaster is Bhopal Gas Tragedy of Dec 1984 which claimed over 2500 lives and affected thousands of people directly or indirectly.

B. Fires

Fire accidents may occur in slums, towns, cities, industries, coal mines, forests etc. They may be caused by electricity, careless smoking, kitchen fire, careless use of naked flames, extremist activities etc. An example of school fire in Kumbakonam, Tamil Nadu on July 16th, 2004 where over 100 students and teachers of Lord Krishna Middle School were burnt alive due to fire from the kitchen when mid-day meal for children was being cooked.

C. Environmental Disasters

They may be air pollution, water pollution due to industrial effluents, civic waste, deforestation etc is also considered as the Man-made disaster. The various causes of environmental disasters are overpopulation, industries, increased energy consumption, low environmental awareness, inadequate environmental incorporated policies etc (Chopra, 2016).

Nuclear accidents and chemical disasters also result in environmental degradation involving man, animals, crops etc.

D. Rail and Road Accidents

Human road accidents are largely urban-centric and caused by the negligence of the drivers, lack of proper road sense in the public and improper use of vehicles. The road fatalities involve mainly pedestrians and bicyclists due to increase in a large number of vehicles on roads. Rail disasters are due to breaches of tracks, human failure, equipment failure, sabotage, non-observance of section 131 of Motor Vehicle Act 1988 (Sharma, 2016).

E. Air and Sea Accidents

An air accident can occur at any phase e.g. in the air where it may be a collision or engine tear away, a wheels-up accident during the take-off, a nose-down type of accident or sabotage. Most accidents occur due to manual errors due to non-adherence of safety norms. Sea accidents occur due to machinery breakdown, overloading of the boat, poor maintenance and manual error.

F. Complex Disasters

Situations entirely due to the human element such as wars, riots, terrorism are complex Man-made disasters. Growing urbanization, high-density areas with poorly built infrastructure etc subjects the inhabitants to greater risks in the event of a disaster. Complex disasters include epidemics, fires, gas leaks, and accidents. These result from the sale of harmful drugs, banned pesticides, excessive displacements of people due to development projects, systemic failure in civic services, exploitive trade, dumping of hazardous waste products etc (Schneiderbauer, & Ehrlich, 2004).

G. Biological Disasters

A biological disaster is a disaster, which causes sickness and fatalities in human beings and animals at mass scale, when they come in contact with biological hazards in the form of living organisms, such as bacteria, virus, fungi etc. Destruction of crops and plantation also fall within the ambit of biological disasters. All communicable diseases, either of human beings or livestock are potential biological disasters. They spread widely; affect people in communities, sometimes across the geographical limits of nations (Rim, & Lim, 2014).

1.4 Disaster Management

Disaster Management may be defined as the long term process in which the possible disasters are identified, measures are taken to prevent them or approaches for their preparedness, reduction of losses in terms of lives and properties, proper response to the situation with proper rescue, relief, rehabilitation and reconstruction (DM Act, 2005).

1.5 Disaster Management Cycle

The different phases of Disaster Management cycle include the following subsections:

1.5.1 Disaster Mitigation

This phase prevents hazardous events, reduce their severity, and minimize the losses and damages. It follows maintenance of building codes for school buildings, hygienic kitchen for mid-day meal preparation; obey of traffic rule follow for traffic disasters etc. are mitigation measures as a part of disaster management strategies for disaster mitigation. Use of safety materials in school infrastructure and technologies to mitigate direct and direct losses in schools are other disaster mitigation measures.

1.5.2 Disaster Preparedness

Disaster preparedness includes identifying the possible threats, targeting the various scenarios that might get manifested by these disasters, identifying the areas which are critical or non critical when a disaster actually strikes, identifying the customers and suppliers needed to continue operation, ensuring all important contacts and links are in places, identifying the crisis management team and defining the roles and responsibilities of them (Alexander, 2014).

1.5.3 Disaster Response

Disaster response includes immediate steps taken to respond to the disaster conditions whether natural or man-made which may be pre-disaster, during disaster or post-disaster situation. The response may be evacuation of people to safer areas, use of resources to seek immediate relief and community based disaster management strategies using coordinated effects of all sections of societies and government machineries.

1.5.2.4 Disaster Recovery

It includes reconstruction of the damaged buildings and rehabilitation of people suffered at the time of various disasters. It is a long term process which involves long term planned construction and planned movement of people in order to get immediate relief. It is an important opportunity for development of the destructed buildings. It aims at social, political and economic development of the population for mid- term and long term relief.

The disaster management cycle may be described as follows:

Diagram 1.1: Disaster Management Cycle

1.6 Disaster Management Acts

1.6.1 Evolution of Disaster Management in India

The Decade of 1990 was declared as 'International Decade for Natural Disaster reduction' by the United Nations. India established a Disaster Management cell under Ministry of Agriculture after facing a series of disasters in that decade e.g. Latur earthquake in 1993, Malpa Landslide in 1994 and Odisha super cyclone in 1999. A committee was constituted in Aug 1999 to review arrangements for disaster management for various disasters and in 2002, the disaster management division of Ministry of Agriculture was shifted to Ministry of Home Affairs. Government of India finally enacted Disaster management Act on 23 Dec 2005 which laid down institutional, legal, financial measures for disaster management and coordination mechanisms of government and non-government machineries at national, state and district level so as to manage all types of disasters in Indian subcontinent.

1.6.2 Disaster Management in Jharkhand

State Disaster Management Authority was constituted in Jharkhand on May 28, 2010, by Governor of Jharkhand and called as Jharkhand State Disaster Management Authority. As per the guidelines laid down in NDMA-2005, Jharkhand has Emergency Operation Center (EOC) at the state and in all 24 districts of the state on.

1.7 School Safety Programs

1.7.1 Need for School Safety Program

School safety is a measured concern in case of school building collapse, fire accidents, and stampede etc. It is the need of an hour to have school emergency preparedness and response plan, drill practice and check plans. In the school premises, both students and staffs are present but students suffer the most in any disaster. Structural measures include construction of school as per building code, avoidance of congested areas etc while non-structural measures include creating awareness, communicating risk, preparedness plan and mitigation. The school safety program should target in promoting disaster resilient culture in school (NFPA, 2017).

A school Safety Advisory Committee headed by school management, government officials; local people including parents will help a lot in the formulation of preparedness and response plan. The School Safety Program primarily targets in promoting safety culture in school and commits to provide the safer learning environment for children and educational professionals. The objective is to promote disaster preparedness in school so as to provide disaster resilient community so as to ensure a healthy and safer future generation.

The primary strategy is to aware all stakeholders of the schools about the safety environment regarding various types of disasters (ISDR, 2007).

The practical demonstration of various disaster management activities through simulations, training, preparation of various disaster management plans etc can help a lot in attaining goals of school safety. The need for school safety program is felt to ensure a generation of future disaster managers and build a disaster resilient society. Building safe schools should be the priority for architects, engineers, administrators and emergency response planners.

1.7.2 Components of School Safety Program

The school safety program includes activities such as identifying hazards that the schools are facing, conducting various types of drills, preparation of plans involving teachers, students, parents, and others.

Students can organize mock drills, search and rescue, first aid and post-disaster counseling. The involvement of students, teachers, parents, government officials etc is very important for the success of the school safety program (IFC, 2010).

Community-based programmes can be organized by taking help of Information Education Communication materials (IEC) for generating awareness among the students and staffs. "Preparedness Month" can be observed involving all schools of that area through partner network channels to create the view of safer, secure and productive schools.

Other basic components of school safety programs are the demonstration of Disaster Risk Management to students and staffs. Identification of hazard areas such as an improper location of electrical panels, live wires, and slippery floors, structural cracks in buildings, false ceilings, heavy objects or flower pots kept on heights, toxic and hazardous chemicals in labs, obstruction in escape routes etc. Emergency plans are continuously tested and updated at least once a year on regular basis (NDMA, 2009).

Training and capacity building is the very important aspect of school safety programme and workshops can be organized on different aspects of disaster management.

1.7.3 Role of CBSE in School Safety Program

Central Board of Secondary Education (CBSE) has incorporated theoretical chapters on disaster management in the school curriculum from class VIII and IX. The curriculum includes case studies, success stories, projects, mock drills etc and awareness in the form of painting, debate, essays, skits, and exhibitions. CBSE is also conducting training programmes for teachers and students for disaster preparedness and prevention.

1.7.4 Role of GOI-UNDP Disaster Risk Management Programme

The GOI-UNDP Disaster Risk Management Programme provides the safer learning environment for children as well as educational professionals. The school safety programme includes a series of ongoing activities such as incorporation of it in the school curriculum, awareness among students, teachers, school management, parents and other sections of society (NIDM, 2010). The programme focuses on reducing the key risk elements leading to various disasters with disaster preparedness measures. The programme focuses on training and capacity building on post-disaster recovery and reconstruction.

1.8 School Disaster Management Planning

The School Disaster Management Planning shall be concise, flexible and comprehensive. The plan shall describe the decision-making process in the emergency process and derived from consultation with the school community. It includes generation of awareness amongst the stakeholders of schools, formation of committee in the school, identification of various man-made disasters in schools, preparation of disaster management plan document, training to the various stakeholders of schools, dissemination of disaster management plan to all, regular conductance of mock drills with regular review and updating the plan.

1.9 Unsafe Schools

Unsafe schools are those which interfere with the learning process. They make parents to discontinue the study of their wards in the schools while others refuse to send their kids to the schools. If the basic needs of children are not fulfilled then the school is not considered safe (NCRI, 2009).

1.9.1 Factors contributing to unsafe schools

Unsafe schools are the result of disorganized school leadership, poor resources, poor organization and poor administration. The factors which contribute to unsafe schools are individual differences which cause school violence and based on behaviors of the human. Family problems also contribute to unsafe schools as they affect the behaviour of the children. Studies show that parental neglect and lack of care, guidance etc causes the damaging effect on the youth. Cultural beliefs also play the major role in children's violent behavior and contribute to the safety of schools (NRC, 1993).

1.9.2 Achieving a Safer School

Counseling and consultation is the first step in order to achieve a safer school. Counselors provide support and counsel students at risk. They also help teachers to do group counseling of children and design courses beneficial to children. Conflict resolution is another step in achieving safer school and shall be achieved by peer mediation program. The school management shall prepare the calendar of preparedness activities for disaster management. It shall take into consideration the disability factor and gender-based needs of the community. The review of the disaster management plan and risk audit of the school management and assured by the officials can largely contribute in upgrading strategy towards the modern approach.

1.10 Schools of Ranchi district facing Man-made disasters

Schools of Jharkhand face numerous Man-made disasters such as school fire, road accidents, midday meal disasters, transport disaster, theft, Naxalite attacks, building disasters, educational excursion disasters, chemical disasters, open drain flooding etc. There are other issues like sexual abuse in schools, physical violence and mental torture in schools, medical issues of students etc.

1.10.1 School Fire

School is vulnerable to fires which can originate from natural sources such as earthquake, volcanic eruptions and lightning generated fires or Man-made fires caused by industrial/chemical accidents, laboratories, short circuits, kitchen fires, intentional causes and carelessness. School fire causes damage to properties of schools, lives of students, teachers and other staffs.

1.10.2 Road Accidents

Road accidents arise from negligence of school students in crossing highways and obeying road safety norms. Children sometimes involve themselves into games and plays in roads and get themselves hurt. School management shall include road safety in its curriculum as well as in practical exercises. After the school time is over, school staffs shall help students in crossing highways.

1.10.3 Midday meal disasters

Midday meal disasters often result from negligence and human errors, but sometimes intentionally caused. Cooking food in open spaces, unhygienic kitchens, low quality food materials etc are some of the causes of midday meal disasters.

1.10.4 Transport Disaster

High speeding school buses, rash driving, use of alcohols by driving staffs, non maintenance of school vehicles, overloading in school buses etc are the prime causes of transport disasters. They often result in destruction of school vehicles and claiming lives of students. Absence of first aid kit and responsible staffs in the buses increase the risk of disasters many folds. Untrained bus staffs, repeated use of alcohols, road and pedestrian crossing conditions, operations of buses by contractors etc increase the risk of transport disasters many fold. Conditions of signs and signals, stop signs, traffic lights, pedestrian cross-walking and crossing guards at busy crossing are safety measures. Vehicle safety, driver training and testing, use of seat belts and proper routing are important considerations.

1.10.5 Theft in Schools

Theft is also regarded as Man-made disasters as it is caused by humans and often results in more disasters. For instance, theft of lightning device from schools has led to lightning strikes in various schools and claimed many lives of students. Likewise, Theft of school alarms, CCTV cameras, fire extinguishers etc increase the risk of many disasters.

1.10.6 Naxalite Attack

Naxalite in Jharkhand target politicians and officials who attend ceremonies in schools. They attack schools in which children are killed and damage to school properties is observed. This Man-made disaster is confined to places prone to Naxalism and school students become victim of these types of disasters. Sometimes, naxalite attacks buildings of government schools in order to make the government machineries feel their presence.

1.10.7 Building Disasters

School buildings are built on certain norms failing which there is always a chance of Man-made disasters which can result in damage to properties as well as claiming lives of students.

1.10.8 Educational Excursion Disasters

Students often go to excursion trips and meet with various accidents which result into Man-made disasters. Various instances of students died in accidents while travelling, taking photos, swimming etc with friends and teachers.

1.10.9 Chemical Disasters

Laboratories in schools are major cause of disasters as they contain toxic chemicals which lead to burns, irritation, fires and sometimes loss of life. Proper handling of chemicals, apparatus, glassware etc is very essential in order to avoid any disaster in schools. Presence of First aid kit and fire extinguishers can avoid these disasters.

1.10.10 Open drain Flooding

Open drains are dangerous to small children and often result in serious accidents taking their lives. Negligence of school management and ignorance of small kids result into disasters. Many cases of open drain accidents and flooding have been reported in recent times and proper care has to be taken in order to avoid them. Sometimes, the schools direct their water outflow to outside area of school which results in accumulation of water in nearby areas and may result in open drain flooding.

1.11 Summary

The present chapter defines basic terminologies related to disasters. It also explains disasters and their types. The chapter discusses disaster management including its definition and different phases of it. The chapter describes different disaster management acts with their purpose, adoption and implementation on central, state and district level. The present chapter discusses various school safety programs initiated by Government of India and Government of Jharkhand. It discusses the need for it, components of program, role of CBSE and GOI-UNDP in the program and their implementation in various Government and private schools in Ranchi district. The chapter discusses the School Disaster Management Planning (SDMP) which involves sensitizing meeting awareness, formation of school committee, identification of various hazards, preparation of disaster plan, formation of disaster teams, dissemination of plan, conducting mock drills and evaluation of plan. The present chapter discusses about unsafe schools in Ranchi district, factors that contribute to unsafe schools and achieving a safer school. The present chapter discusses various Man-made disasters that schools of Ranchi district are facing.

CHAPTER 2- LITERATURE REVIEW

2.1 Overview

The literature has been discussed in terms of established laws in India, case studies, effective strategies, school safety measures etc. It includes existing relevant literatures surveyed that have provided the base for this research, identify the gaps and linkages to own research. Type of literature includes books, research papers, electronic sources, websites, newspapers and thesis. The literature referred has been described briefly under various subheadings with the gist of the literature and their linkage with the current study. The present chapter describes various literature sources and their details under various subheadings.

2.2 Summary of Literature Review on Disaster Management

Sl. No	Title	Type of literature	Author	Website reference	Publishing year	Gist of the article	Linkage to own research	Remarks
1	Jharkhand-National Disaster Risk Reduction Portal	Book	National Institute of Disaster Management (NIDM)		2014	State vulnerability to disasters, institutional setup and initiatives	Need for the disaster management in Jharkhand	
2	Disaster management In India	Book	Ministry of home affairs		2011	Disasters in India, institution frame work, policies and guidelines, capacity developments	Overview of the different types of disasters in India and Govt policies to face them.	

3	School Safety version 1.0	Book	Prof A S Arya, G Padmanabhan and Anup Karanth		2009	School safety programme, primary strategies and management structures	Application of disaster management in schools, its necessity and role.	
4	Indicators of Disaster risk and risk management	Book	Omar D. Cardona		2005	Various indexes related to disaster, risk management, prevalent vulnerability.	Indicators for disaster risk management and measure of various indexes.	
5	Disaster management in India -a status report	Book	Ministry of home affairs		2004	Disaster prevention, mitigation and preparedness	Current status of Govt. plans in managing disasters	
6	Extreme Weather Events in India- A Preliminary Analysis of Impacts	Research paper	Ajay Singh, Anand Patwardha, Abhijat Abhyankar, Nandlal L.Sarda		2012	Climate change and disasters in India, Addressing changes and adaptations	Strategy improvement for different types of disasters and methods.	

7	Disaster Management in Hospitals: Shifting Strategy Towards Systems Approach	Research paper	Muzaffar Ahmad, J.S. Murli		2012	System approach to address gaps in disaster management	Strategy upgradation from the conventional to modern approach in various schools.	
8	Children and Disaster Risk Reduction: Taking stock and moving forward	Research paper	Emma Back, Catherine Cameron and Thomas Tanner		2009	child-led disaster risk reduction approaches and techniques	Maintaining education during disasters and risk reduction	
9	Earthquake disaster risk management planning in schools	Research paper	Mahmood Hosseini, Yasamin O. Izadkhah		2006	Development of earthquake disaster management system for the schools.	Basis for the emergency management system for the schools.	
10	Disaster planning and management	Research paper	Holmes E. Miller, Kurt J. Engemann, Ronald R. Yager		2006	Phases of disaster management. Recovery plans.	Planning of disaster management. Emergency response at the time of disaster.	

11	Disaster Management In India	Research paper	Daya Kaul, Md. Ayaz , Lohitkumar S N		2005	Mitigation and prevention of various natural disasters in India	Approaches to tackle various disasters and development of models.	
12	Applying Management Science to Emergency Response Systems: Lessons from the Past	Research paper	Green, LV. and PJ Kolesar.		2004	Interdisciplinary approach involving management and disaster science.	Integration of management and disaster management system.	
13	Towards total disaster risk management approach	Research paper	De Guzman, E. M., & Unit		2003	Different aspects of disaster management approach	Risk management aspect of the disaster management	
14	DMD, 2011. A draft on Jharkhand State disaster Management Plan 2011.	Internet		http://www.jharkhandonline.gov.in/		Disaster risk profile of jharkhand and institutional set up.	Details about vulnerability of jharkhand to disasters and need for the plan.	

15	Disaster management department, Govt. of jharkhand	Internet		http://www.jsdmd.in/		State disaster management plan, IEC materials etc.	Need for the development of disaster management system.	
16	National institute of disaster management (NIDM)	Internet		http://nidm.gov.in/		Disaster management at national level, disaster updates etc.	NIDM periodicals gave the base for the research.	
17	National disaster management authority (NDMA)	Internet		http://www.ndma.gov.in/en/		National policy, plans, capacity building etc.	Literature source, DM organisations for the basis of research.	
18	National disaster response force (NDRF)	Internet		http://ndrfandcd.gov.in/		Concept of civil defense , home guards and fire cell in disaster management	Role during disasters and strategy development.	
19	National disaster management division (NDM)	Internet		http://www.ndmindia.nic.in/		Plans, norms, reports about disaster management, implementation.	Basis for upgradation of traditional strategy for school safety	

20	Indian meteorological dept (IMD)	Internet		http://www.imd.gov.in/		Weather forecasting, press release and alerts.	Aid to the disaster management system	

2.3 Summary of Thesis on Disaster Management

Sl. No	Title	Type of literature	Author	Publishing year	Gist of the article	Linkage to own research	Remarks
1	Safe Schools for Teaching and Learning: Developing a School-wide, Self-study Process	Thesis	Hasten Mjoni Mwale	2006	The study focused on teachers perceptions to safe school learning environment	Study design and respondent selection.	
2	Preparing for the future: Incorporating Disaster Management Education into Sri Lankan Schools	Thesis	Deborah rhea	2007	Study of disaster management education in school curriculum and teachers response.	Questionnaire design and incorporation of disaster management education	
3	The Changing Paradigm of Emergency Management	Thesis	Robert Edward Grist	2008	Study on Government policies and the	Government policies of disaster management in the	

	: Improving Professional Development for the Emergency Manager				factors making them effective, policy reform	research design.	
4	Disaster Management in India: Analysis of Factors Impacting Capacity Building	Thesis	Bala Prasad Erramilli	2008	Study on Government policies and the factors making them effective, policy reform	Government policies of disaster management in the research design.	
5	Emergency preparedness : An analysis of Iowa high school emergency preparedness plans	Thesis	Julie Marie Tigges	2008	Study on school emergency preparedness plans and policies to deal with various disasters.	Research design and questionnaire preparation. Emergency preparedness in schools and roles of different stakeholders	
6	A study on Uncertain dynamic disaster management tasks, Knowledge	Thesis	Jose Rocha	2011	Study on dynamic characteristics of disaster management tasks,	Task performance in case of disaster management and knowledge	

	sharing, and task performance				performance , knowledge sharing etc.	sharing.	
7	Assessing disaster preparedness of learners and educators in Soshanguve North schools	Thesis	Hellen Mamosegare Mamogale	2011	Disaster preparedness by learners and educators in schools for possible threats.	Disaster management education in schools and research design.	
8	Rethinking disasters: Finding efficiencies through collaboration	Thesis	Samantha C. Phillips	2012	Evaluation on processes for responding disasters and response model.	Community based disaster management in schools.	
9	School Disaster Needs for Students with Disabilities: Voices from the Field	Thesis	Jill Maria Barnes	2013	Aspects of disaster care for students with disabilities. Study on Disaster planning	Disaster management for students with disabilities, different strategies for effectiveness of	

					for schools and for governm ent.	disaster manageme nt.	
10	Disaster Management and Prevention Education for Volcanic Eruption: A Case of Merapi Area Primary Schools in Java Island, Indonesia	Thesis	Tuswad i	2014	Study on disaster managem ent in schools and preventio n education in primary schools, teacher performa nce and student achievem ents.	Developm ent of pilot studies and questionna ire preparatio n for the pilot study survey. Results and discussion s of the study.	

2.4 Summary of News Articles on Disaster Management

Sl. No	Title	Type of literature	Author	Website reference	Publishing year	Gist of the article	Linkage to own research	Remarks
1	Dainik Bhaskar	Newspaper	Correspondent		2018	Warden and two guards accused of murder of class VII boy	Security issues in schools to be addressed.	

2	Hindustan Times	Newspaper	Correspondent		2017	Class 8 student kills self after failing to complete summer vacation homework	Mental stress to be studied which results in man-made disasters.	
3	The Indian Express	Newspaper	Correspondent		2016	Murder of school boy in Sapphire International School located in Ranchi district	Man-made disasters in the form of accident/attacks or murder.	
4	The Telegraph	Newspaper	Correspondent		2015	Student's death due to lack of information by school management on diseased conditions.	School database for diseased children and special care to be taken.	
5	The Telegraph	Newspaper	Correspondent		2015	Road accidents kill many students.	Road safety features to be included.	
6	The Hindu	Newspaper	Correspondent		2013	Quality issues in mid day meals.	Safety issues in mid day meals.	
7	The Telegraph	Newspaper	Correspondent		2012	Safety issues in school bus.	Effective strategies for school bus safety.	
8	The Telegraph	Newspaper	Correspondent		2006	Road safety measures	Safety strategies to be	

						were not taken.	developed.	
9	The Hindustan	Newspaper	Correspondent		2004	School fire accident was met.	School fire plan should be developed	
10	The Hindu	Newspaper	Correspondent		2001	School safety in natural disaster like earthquake.	Infrastructure should be developed for future disasters.	
11	The Times of India	Newspaper	Correspondent		1995	School fire disaster.	Fire evacuation plan and strategies to be developed	

2.5 Summary of Learnings

The gist of the learning outcomes from literature survey described as under in following points:

- Various types of man-made disasters prevailing in the schools.
- Different accidents that are categorized under man-made disasters.
- Different research studies related to man-made disasters and disaster management.
- Research could be designed taking prevention and preparedness dimensions related to disaster management.
- Research could be designed in secondary schools as the students of secondary schools are capable of disaster management.
- Research could be designed by taking perceptions of stakeholders of schools such as school head, teaching staff, nonteaching staff and students.

2.6 Research Gap

On the basis of literature review, research gap is figured out in the research topic which is described in following points:

- A lot of studies have been conducted in similar line of research. However, there is lack of empirical and field based research on Man-made disasters in schools.
- Research gap regarding formulation and planning of disaster management Strategies and its implementation in secondary schools.
- Research gap regarding comparison of Prevention and Preparedness activities in Government and Private schools in Ranchi district, with special reference to Man-made disasters.
- Research gap in perception analysis of school heads, teaching staffs, nonteaching staff and students.

2.7 Summary

The present chapter includes literature survey over 30 Government reports, 10 research thesis, 09 news articles, 52 research papers, 36 books, 06 internet sources etc. on disaster management from all over the world. The government reports include National Institute of Disaster Management, Ministry of Home Affairs, UNICEF, UNISDR, CAG reports etc. Other sources include news articles from Ranchi district of Jharkhand, Thesis on disaster management related to school safety etc.

CHAPTER 3- RESEARCH OBJECTIVES

3.1 Overview

The chapter discusses the problem statement, research motivation, relevance of the research topic, objectives of the research study, scope of research, and data collection for the research topic. The various subheadings briefly describe the need of such study and the current scenario of the status of disaster management.

3.2 Problem Statement

Both Government and Private secondary schools in Ranchi are facing major disaster threats in the due to continuous vulnerability of various man-made disasters. Moreover some additional manmade factors increase this danger to many folds like the Naxalite attacks, quality related issues in mid day meals, safety issues in schools, non-compliance to building codes in schools etc.

Following are the problem statement or research gaps identified by the literature survey:

a) There is lack of empirical and field-based research on man-made disasters in schools in Ranchi district of Jharkhand.

b) Formulation and planning of disaster management Strategies and its implementation in Government and Private secondary Schools.

c) Comparative study of Prevention and Preparedness activities for man-made disasters in Government and Private secondary Schools.

d) Psychological preparedness, psychological behaviour aspects and response strategies of school students at the time of man-made disasters.

e) Root cause analysis of man-made disasters in government and private secondary schools in Ranchi district of Jharkhand through Fish-Bone diagrams, Case-Studies, Focused-Group discussions, In-depth interview of the respondents etc.

3.3 Research Motivation

The research has been motivated by losses in terms of lives and properties of school students and others due to manmade disasters in schools. Students are the major sufferer in the various events of manmade disasters. There is lack of field based research in manmade disasters especially in Ranchi district of Jharkhand. Disasters can be prevented by means of adequate preparedness activities and that which cannot be prevented is mitigated or responded by adequate disaster management measures. The research is motivated by the fact that if the students are aware of the disaster management measures, then they will be better prepared for the coming man-made disasters and combat with them effectively, thus save their lives as well as save the lives of fellow students and other staffs. Students are the future of the country, educating them will nourish the future generations of the country.

3.4 Relevance of Research Topic

Existing school safety plans need a major up gradation in strategies in the form of effective preventive measures and from conventional to modern approach. This can be done by identifying the gaps in the existing disaster management policies and replacing it by modern approaches in disaster management. The conventional system was based on post disaster management, rehabilitation and relief, but the modern strategy is focused on mitigation, prevention and preparedness about the incoming disaster.

Formation of a school committee and task team with clear roles and responsibilities and regular monitoring for possible hazards given by government sites and experts would form the basis for modern strategies. The school management would make a calendar of preparedness activities for disaster management, detailed version of school maps, evacuation plans and mock drills with the involvement of parents and government officials to be conducted in the school.

The task of the school management to prepare a disaster management plan document by considering the disability of students and gender based needs of the them. The periodical review of the disaster management plan and risk audit by the school management and assured by the government officials can largely contribute in upgrading strategy towards the modern approach.

There is a need of community based preventive strategies/model for handling various manmade disasters in schools. The Indigenous technologies can be upgraded and can be used with modern technologies so as to make a preparedness sense among the students and school management staffs. Manmade disasters can be prevented by paying attention to the prediction by government authorities and using the correct disaster management strategies for prevention, mitigation etc.

3.5 Research Objectives

Researches' objectives have been originated from research problem statements discussed above and they are as follows:

a) To identify the types of man-made disasters in Government and Private Secondary Schools in Ranchi district of Jharkhand.

b) To identify the sources and causes of man-made disasters in Secondary Schools.

c) To analyze different approaches for Prevention and Preparedness for identified man-made disasters in Secondary Schools.

d) To analyze the Perceptions of the school head, students, and teachers with regard to management of man-made disasters.

e) To analyze the Psychological behavior of School students with regard to management of man-made disasters.

f) To analyze disaster preparedness planning for man-made disasters by parents, experts, staffs, and school management.

3.6 Scope of Research

The scopes of this research topic covers:

- Various types of manmade disasters in Ranchi district which affect the stakeholders of Government and Private secondary Schools such as students, teachers and staffs.
- The sources and causes of manmade disasters in Secondary Schools of Ranchi district.
- Analysis of approaches for Prevention and Preparedness for qualified manmade disasters in Secondary Schools.
- Analysis of the perceptions of school head, students, teachers, disaster management experts etc.
- Analysis of psychological responses, stress management responses, panic management responses, disaster preparedness measures, disaster preparedness planning etc.

3.7 Data collection

The research topic aims at obtaining critical information about disaster management in Government schools and Private schools in Ranchi district of Jharkhand. The data are collected as primary data and is collected by survey method. The in-depth interview was conducted with the view to record responses, focused group discussion was conducted and separate sessions were conducted students in order to record psychological and behavioral responses, panic and stress management responses etc. The respondents include school management head, teachers, non teaching staffs, students, disaster management experts etc. The root cause analysis was done with the help of Fish-Bone diagrams and comparison was done between the government and private secondary schools in Ranchi district of Jharkhand. The Case-Studies were analyzed in order to draw intellectual contributions from the research study.

3.8 Summary

The chapter gives a brief idea about problem statement for the research topic, research motivation, and relevance of the research topic, research objectives, scope of research, and data collection for the research survey. The research methodology for the study is discussed in the next chapter.

CHAPTER 4- RESEARCH METHODOLOGY

4.1 Overview

The Research Methodology adopted for this study is described in following sub sections, which cover aspects like Research Type, Research Design, Sources of data, Sample Size, Sampling Methods and Techniques, Data analysis Methods, Experiences and Lessons from field study, summary etc.

4.2 Research Type

The present research is qualitative study which deals with immeasurable aspects of prevention and preparedness in case of man-made disasters in government and private schools in Ranchi district of Jharkhand. The present study attempts to trace historical events, their root causes, long term consequences and derive insightful conclusions from all of them.

The qualitative aspect of present study follows concept of deduction which implies process of reasoning in which conclusion is drawn from the stated objectives with the help of evidences as provided by the respondents and the case studies in the related events (Kumar, 2014).

Other aspect of present study follows inductive approach of qualitative study which involves drawing conclusions about all members of community such as school management, school staffs, students etc by examining a few members of the community (a small sample) by means of conducting personal interviews with the respondents, asking open ended questions, focused group discussion etc.

4.3 Research Design

Research Design is the measurement and analysis of data collected during the course of research process. The present study is designed as a set of key operational steps including identification of research problems or gaps by means of literature survey related to various types of disasters, school related disasters, disaster management in schools, perception analysis, behavioral analysis etc.

Following are the subsequent steps for the research design (Attig et al, 1989):

a) To ask questions to the respondents about the management of man-made disasters in government and private secondary schools. The structured questionnaire was designed to gather the responses from the respondents by means of personal interview.
b) To collect data from the respondents by means of questionnaire, open ended questions, case studies which were done by conducting personal interview in various government and private secondary schools in Ranchi district of Jharkhand.
c) To record and process information which was done through bar diagrams for different types of man-made disasters showing the responses separately for government and private schools.
d) To analyze the information which was done through fish bone analysis for the root and cause analysis of man-made disasters in government and private schools in Ranchi district? Comparative analysis was made between the government schools and the private schools in terms of their infrastructure and approaches for disaster management etc.
e) To give report or recommendations which were done by drawing conclusions from the data analysis, giving intellectual contributions from the research study, giving recommendations about management of man-made disasters in secondary schools and highlighting limitations about the study.

4.4 Sources of Data

The primary sources of data include primary stakeholders of schools such as school management, Principal, teaching staffs, non-teaching staffs, supporting staffs, students, disaster management experts etc. The secondary sources of data includes research papers, Government reports related to disasters, Thesis related to disasters, newspapers citations, books, online reports related to various disasters related to school safety.

Sampling refers to systematic selection of a limited number of elements out of a theoretically specified population of elements. The reason for sampling in this topic is to reduce the cost, increase accessibility to study the population and to increase the cost of data collection. The sampling design consists of following steps:

- **Pilot study**

A pilot study in the line with the objective was conducted for testing the research design as well as the feasibility of application of data collection techniques of a small sample say 2 Government schools i.e. Jawahar Navodaya Vidyalaya, Mesra, Ranchi and Kendriya Vidyalaya, Hinoo, Ranchi and 2 Private Schools i.e Cambrian Public School, Ratu, Ranchi and Taurian World School, Dundigarah in Ranchi district of Jharkhand where respondents included School head, teaching and non teaching staffs, students etc.

- **Research study**

A sample of 5 Government schools in Ranchi district were selected, which include Rajkiya-Krit Utkramit Ucch Vidyalaya, Dundigarha where total population size was 700 and respondents include 60 students, 5 Staffs and 1 school head, Kasturba High School, Kharsidag where total population size was 150 and respondents include 10 students, 2 Staffs and 1 school head, Rajkiya-Krit Utkramit Madhya Vidyalaya, Gundu where total population size was 138 and respondents include 20 students, 2 Staffs and 1 school head, Rajkiya-Krit Utkramit Madhya Vidyalaya, Kochbong where total population size was 120 and respondents include 12 students, 3 Staffs and 1 school head, Rajkiya-Krit Utkramit Madhya Vidyalaya, Tupudana where total population size was 405 and sample respondents include 35 students, 3 Staffs and 1 school head.

Total sample size in Government schools includes 137 students, 15 staff members and 5 schools heads i.e. total 157 respondents out of total population size is 1513.

A sample of 5 Private schools in Ranchi district were selected, which include Sachidanand Gyan Bharti Model School, Kusai where total population size was 150 and respondents include 30 students, 2 Staffs and 1 school head, ST. Xavier's School, Doranda where total population size was 140 and respondents include 30 students, 5 Staffs and 1 school head, DAV Hehal Public School, Hehal where total population size was 600 and respondents include 30 students, 4 Staffs and 1 school head, ST. Thomas Public School, Kathitand where total population size was 250 and respondents include 40 students, 2 Staffs and 1 school head, Calcutta Public School, Ormanjhi where total population size was 250 and respondents include 40 students, 2 Staffs and 1 school head,

Total sample size in Private schools includes 142 students, 19 staff members and 5 schools heads i.e. total of 166 respondents out of total population size is 1390.

4.5 Sample Size

The following formula was used for infinite population ('unknown') to arrive at a representative number of respondents (Godden, 2004):

Where:

SS= Sample Size for infinite population (more than 50,000)

Z = Z value (e.g. 1.96 for 95% confidence level)

P = population proportion (expressed as decimal)

[Assumed to be 0.5 (50%) since this would provide the maximum sample size]

M = Margin of Error at 5% (0.05)

Using the values of Z=1.96, P=0.5, and M = 0.05, the maximum sample size for infinite population would be 384.16 or 385.

Total number of respondents in both Government schools (157) and Private schools (166) is 323.

Table 4.1: Sample size distribution for research study on man-made disasters

Sl. No	Parameter	Population in Ranchi district			Sample selected for the study for min 95% confidence level		
		Govt.	Private	Total	Govt.	Private	Total
1	No of schools	85	63	148	5	5	10
2	No of school heads	85	63	148	5	5	10
3	No of school staff	510	320	830	15	19	34
4	No of students	1013	1070	2083	137	142	279
	Total	1608	1453	3061	157	166	323

4.6 Sampling Methods and Techniques

The sampling methods and techniques involve the following widely used methods for qualitative analysis (Kumar, 2014):

a. **Rapport establishment:** It is the process of creating the feeling of trust and confidence among the respondents during the initial visits in the field work. It involved frequent visits to the various government and private schools in Ranchi district of Jharkhand, meeting with the school management, Principal, teaching, non-teaching staffs, supporting staffs, students etc. The purpose for visiting the school, background of research, research objectives were conveyed to the respondents before the personal interview and data collection procedure. For bringing the authenticity and quality of the research work, separate sessions were conducted for the students (Young, 2003).
b. **Observation:** It is the process of scientific and systemic recording of details during the field visit which were observed through naked eyes

(Bogden, 1972). The entire process of field visits was done in secondary schools in Ranchi district of Jharkhand. The process invoves recording of activities during the course of school visit, during interview and during sessions with students.

c. **In-depth interview:** It is a process of less structured, long term discussion with the respondents with the investigator. The prepared questionnaire was taken to the various government and private schools with the view to conduct in-depth interview with the respondents. The open ended questions were asked to take all the responses in as many as sessions as required to satisfy the research questions.

d. **Case studies:** Various case studies were discussed with the respondents related to the man-made disasters in schools to provide in-depth and comprehensive insights about the experiences of the respondents about those cases within the framework of sample universe (Charlotte, 1986). It records the success or failure stories of the cases.

e. **Focused Group Discussion:** This method is used to collect information such as perceptions of various stakeholders of schools, psychological behaviour of students, stress management, panic management etc. in focused area of inquiry (Boonchalaksi, 1989). It was done in various sessions till the adequate responses were recorded.

4.7 Data analysis Methods

For successful analysis of the collected data various methods have been employed in the research study. The collected data mostly comprises of verbal notes or transcribed recordings of in-depth interviews or focused group discussions, field notes and reflective notes of the researcher during the field visits. The analysis has been done by efficient sorting, coding and filing of collected data in the pictorial form as charts and through fish bone diagrams.

The observed data were converted into concepts and later concepts were converted into relationships from which conclusions were drawn and

recommendations were given. The attempt was done to find the patterns out of data and make sense out of observations, interviews and case studies.

Following approaches were used for the data analysis (Pope et al, 2000):

a. Familiarization: The collected data, observations, case studies were studied in order to get key points, so the concept can be figured out and later relationships could be developed. Themes were developed and man-made disasters were mapped in order to get thematic analysis.

b. Identifying Thematic Framework: Key issues were identified and concepts were developed out of the collected data by which data can be examined and referenced. The aims and objectives of the research topic were mapped with the responses of the respondents.

c. Indexing: In this phase, all data were condensed to get some numerical values out of the texts obtained at the time of in-depth interviews, case studies and focused group discussion related to man-made disasters. Index heading was created and different themes were created.

d. Charting: The indexed data were rearranged according to various thematic frameworks to which they relate and charts, fish bone diagrams etc. were prepared for government and private schools showing the responses. This process required considerable amount of abstraction and synthesis of obtained raw data.

e. Mapping and interpretation: In this phase, different charts were used to define the concepts, mapping was done to draw some insightful conclusions and recommendations were given for the research study. Associations were determined for the research study and explanations were provided for various themes. The mapping and interpretation were influenced by research objectives as well as from the themes emerged from the data itself.

4.8 Experiences of Field Study and Lessons Learnt

The experiences from the field study can be summarized as the following points:

- For conducting survey in Government schools, first permission was taken from District Education Officer, Ranchi and then Director, Secondary education, Project Building, Dhurwa, Ranchi.
- For survey in Private schools, appointment was taken from the school head and then the survey was done.
- The school authorities organized a disaster management seminar in which students, teachers, non teaching staffs and students were present.
- There were separate sessions for school heads, teachers and staffs in which data was collected and documented with seal and signature of the school principal.

The lessons from the field study can be summarized in following points:

- To maintain uniformity at level of asking questions for understanding the responses, questions were first asked in English, translated in Hindi, after getting the responses again Hindi version was back translated for standardization.
- In Government schools Hindi language was used while in Private school English language was used as the private schools were English medium.

4.9 Summary

The chapter discusses the research methodology as to how data has been collected for the research topic. It discusses the research design of the present study, sources of data, sample size, tools and techniques of data collection. This chapter also discusses the experiences of the field study as well as lessons drawn from field while sampling and data collection.

CHAPTER 5 RESULTS & DATA ANALYSIS

5.1 Overview

The result and data analysis for this study is described in this chapter. Qualitative methods have been used for the data collection to measure the same phenomenon by applying different analytical tools and techniques, in depth analysis and root cause analysis. Data collected through qualitative data analysis is analyzed by means of Fish-Bone diagrams and charts have been used to compare the responses between Government and Private schools. The chapter starts by the profile of the participants and the subsequent findings from different research questions to correlate with the research topic.

5.2 Profile of Participants

5.2.1 Pilot Study Participants

The pilot study was conducted in two Government schools and two Private secondary schools in Ranchi district of Jharkhand. Principal's gender ratio is divided into male and female who participated in the study. The result shows that in Government school the gender ratio is 50% and 50% while in Private schools the gender ratio is also 50% and 50%. The other respondents include teachers from each school, students of secondary and higher secondary sections and non teaching staffs from each school including security staff and attendants, students, disaster management experts etc.

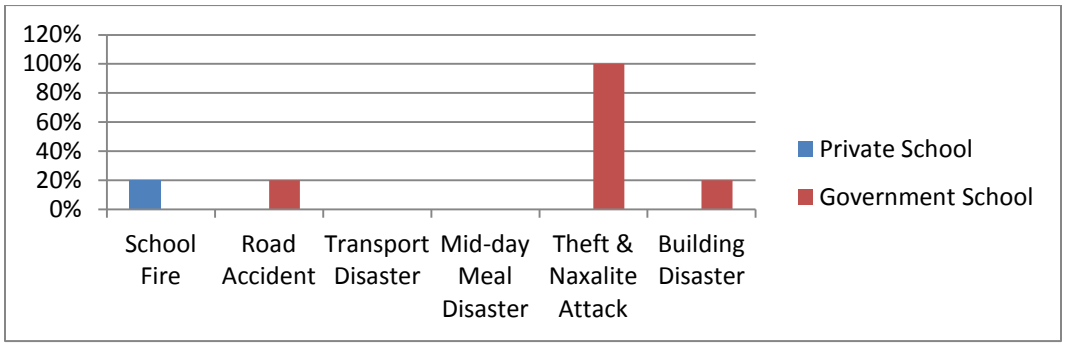
5.2.2 Research Study Participants

The research study was conducted in five Government schools and five Private schools in Ranchi district of Jharkhand. The respondents include school management heads, principals, experts, teachers from each school, students of various classes, non teaching staffs from each school including security staff and attendants. Other respondents include parents of students of Government and Private Schools in Ranchi. Data was collected through personal interview by means of personal interviews, focused group discussions and technical sessions.

5.3 Findings on Disaster Management Questions

5.3.1 Research Study Responses

Research Question: What Manmade disasters occurred in past 5 years?



X axis= Man-Made Disasters, Y axis= Responses recorded

Table 5.1: Manmade Disasters occurred in last five years

- **School Fire**: The result shows 20% Private School reported school fire while No Government School reported School fire incident in last 5 years.
- **Road accident:** No Private School reported road accident incident while 20% Government School reported road accident incident in last 5 years.
- **Transport Disaster:** No Private School reported transport disaster while No Government School reported transport disaster incident in last 5 years.
- **Mid-day meal Disaster:** No Private School reported Mid-day meal disaster while No Government School reported Mid-day meal disaster incident in last 5 years.
- **Theft & Naxalite Attack:** No Private School reported theft and Naxalite attack while 100% Government School reported theft and Naxalite attack incident in last 5 years.
- **Building Disaster:** No Private School reported building disaster while 20% Government School reported building disaster incident.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

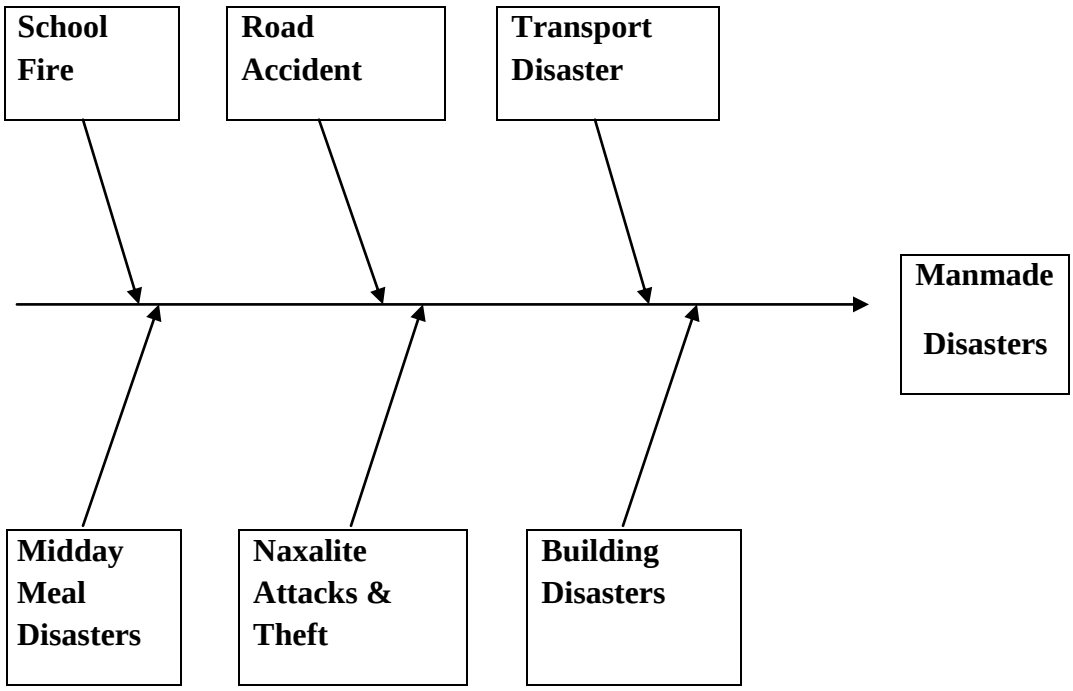


Figure 5.1: Fish Bone Analysis of Manmade Disasters in last five years

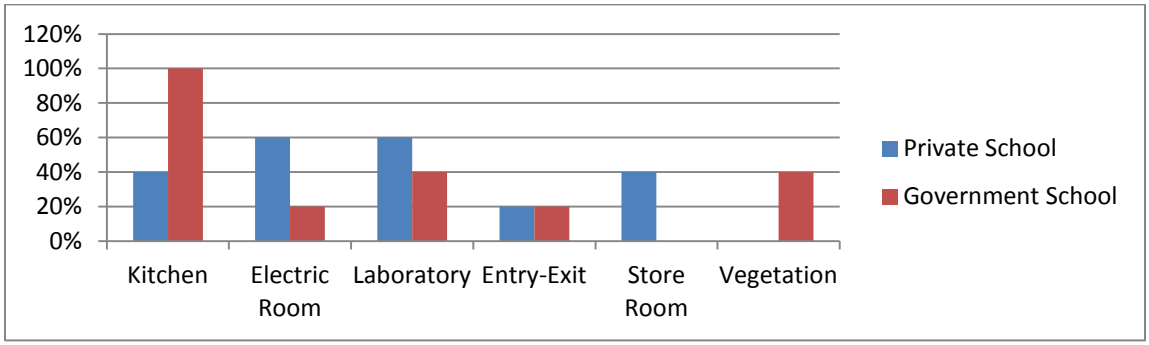
The data analysis of the research question leads to the principal causing factors of manmade disasters in schools such as school fire, road accident, transport disaster, midday meal disaster, Naxalite attack, building disaster etc.

Government schools have reported more cases of manmade disasters in their schools than the Private schools. Government schools as well as Private schools have resources and infrastructures to deal with manmade disasters. Private schools have better disaster management implementation than the government schools so that they show less incidence of manmade disasters.

Private schools are advanced in terms of technology than the government schools in terms of CCTV cameras, security guards etc. So the incidents of theft, Naxalite attacks, building disasters etc are less in Private schools. Private schools have transport facilities while Government schools have not.

Research Question: What are the disaster prone areas identified by the school management?

Result: For School Fire:



X axis= Disaster Prone Areas for School fire, Y axis= Responses recorded

Table 5.2: Disaster Prone areas for School fire identified by various school

- **Kitchen:** 40% Private School reported Kitchen while 100% Government School reported Kitchen as disaster prone area in the school.
- **Electric Room:** 60% Private School reported Electric Room while 20% Government School reported Electric room as disaster prone area in the school.
- **Laboratory:** 60% Private School reported Laboratory while 40% Government School reported Laboratory as disaster prone area in the school.
- **Entry-Exit:** 20% Private School reported Entry-Exit while 20% Government School reported Entry-Exit as disaster prone area.
- **Store room:** 40% Private School reported Store room while No Government School reported Store room as disaster prone area.
- **Vegetation:** No Private School reported Vegetation while 40% Government School reported Vegetation as disaster prone area.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

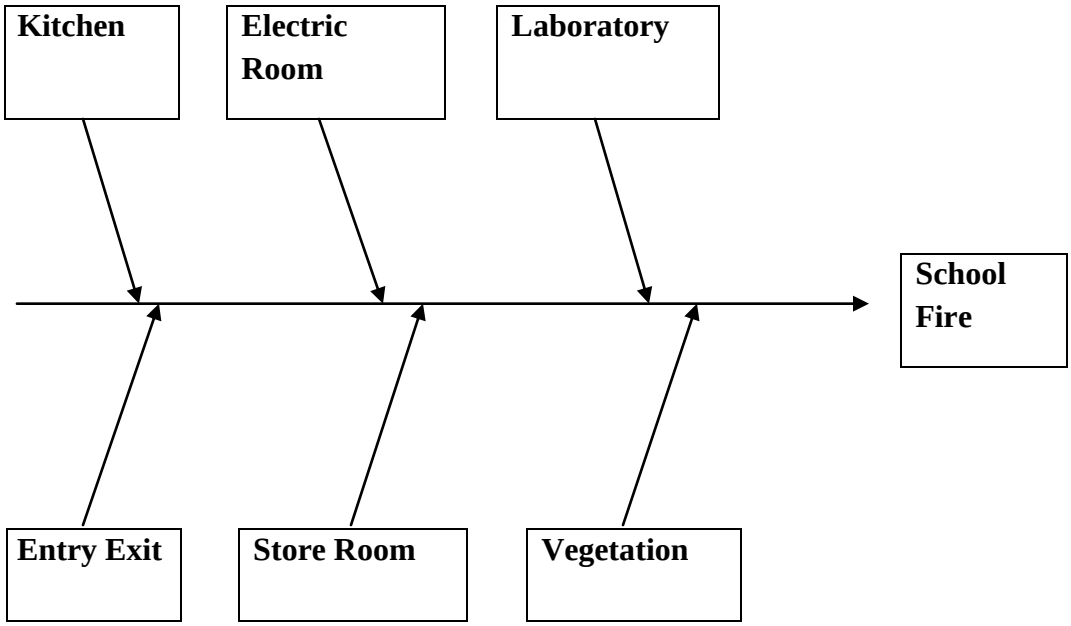


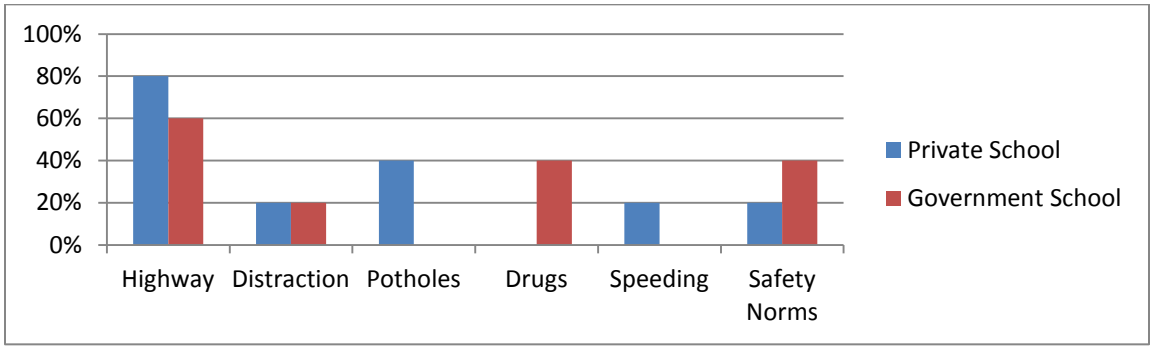
Figure 5.2: Fish Bone Analysis of Disaster prone areas for school fire

Kitchen contains many inflammable materials like LPG gas cylinders, woods, materials that easily catch fires etc. They lead to school fire incidents very easily. Short circuits in electrical circuits also lead to school fire incidents. If the electrical control rooms are not properly constructed or there are loose wires then there are chances of electrical fires.

Chemical in laboratories leads to fire incidents. Acids and certain chemicals are prone to catch fire very easily. Fumes liberated from many chemicals lead to fire incidents. Fume chambers are used in laboratories to prevent any fire accidents.

Construction of schools in congested areas, poorly constructed entry and exit system also leads to fire incidents. Safety norms in school building construction are followed in order to avoid any future disasters. Dry vegetations and bushes also cause school fire incidents in various schools. They are also disaster prone areas of school fire.

Road accident:



X axis= Disaster prone areas for Road accident, Y axis= Responses recorded

Table 5.3: Disaster Prone areas for Road accident identified by school

- **Highway:** 80% Private School reported Highway while 60% Government School reported Highway as disaster prone area for road accident identified by the school.
- **Distractions:** 20% Private School reported Distractions while 20% Government School reported Distractions as disaster prone area for road accident identified by the school.
- **Potholes:** 40% Private School reported Potholes while No Government School reported Potholes as disaster prone area for road accident identified by the school.
- **Drugs:** No Private School reported Drugs while 40% Government School reported Drugs as disaster prone area in the school.
- **Speeding:** 20% Private School reported Speeding while No Government School reported Speeding as disaster prone area for road accident identified by the school.
- **Safety Norms:** 20% Private School reported Non compliance of safety Norms while 40% Government School reported Non compliance of safety norms as disaster prone area in the school.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

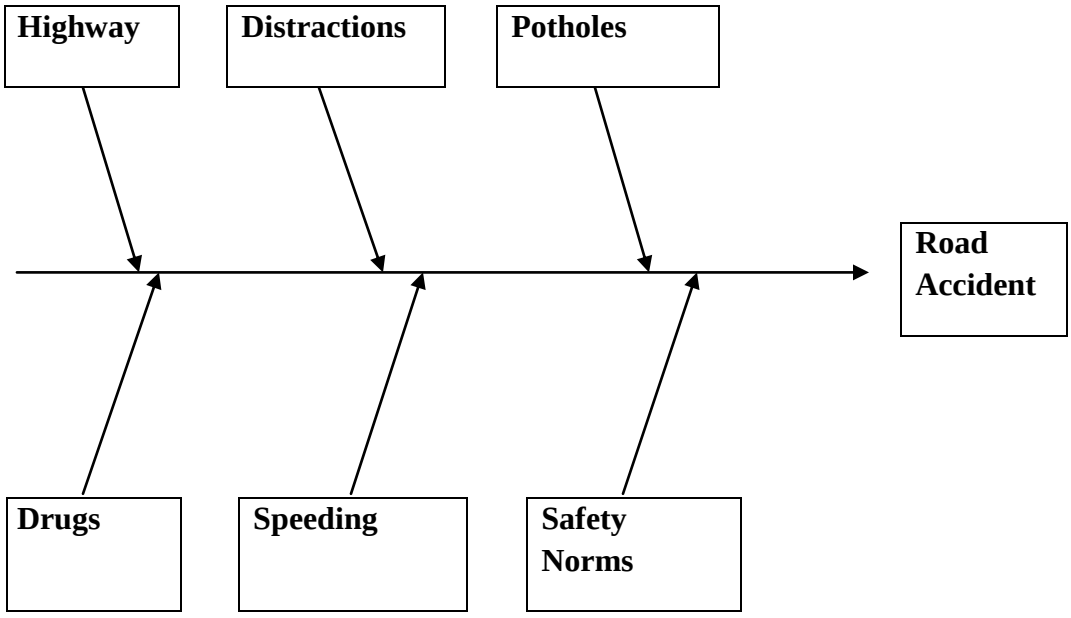


Figure 5.3: Fish Bone Analysis of Disaster Prone areas causing for Road Accidents identified by school.

Road accident is the result of nearness to highway in which students meet with accidents leading to manmade disasters. Distractions of the drivers during driving also cause road accidents. Potholes in roads cause different types of accidents in roads.

Drugs and drunken driving cause major accidents on roads as the drivers lose control over the vehicle and meet with accidents risking their lives as well as the lives of children and other staffs of schools. Over speeding is another cause for road accidents by drivers. Untrained drivers or involved in chasing or racing in roads results in fatal accidents.

The periodic checkup of school vehicles is very important in order to avoid any future mishaps. Further, not following of safety norms and traffic rules lead to road accidents.

Transport Disaster:

X axis= Disaster prone areas for Transport Disaster, Y axis= Responses recorded

Table 5.4: Disaster Prone areas for Transport Disaster identified by school

- **Safety Norms:** 20% Private School reported Safety Norms while 60% Government School reported Safety Norms as disaster prone area for Transport Disaster identified by the school.
- **Personal Errors:** 20% Private School reported Personal errors while 40% Government School reported Personal errors as disaster prone area for Transport Disaster identified by the school.
- **Malfunctioning:** 20% Private School reported Malfunctioning while 20% Government School reported Malfunctioning as disaster prone area for Transport Disaster identified by the school.
- **Traffic Rules:** 40% Private School reported Traffic rules while 20% Government School reported Traffic rules as disaster prone area.
- **Weather:** 20% Private School reported Weather while No Government School reported weather as disaster prone area for Transport Disaster identified by the school.
- **Vehicles:** 60% Private School reported Vehicles while 20% Government School reported Vehicles as disaster prone area for Transport Disaster.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

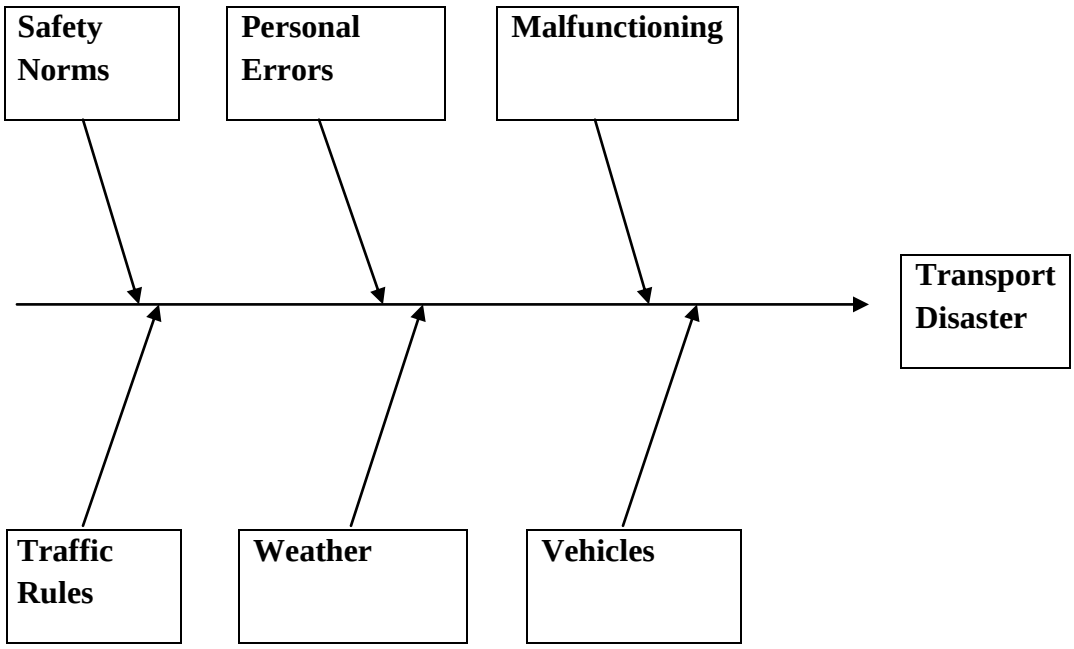


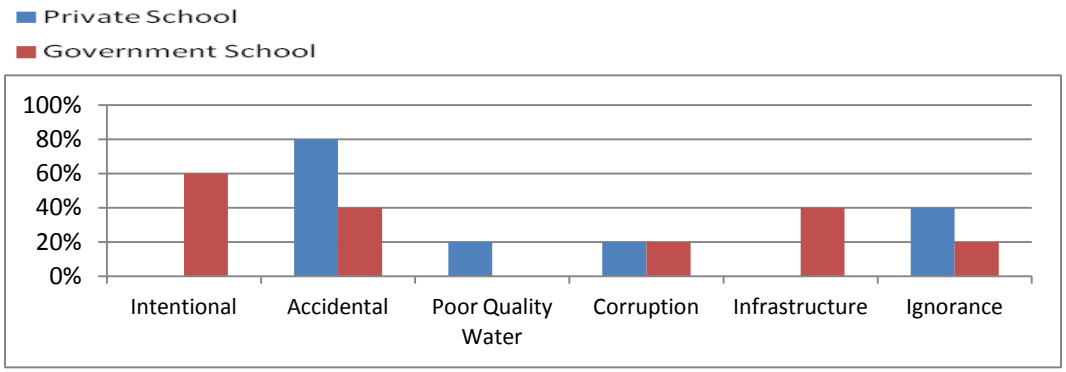
Figure 5.4: Fish Bone Analysis of Disaster Prone areas for Transport Disaster identified by school Management

Transport safety is major concern for Private schools as they provide vehicles to students and staffs while government schools do not provide such facilities. Major causes of disasters related to transport safety are due to non compliance to safety norms while using transport facilities like driving without seat belts, non availability of fire extinguishers, first aid kits in vehicles etc.

Personal errors account for majority of accidents in roads. They include over speeding, rash driving, chasing, and racing which result in fatal accidents in roads.

Malfunctioning of vehicles and their parts such as engines, brakes and other motor parts also leads to transport disasters. Non compliance to traffic rules, extreme weather conditions and ignorance like talking to somebody in mobiles, distracting while driving and accidents result in severe transport disasters and claim lives of students as well as other staffs of schools.

Mid day Meal Disaster:



X axis= Disaster prone areas for Mid-day meal disasters, Y axis= Responses recorded

Table 5.5: Disaster Prone areas for Mid-day meal disasters identified

- **Intentional:** No Private School reported Intentional while 60% Government School reported Intentional activities as disaster prone area for Mid-day meal Disaster identified by the school.
- **Accidental:** 80% Private School reported Accidental while 40% Government School reported Accidental activities as disaster prone area for Mid-day meal Disaster identified by the school.
- **Poor Quality Water:** 20% Private School reported poor quality water while No Government School reported poor quality water issues activities as disaster prone area for Mid-day meal Disaster identified by the school.
- **Corruption:** 20% Private School reported Corruption while 20% Government School reported Corruption activities as disaster prone area for Mid-day meal Disaster identified by the school.
- **Infrastructure:** No Private School reported Infrastructure while 40% Government School reported Infrastructure as disaster prone area.
- **Ignorance:** 40% Private School reported Ignorance while 20% Government School reported Ignorance activities as disaster prone area.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

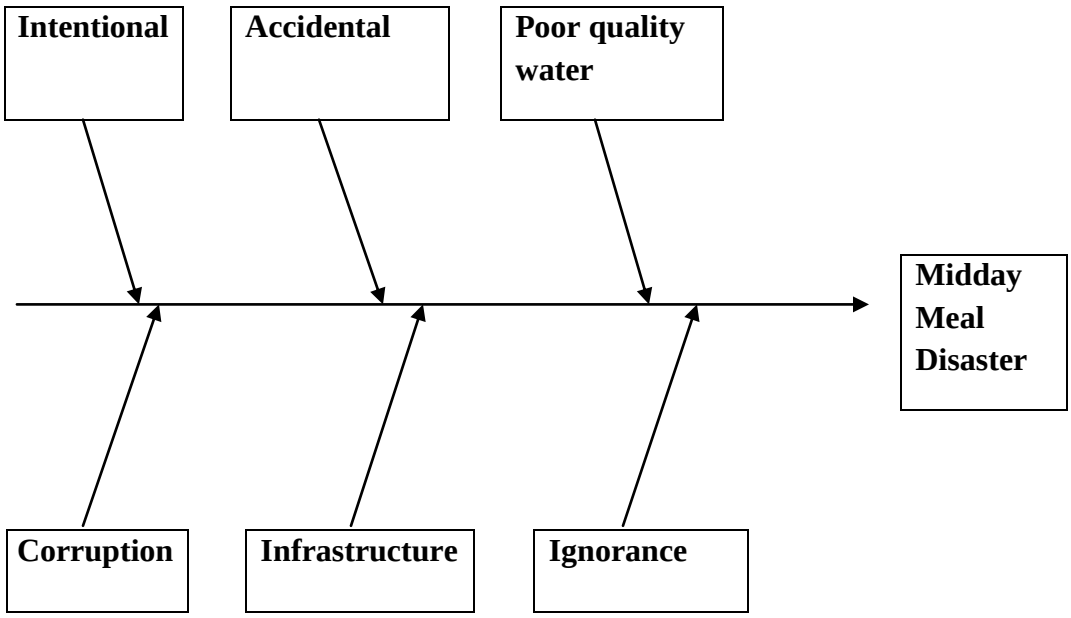
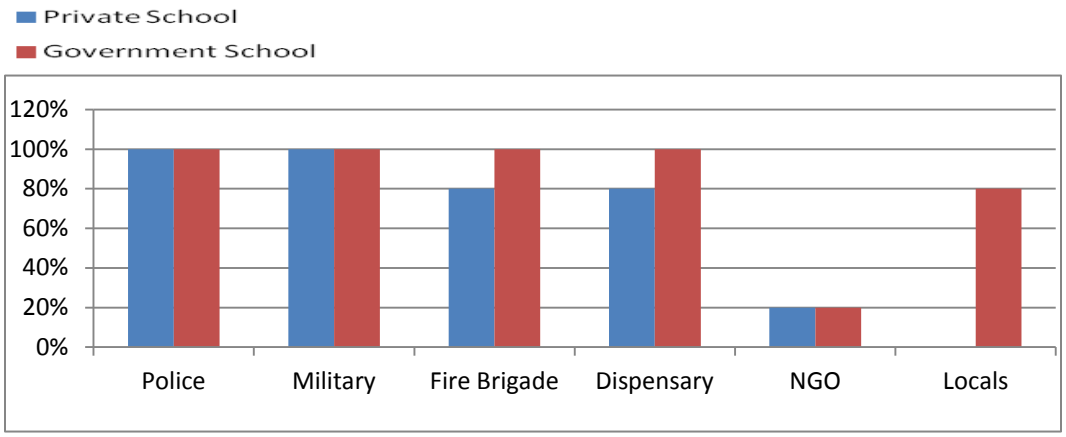


Figure 5.5: Fish Bone Analysis of Disaster Prone areas identified for Midday meal disaster by school Management

Mid day meal disasters is often reported by government schools as the Private schools do not offer mid day meal but sometimes they do run canteen or mess. The disaster is result of several causes such as gas leakage from cylinders, wooden fire, falling of lizard or any other animals into food, use of substandard or adulterated food materials in the preparation of meals, poor quality water, untrained cooks lead to mid day meal disasters etc.

Sometimes accidents lead to mid day meal disasters or ignorance in preparing meal also lead to such disasters. Mid day meals are served to all students of government schools, so any such mishap leads to bulk casualties. Incidents of corruption in purchase of substandard raw materials also lead to such disasters and improper as well as unhygienic cooking methods lead to such hazards. The use of water from ponds or local sources leads to manmade disasters.

Research Question: What is the community Based Disaster Management Teams identified by the school management?



X axis= Community based disaster management teams, Y axis= Responses recorded

Table 5.6: Community Based Disaster Management teams identified by school management

- **Police:** 100% Private School reported Police while 100% Government School reported Police as Disaster Management Team identified by school management.
- **Military:** 100% Private School reported Military while 100% Government School reported Military as Disaster Management Team.
- **Fire Brigade:** 80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade as Disaster Management Team.
- **Dispensary:** 80% Private School reported Dispensary while 100% Government School reported Dispensary as Disaster Management Team.
- **NGO:** 20% Private School reported NGO while 20% Government School reported NGO as Disaster Management Team.
- **Locals:** No Private School reported Locals while 80% Government School reported Locals as Disaster Management Team.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

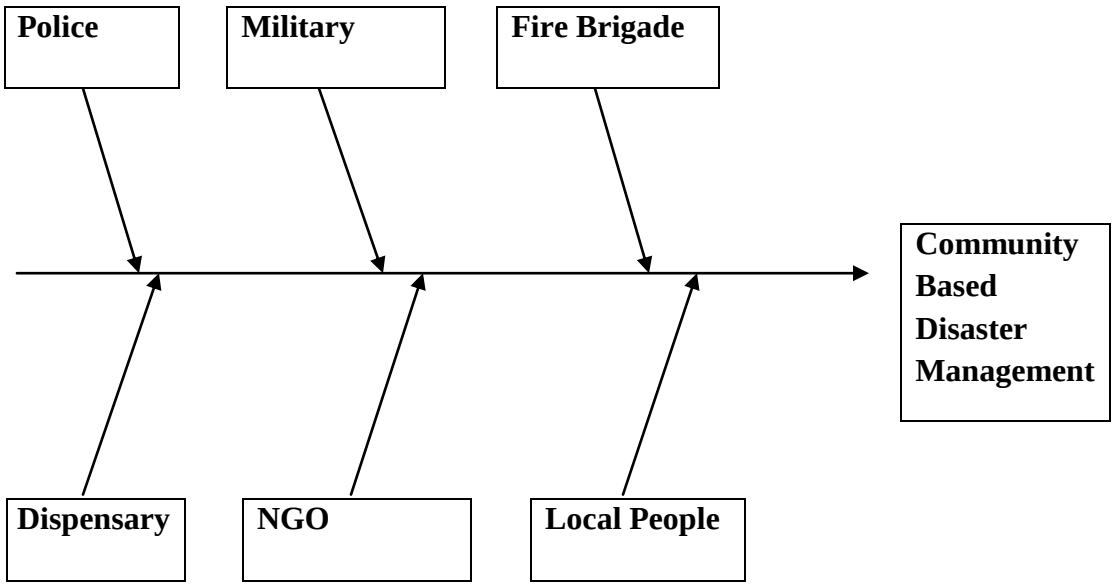


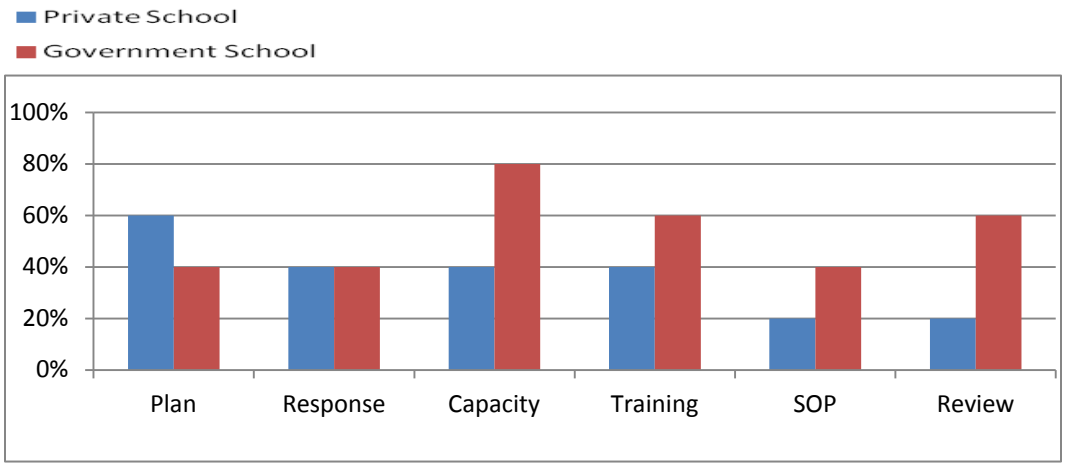
Figure 5.6: Fish Bone Analysis of Community Based Disaster Management Teams identified by school Management

Community Based Disaster Management is combined effort of all sections of society to deal with different types of disasters. This method is most effective method of disaster management as it requires involvement of all sections of society with different competencies, skills, knowledge etc. They act as link between the Government and the community. They perform various functions like distribution of relief material, ensuring sanitation and hygiene.

Community based Disaster Management organizations play important roles in disaster management especially in assistance and co-ordination. They can contribute effectively in communication with local people, arranging man power, mobilizing man power, providing technical and professional services.

The team includes police, military, Fire brigade, Dispensary, NGO and local people who work together at the time of disasters and manage them effectively.

Research Question: What are the Traditional Approaches adopted by the School management for man-made disaster?



X axis= Traditional approaches for man-made disasters, Y axis= Responses recorded

Table 5.7: Traditional Approaches adopted by school management

- **Plan:** 60% Private School reported Plan while 40% Government School reported Plan as Traditional approach adopted by school management for manmade disasters.
- **Response:** 40% Private School reported Response while 40% Government School reported Response as Traditional approach.
- **Capacity:** 40% Private School reported Capacity while 80% Government School reported Capacity as Traditional approach.
- **Training:** 40% Private School reported Training while 60% Government School reported Training as Traditional approach.
- **SOP:** 20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures as Traditional approach.
- **Review:** 20% Private School reported Review while 60% Government School reported Review as Traditional approach.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

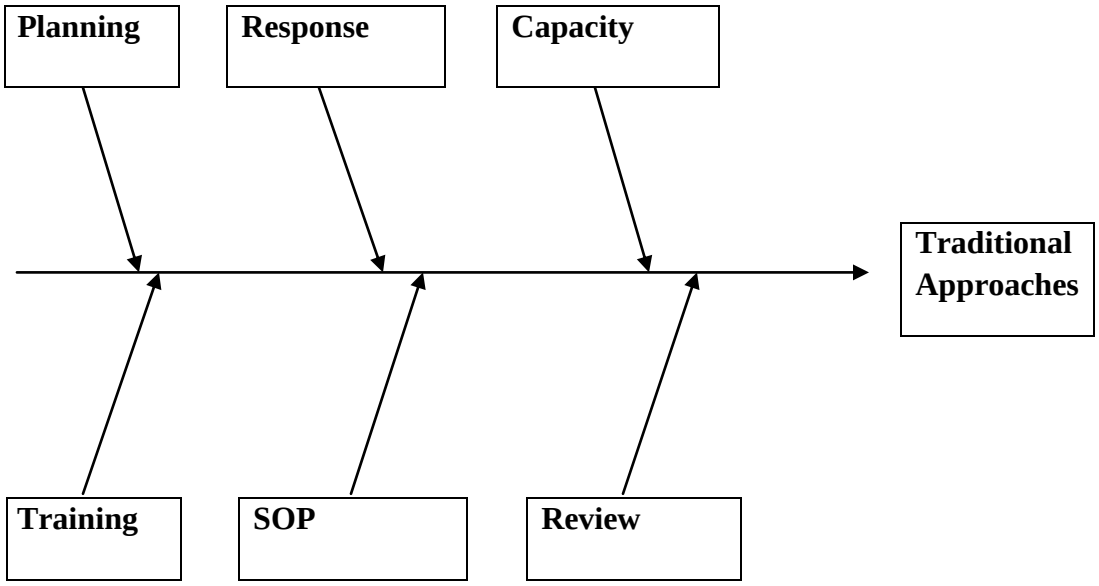
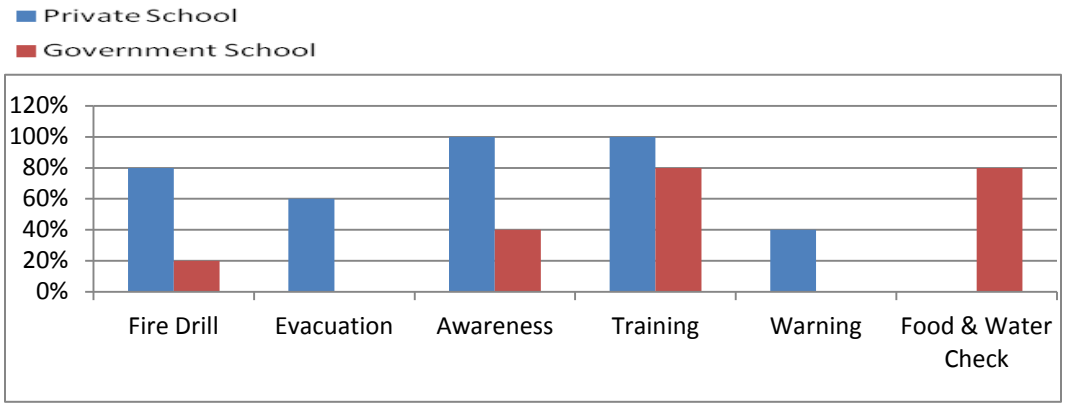


Figure 5.7: Fish Bone Analysis of Traditional approaches adopted by school Management

The traditional approaches are those which are recommended by the Government of India through their policies and acts such as Disaster Management Act, 2005. These policies are documented in the acts and reports of Ministry of Home Affairs. They include planning measures for any incoming disasters like the disaster management plan, the response guide for dealing with different disasters, the capacity building for disaster management, training materials for staffs and students, standard operating procedures during different disasters and review of the plans designed for the management of manmade disasters.

These traditional approaches are mostly followed by the government schools while some followed by the Private schools. Private schools focus on training methodology, increasing capacity and effective response measures to deal with various manmade disasters while government schools have documented plan to deal with various disasters.

Research Question: What are the Modern Approaches adopted by the school management for manmade disasters?



X axis= Modern approaches for man-made disasters, Y axis= Responses recorded

Table 5.8: Modern Approaches adopted by school management

- **Fire drill:** 80% Private School reported Fire Drill while 20% Government School reported Fire Drill as Modern approach adopted by school management.
- **Evacuation:** 60% Private School reported Evacuation while No Government School reported Evacuation as Modern approach adopted by school management.
- **Awareness:** 100% Private School reported Awareness while 40% Government School reported Awareness as Modern approach.
- **Training:** 100% Private School reported Training while 80% Government School reported Training as Modern approach adopted by school management.
- **Warning:** 40% Private School reported Warning while No Government School reported Warning as Modern approach.
- **Food & Water Check:** No Private School reported food check while 80% Government School reported food & water check as Modern approach.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

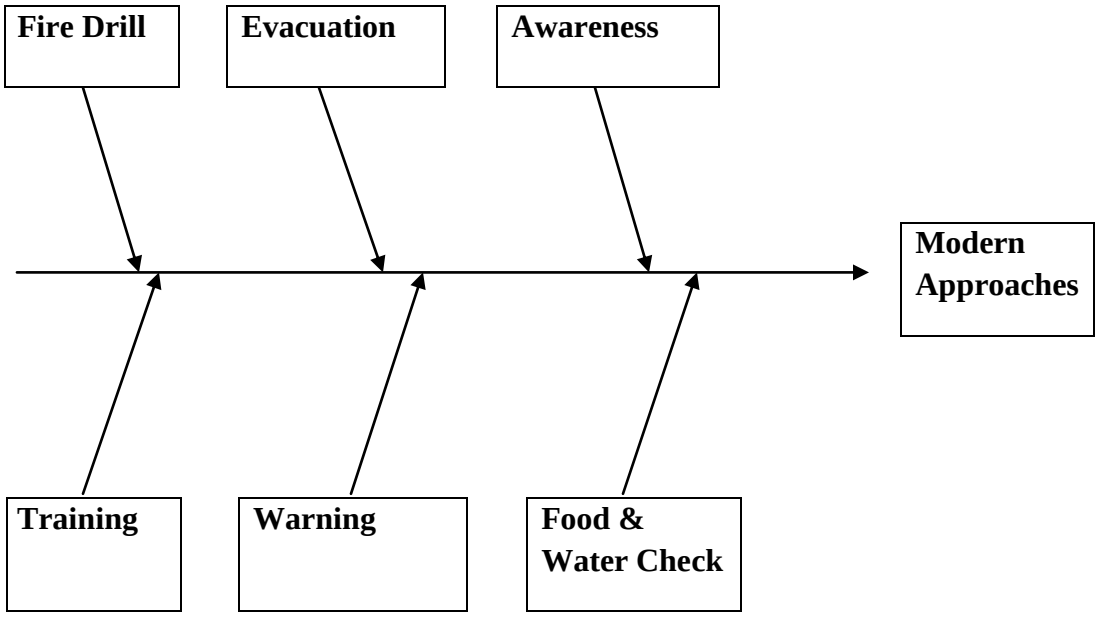


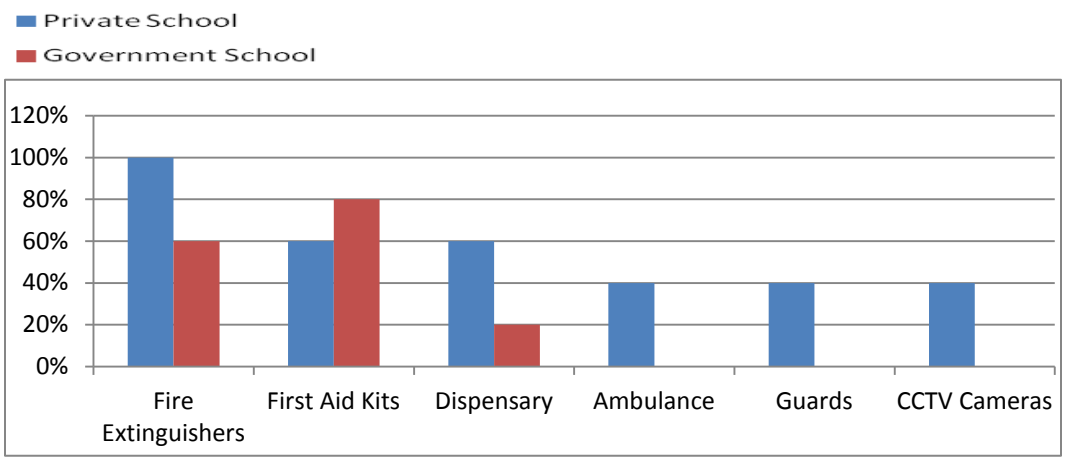
Figure 5.8: Fish Bone Analysis of Modern Approaches adopted by school Management

Modern approaches are used frequently these days in different schools so to implement disaster management with effectiveness. These approaches focus on preparedness activities so that schools would be more prepared to face any disasters.

Modern approaches include fire drill exercises, evacuation measures, awareness among the students and teachers, training among them, warning by different sources such as Indian Meteorological Department, quality check issues for prepared food and water, building condition etc. These approaches serve the purpose of disaster preparedness as well as upgrade the approaches for better response to various manmade disasters.

Many schools themselves involved in implementing modern approaches for their schools or employ technical experts from outside in order to give training.

Research Question: What are the Facilities and resources available with the school for dealing manmade disaster?



X axis= Facilities and resources available for man-made disasters, Y axis= Responses recorded

Table 5.9: Facilities and Resources available with schools for dealing Manmade Disasters

- **Fire Extinguishers:** 100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers as resources available with school for dealing Manmade Disasters.
- **First Aid Kits:** 60% Private School reported First aid kits while 80% Government School reported First aid kits as resources.
- **Dispensary:** 60% Private School reported Dispensary while 20% Government School reported Dispensary as resources.
- **Ambulance:** 40% Private School reported Ambulance while No Government School reported Ambulance as resources.
- **Guards:** 40% Private School reported Guards while No Government School reported Guards as resources available with school.
- **CCTVs:** 40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras as resources available.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

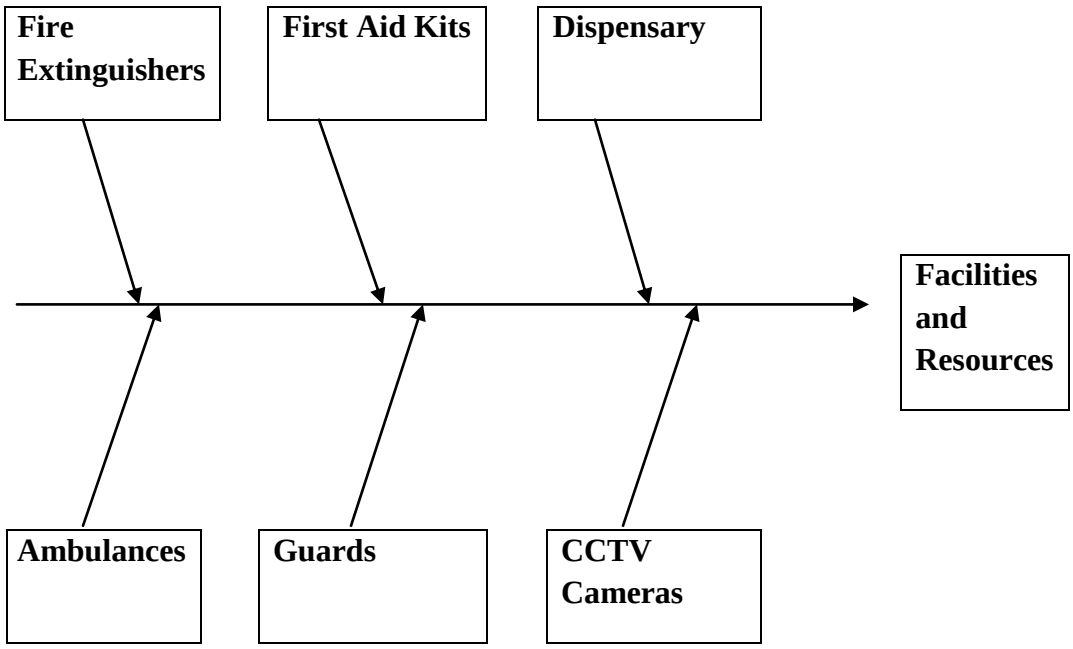


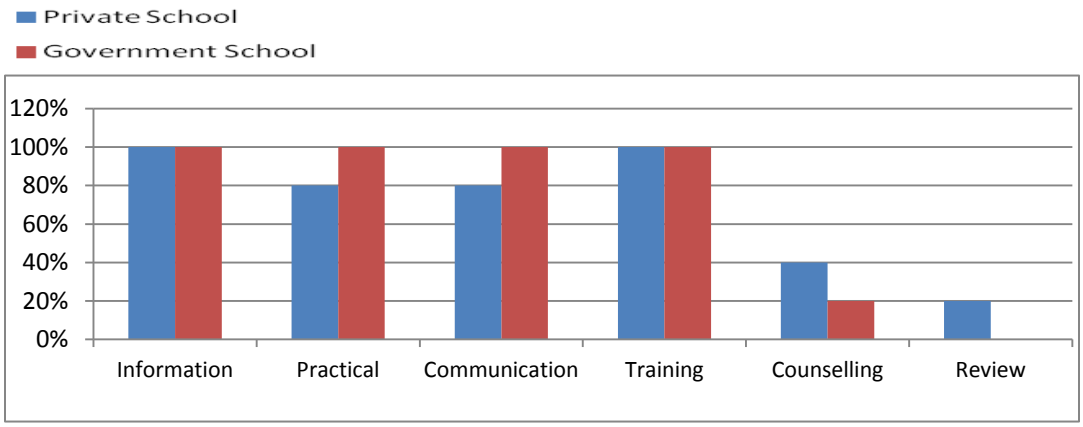
Figure 5.9: Fish Bone Analysis of Facilities and Resources adopted by school Management

Both Private and Government schools have certain facilities as well as resources to deal with various disasters. They include fire extinguishers to deal with school fire, First Aid kits to deal with minor injuries, cuts, burns etc.

Dispensaries in the premises of school serve as the major controlling centre for dealing with any type of disaster. Doctors and nurses of the dispensary control the situation and provide the disaster medicine.

Ambulances help in transportation of patients to hospitals where serious patients are attended and life support system is given if necessary. Guards provide the security against thieves, Naxalite etc and in hard times help in the evacuation of children as well as other staffs of the schools. CCTV Cameras help in continuous guarding of the activities as well as keep the record of the activities.

Research Question: Whether Syllabus of the schools should be modified for dealing with manmade disaster management?



X axis= Syllabus to be modified to deal with man-made disasters, Y axis= Responses recorded

Table 5.10: Syllabus to be modified to deal with Manmade Disasters

- **Information:** 100% Private School reported Information while 100% Government School Information reported Information to be modified in syllabus in school to deal with Manmade Disasters.
- **Practical:** 80% Private School reported Practical while 100% Government School Information reported Practical session to be modified in syllabus.
- **Communication:** 80% Private School reported Communication while 100% Government School Information reported Communication to be modified in syllabus in school to deal with Manmade Disasters.
- **Training:** 100% Private School reported Training while 100% Government School Information reported Training to be modified.
- **Counseling:** 40% Private School reported Counseling while 20% Government School Information reported counseling to be modified.
- **Review:** 20% Private School reported Review while No Government School Information reported Review to be modified in syllabus in school.

Analysis:

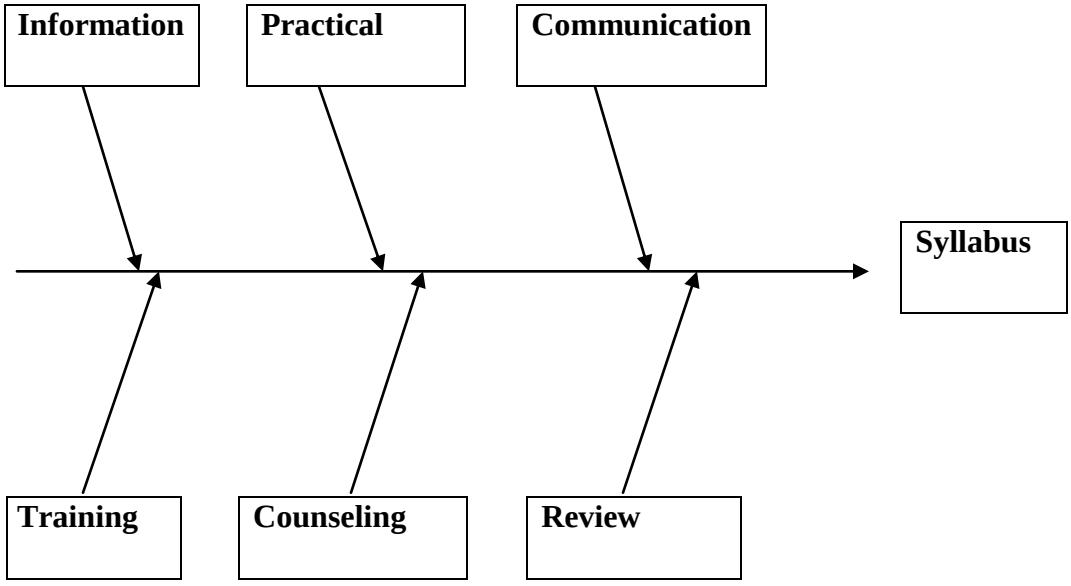


Figure 5.10: Fish Bone Analysis of Modern strategies adopted by school Management

Disaster preparedness is incorporated in schools by modifying the syllabus of the schools. The syllabus of the schools is modified in terms of information regarding different types of disasters, their occurrences and their management.

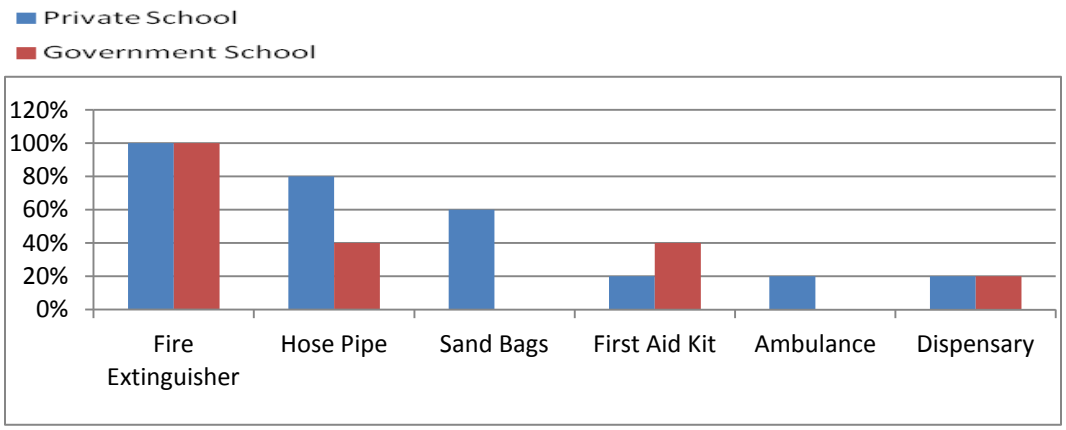
The syllabus is modified in terms of practical sessions for students preparing them for any incoming disasters. The mock drills serve as the practice session for students which could help them in real life situations responding to any disasters.

The communication measures during disasters and the proper means of communication during disasters is very effective in dealing them. The training of the students and counseling helps students to remain calm during the mishaps and handle the situations tactfully.

The periodic review of the disaster plan helps in formation of solid plan that helps in upgrading syllabus and formulation of curriculum helpful to the children and the society.

Research Question: What is the preparedness for man-made disasters by the school management?

School Fire:



X axis= Preparedness for School fire, Y axis= Responses recorded

Table 5.11: Preparedness for School Fire by School Management

- **Fire Extinguishers:** 100% Private School reported Fire extinguisher while 100% Government School reported Fire extinguisher as preparedness for school fire by school management.
- **Hose Pipes:** 80% Private School reported Hose Pipes while 40% Government School reported Hose pipe as preparedness for school fire.
- **Sand Bags:** 60% Private School reported Sand Bags while No Government School reported Sand Bags as preparedness for school fire.
- **First Aid Kits:** 20% Private School reported First Aid Kits while 40% Government School reported First Aid Kits as preparedness.
- **Ambulance:** 20% Private School reported Ambulance while No Government School reported Ambulance as preparedness for school fire.
- **Dispensary:** 20% Private School reported Dispensary while 20% Government School reported Dispensary as preparedness for school fire.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

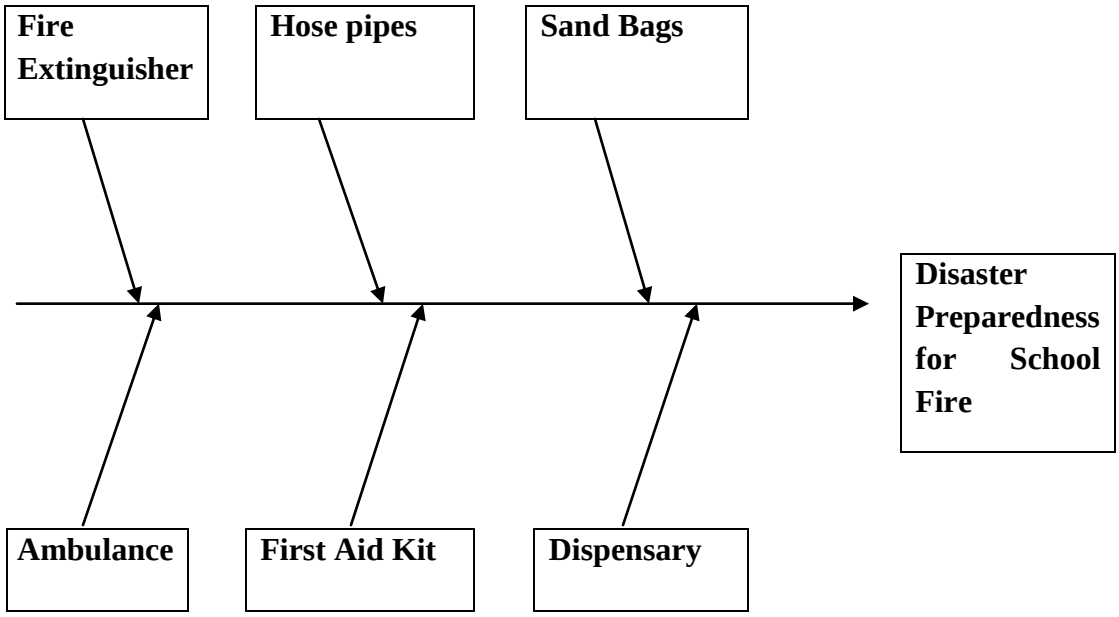


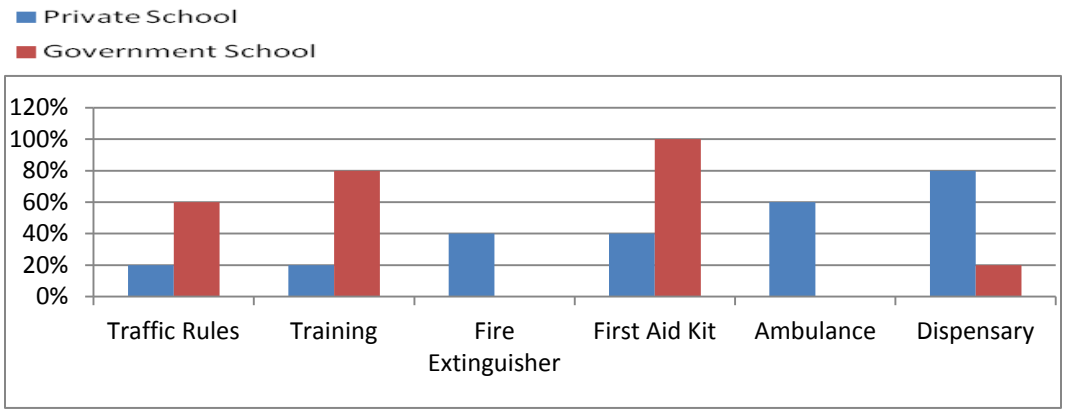
Figure 5.11: Fish Bone Analysis of Disaster Preparedness of school for School Fire

The resources available to the school for preparedness by school management for school fire includes fire extinguishers, hose pipes, sand bags, ambulance, first aid kit, dispensary etc.

Fire extinguishers are used for all types of fires but the operating hands must be trained first to operate the equipment. Teachers, supporting staffs and senior students are given training to operate the fire extinguishers and for the rest Standard Operating Procedure is displayed in public area.

Hose pipes and sand bags are also made available to the schools for fighting fires. Sand bags are used for fires caused by fuel while hose pipes are connected with water supply. Ambulance transports the victims to hospitals while first aid kits and dispensaries provide the first aid to the patients, control the severity of burning and control the situation.

Road accident:



X axis= Preparedness for Road Accident, Y axis= Responses recorded

Table 5.12: Preparedness for Road Accident by School Management

- **Traffic Rules:** 20% Private School reported Traffic Rules while 60% Government School reported Traffic Rules as preparedness for Road accident by school management.
- **Training:** 20% Private School reported Training while 80% Government School reported Training as preparedness for Road accident.
- **Fire Extinguishers:** 40% Private School reported Fire extinguisher while No Government School reported Fire extinguisher as preparedness for road accident by school management.
- **First Aid Kits:** 40% Private School reported First Aid Kits while 100% Government School reported First Aid Kits as preparedness for road accident by school management.
- **Ambulance:** 60% Private School reported Ambulance while No Government School reported Ambulance as preparedness for road accident by school management.
- **Dispensary:** 80% Private School reported Dispensary while 20% Public School reported Dispensary as preparedness for road accident.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

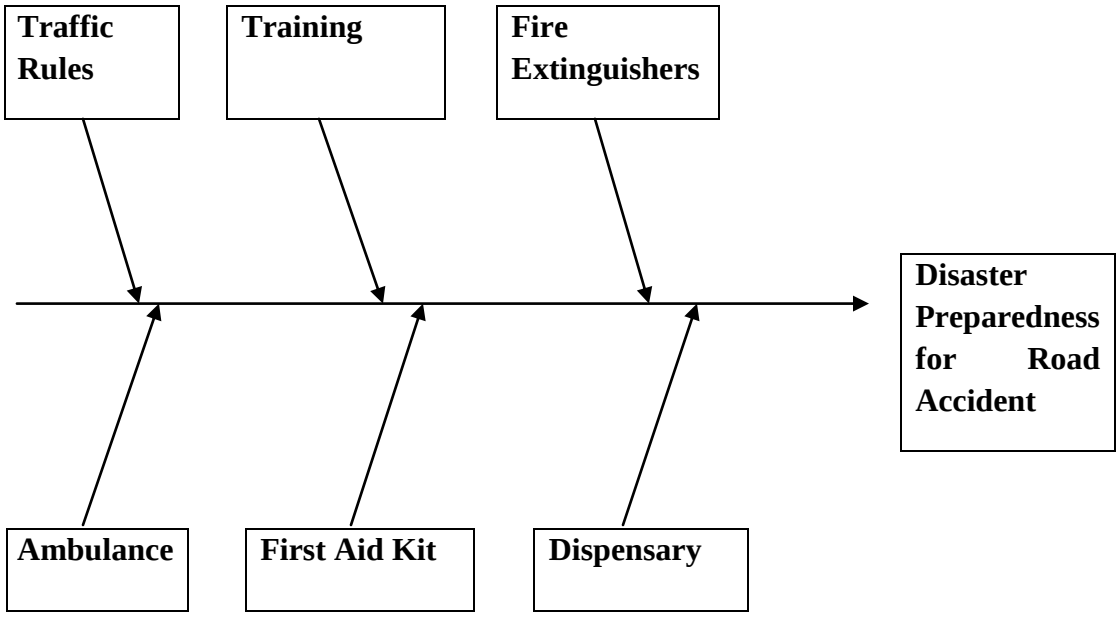


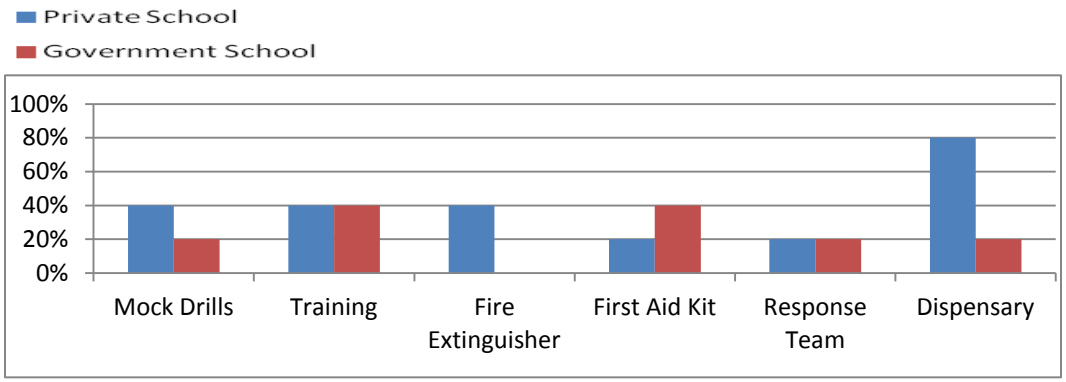
Figure 5.12: Fish Bone Analysis of Disaster Preparedness of school for Road Accident

The resources available to the schools for preparedness by school management for road accident includes ambulance, first aid kit, dispensary, fire extinguishers, training to students and supporting staffs, imparting knowledge about traffic rules to students as well as transportation staffs etc.

Knowledge of traffic rules is very important in controlling road accidents for both students as well as for transportation staffs. Proper training to them helps in controlling road accidents.

Resources include fire extinguishers which is used in case of vehicle fire or any incident igniting the risk of fires, first aid kits which is used to provide relief to the sufferers of the road accidents and dispensary where the patients are taken after road accidents, attended, treated and if necessary referred to hospitals where they could be treated better.

Transport Safety:



X axis= Preparedness for Transport Safety, Y axis= Responses recorded

Table 5.13: Preparedness for Transport Safety by School Management

- **Mock Drills:** 40% Private School reported Mock Drills while 20% Government School reported Mock Drills as preparedness for transport Safety by school management.
- **Training:** 40% Private School reported Training while 40% Government School reported Training as preparedness for Transport Safety.
- **Fire Extinguishers:** 40% Private School reported Fire extinguisher while No Government School reported Fire extinguisher as preparedness for Transport Safety by school management.
- **First Aid Kits:** 20% Private School reported First Aid Kits while 40% Government School reported First Aid Kits as preparedness for Transport Safety by school management.
- **Response Team:** 20% Private School reported Response Team while 20% Government School reported Response Team for Transport Safety.
- **Dispensary:** 80% Private School reported Dispensary while 20% Government School reported Dispensary as preparedness for Transport Safety by school management.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

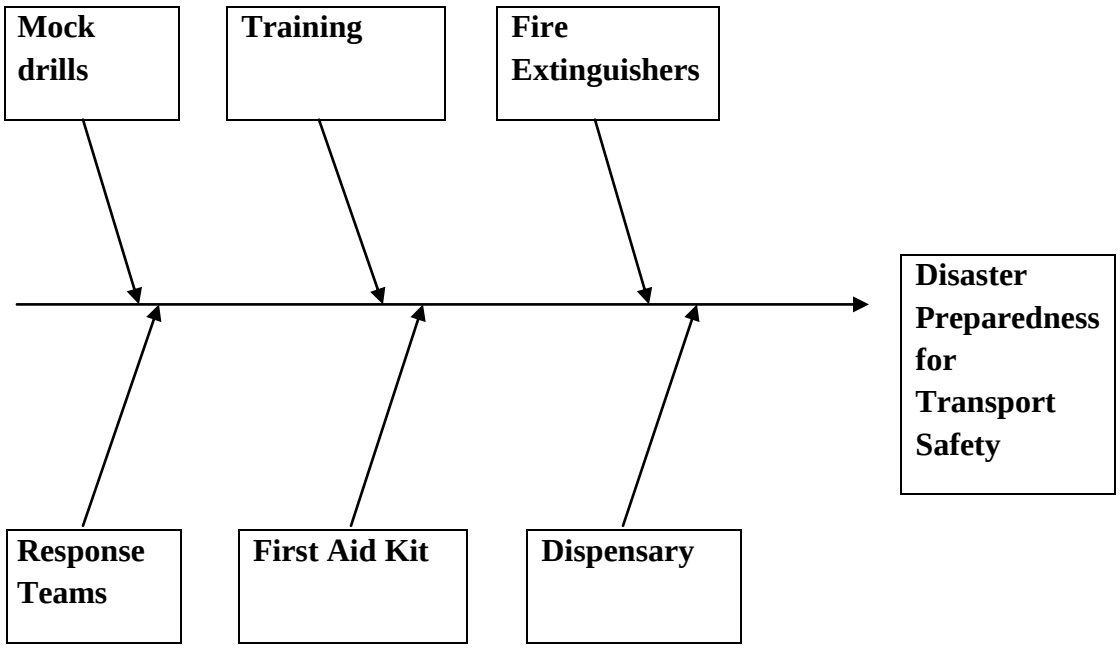


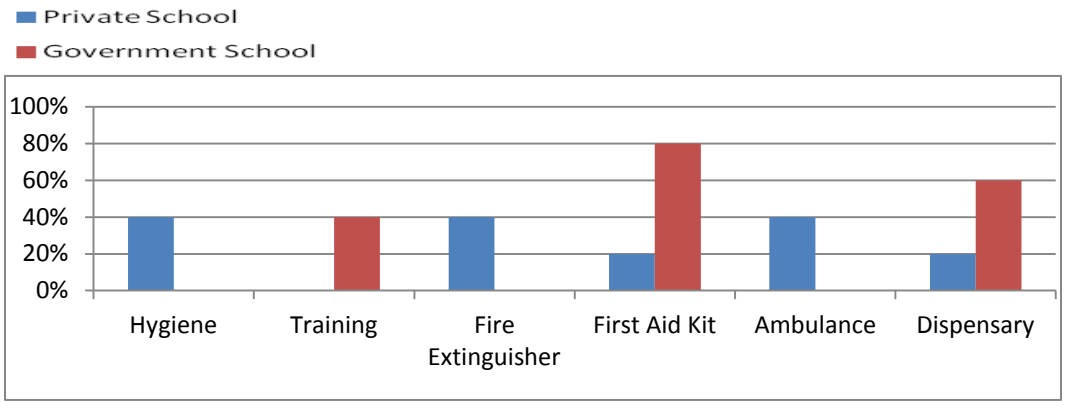
Table 5.13: Fish Bone Analysis of Disaster Preparedness of school for Transport Safety

The resources available to the schools for preparedness by school management for transport safety includes mock drills, training to students as well as support staffs, fire extinguishers, response teams, first aid kits, dispensary etc.

Mock drills to students and transportation staffs help in controlling varieties of accidents and aftereffects of the accidents. Constitution of the response team including staffs, students and other members also help in controlling the situations which lead to road accidents.

Other resources include fire extinguishers which mitigate the risks of fire to both properties as well as mankind. First aid kits provide immediate relief to the patients on the spot and dispensary in which patients are admitted immediately after accidents may be referred to hospitals if the conditions of patients worsen.

Mid day meal Disaster:



X axis= Preparedness for Mid-day meal disasters, Y axis= Responses recorded

Table 5.14: Preparedness for Mid Day Meal Disaster by School Management

- **Hygiene:** 40% Private School reported Hygiene while No Government School reported Hygiene as preparedness for Mid Day Meal Disaster by school management.
- **Training:** No Private School reported Training while 40% Government School reported Training as preparedness for Mid Day Meal Disaster by school management.
- **Fire Extinguishers:** 40% Private School reported Fire extinguisher while No Government School reported Fire extinguisher as preparedness for Mid Day Meal Disaster by school management.
- **First Aid Kits:** 20% Private School reported First Aid Kits while 80% Government School reported First Aid Kits as preparedness.
- **Ambulance:** 40% Private School reported Ambulance while No Government School reported Ambulance as preparedness.
- **Dispensary:** 20% Private School reported Dispensary while 60% Government School reported Dispensary as preparedness for Mid Day Meal Disaster by school management.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

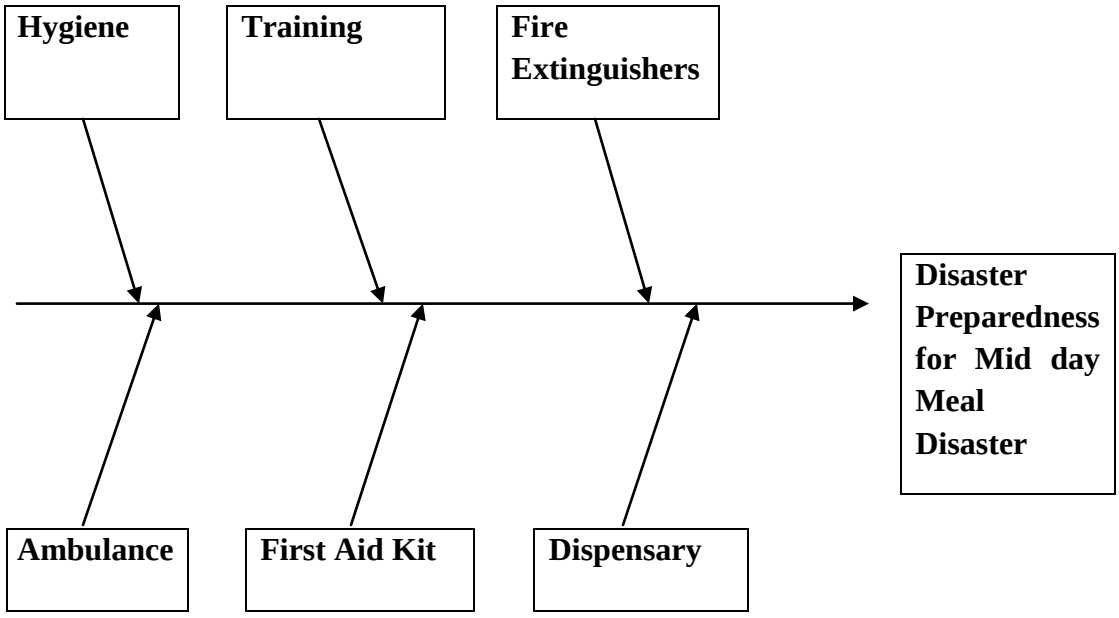


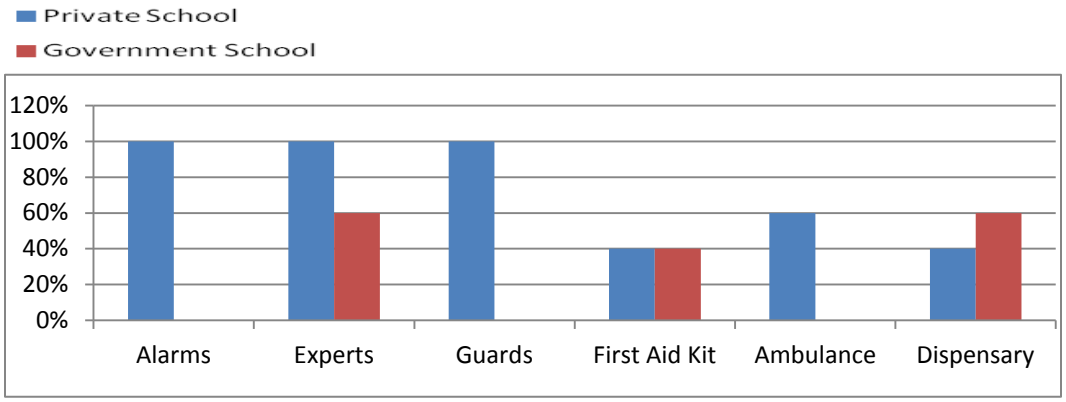
Figure 5.14: Fish Bone Analysis of Disaster Preparedness of school for Mid Day Meal Disaster

The resources available to the schools for preparedness by school management for mid day meal disaster includes maintenance of hygiene in kitchen and in area where food is serves, training to the staffs how good quality food is prepared and served to students etc.

The other resources include fire extinguishers used to control fires in kitchen and adjacent areas, first aid kits which provide immediate relief to the burning cases. Special precaution is taken for burning cases like availability of creams specialized for burning, ice packs etc.

Dispensary plays important role in controlling the situations due to burning accidents by minimizing burning sensation, stopping spread of burning area, providing cool environment to the patients and immediate relief to the patients of mid day meal disaster.

Research Question: What are the Disaster response strategies at the time of disasters?



X axis= Disaster response strategies, Y axis= Responses recorded

Table 5.15: Disaster response Strategies for Manmade Disasters

- **Alarms:** 100% Private School reported Alarms while No Government Public School reported Alarms as Disaster Response Strategies for Man Made Disasters by school management.
- **Experts:** 100% Private School reported Experts while 60% Government School reported Experts as Disaster Response Strategies for Man Made Disasters by school management.
- **Guards:** 100% Private School reported Guards while No Government School reported Guards as Disaster Response Strategies.
- **First Aid Kits:** 40% Private School reported First Aid Kits while 40% Government reported First Aid Kits as Disaster Response Strategies.
- **Ambulance:** 60% Private School reported Ambulance while No Government Public School reported Ambulance as Disaster Response Strategies.
- **Dispensary:** 40% Private School reported Dispensary while 60% Government School reported Dispensary as Disaster Response Strategies.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

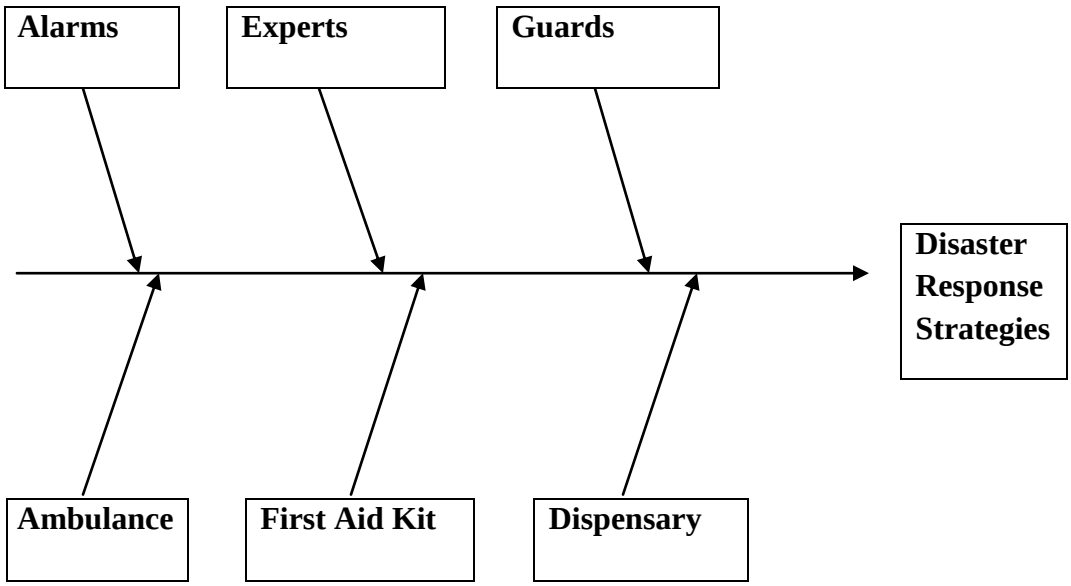


Figure 5.15: Fish Bone Analysis of Disaster Response strategies for Manmade Disasters

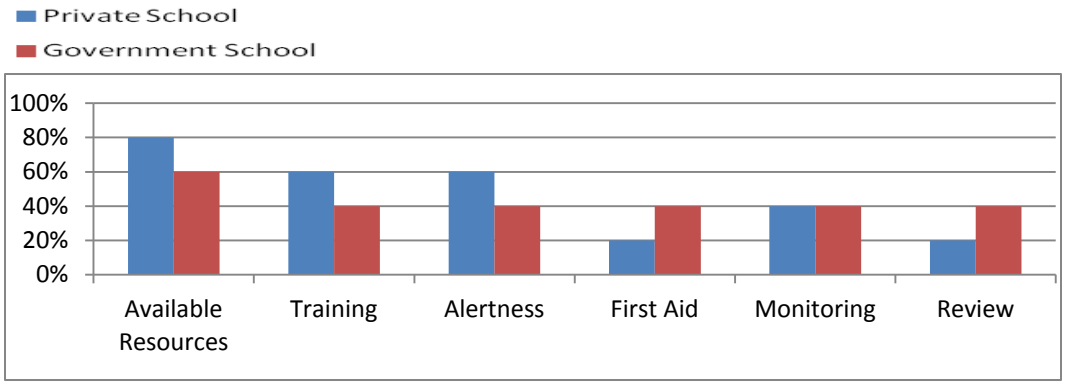
Response during disaster reduces the loss in terms of lives and properties. Various strategies to respond to manmade disasters are alarming systems, expert's opinions, guards, first aid kit, availability of ambulance, presence of dispensary in the school premises etc.

Alarms prevent any manmade disasters prior to their occurrence while the experts predict any unfair situations in advance. The guards by their presence tend to avoid any disastrous situations and also watch advancement of any manmade disasters.

The disaster response strategies include first aid kits which provide immediate relief to the patients, ambulances which carry the patients to the hospitals for their better treatment, dispensary serve as major controlling center for mitigating the suffering due to any disasters by providing immediate treatment to them.

Research Question: What are the Perceptions of the school management about the management of School fire as man-made disasters in schools?

School fire:



X axis= Perceptions of the school management for managing school fire, Y axis= Responses recorded

Table 5.16: Perceptions of the school management about the management of school fire as man-made disasters in schools

Available Resources: 80% Private School reported Available Resources while 60% Government School reported Available Resources as perceptions of school management about managing Man Made Disasters.

Training: 60% Private School reported Training while 40% Government School reported Training as perceptions of school management.

Alertness: 60% Private School reported Alertness while 40% Government School reported Alertness as perceptions of school management.

First Aid: 20% Private School reported First Aid while 40% Government School reported First Aid as perceptions of school management.

Monitoring: 40% Private School reported Monitoring while 40% Government School reported Monitoring as perceptions of school management.

Review: 20% Private School reported Review while 40% Government School reported Review as perceptions of school management.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

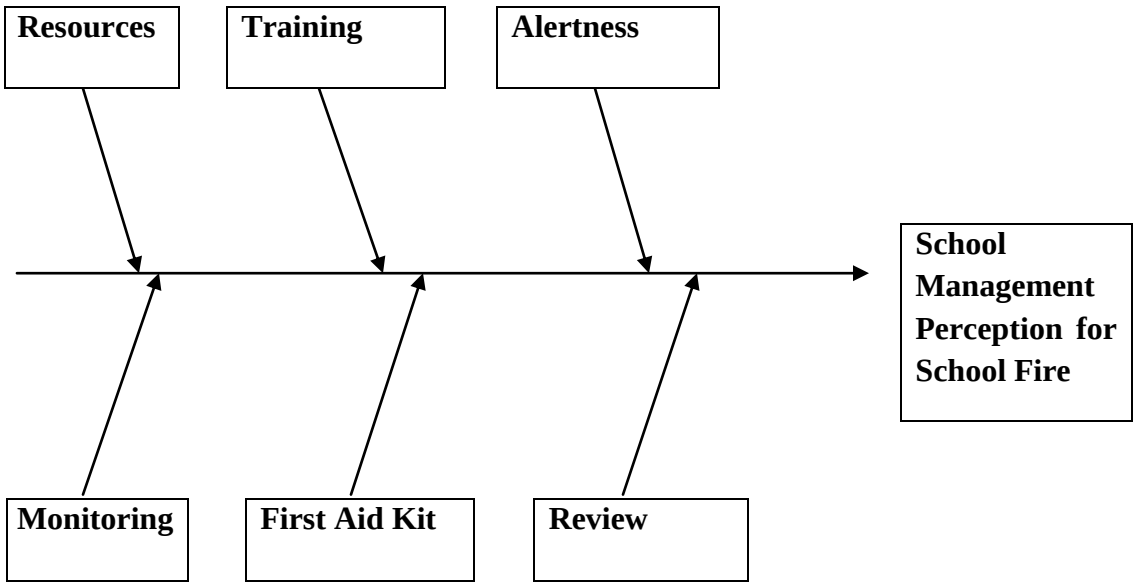


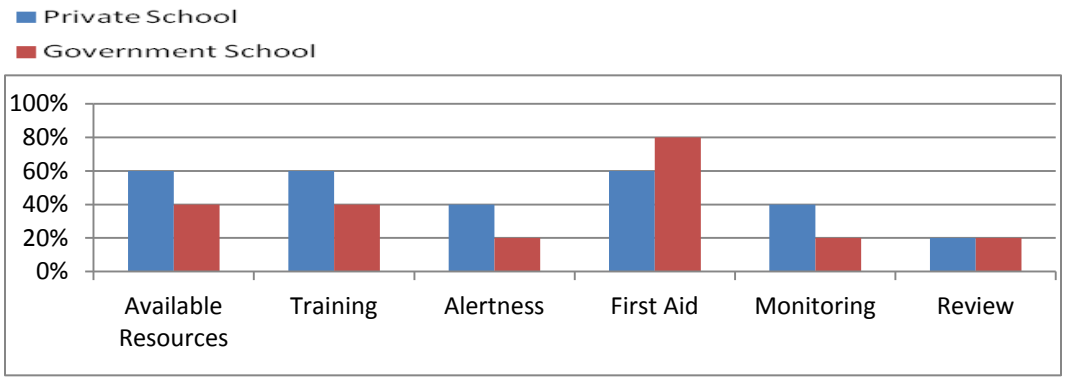
Figure 5.16: Fish Bone Analysis of Perceptions of School management about management of school fire as manmade disasters in Schools

As per the perceptions of school management, for the management of school fire as manmade disasters available resources are very important which includes fire extinguishers, hose pipes, sand bags etc.

Training to the school staffs as well as students about the use of available resources serve as major control check for various manmade disasters. Alertness of the school management regarding various incoming hazards, getting the experts' advice, checking the predictions by government organizations etc mitigate the risks of various disasters.

Monitoring of the disaster management plan and any update if necessary is put into the plan makes it more effective. First Aid kits immediately provide medical assistance to the victims of disasters while reviewing the existing disaster management plan makes it more effective.

Road accident:



X axis= Perceptions of the school management for managing road accidents, Y axis= Responses recorded

Table 5.17: Perceptions of the school management about the management of Road Accident as man-made disasters in schools

Available Resources: 60% Private School reported Available Resources while 40% Government School reported Available Resources as perceptions of school management about managing Road accidents as Man Made Disasters.

Training: 60% Private School reported Training while 40% Government School reported Training as perceptions of school management.

Alertness: 40% Private School reported Alertness while 20% Government School reported Alertness as perceptions of school management.

First Aid: 60% Private School reported First Aid while 80% Government School reported First Aid as perceptions of school management about managing Manmade Disasters.

Monitoring: 40% Private School reported Monitoring while 20% Government School reported Monitoring as perceptions of school management.

Review: 20% Private School reported Review while 20% Government School reported Review as perceptions of school management about managing Manmade Disasters.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

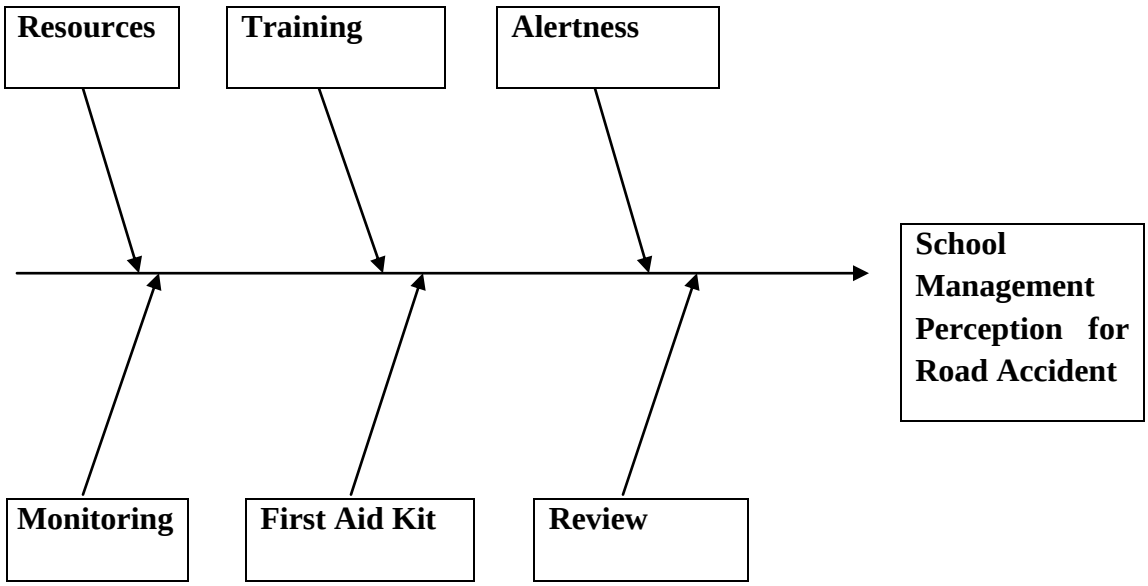


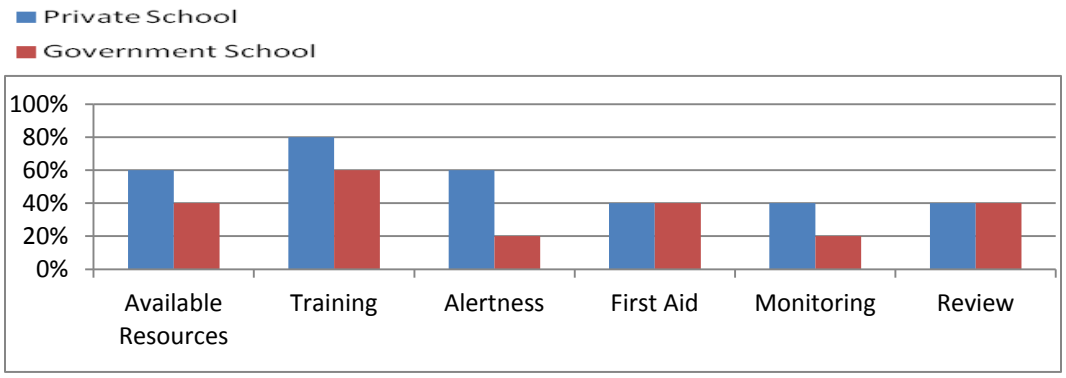
Figure 5.17: Fish Bone Analysis of Perceptions of School management about management of Road Accident as manmade disasters in Schools

As per the perceptions of school management, for the management of road accident as manmade disasters available resources are very important which includes mock drills, fire extinguishers, response teams etc.

Training to the school staffs as well as students about the use of available resources serve as major control check for various manmade disasters. Alertness of the school management regarding various incoming hazards, getting the experts' advice, checking the predictions by government organizations etc mitigate the risks of various disasters.

Monitoring of the disaster management plan and any update if necessary is put into the plan makes it more effective. First Aid kits immediately provide medical assistance to the victims of disasters while reviewing the existing disaster management plan makes it more effective.

Transport Disaster:



X axis= Perceptions of the school management for managing Transport Disaster, Y axis= Responses recorded

Table 5.18: Perceptions of the school management about the management of Transport Disaster as man-made disasters in schools

Available Resources: 60% Private School reported Available Resources while 40% Government School reported Available Resources as perceptions of school management about managing Transport Disaster as Man Made Disasters.

Training: 80% Private School reported Training while 60% Government School reported Training as perceptions of school management.

Alertness: 60% Private School reported Alertness while 20% Government School reported Alertness as perceptions of school management.

First Aid: 40% Private School reported First Aid while 40% Government School reported First Aid as perceptions of school management about managing Manmade Disasters.

Monitoring: 40% Private School reported Monitoring while 20% Government School reported Monitoring as perceptions of school management.

Review: 20% Private School reported Review while 20% Government School reported Review as perceptions of school management about managing Manmade Disasters.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

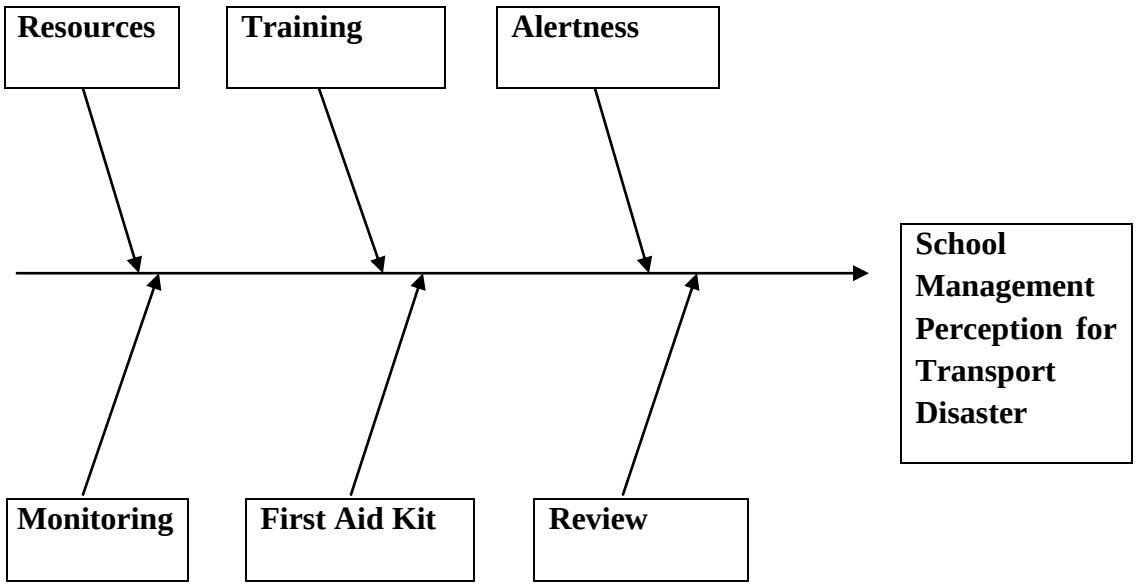


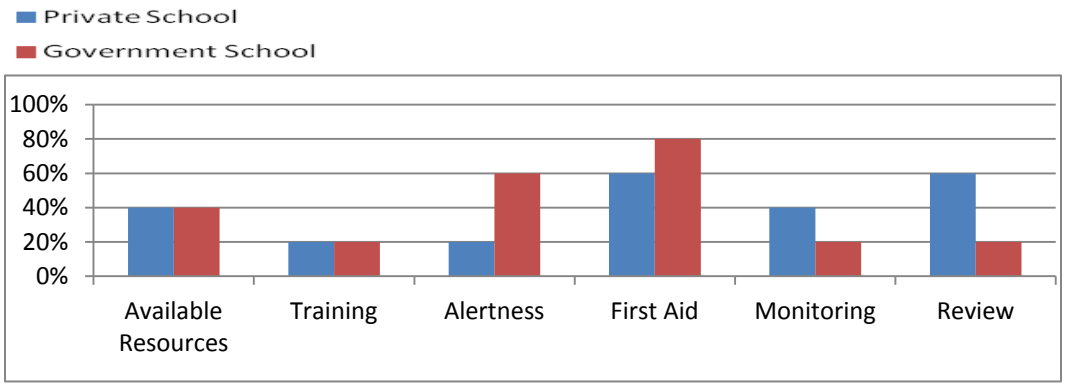
Figure 5.18: Fish Bone Analysis of Perceptions of School management about management of Transport Disaster as manmade disasters in Schools

As per the perceptions of school management, for the management of transport safety as manmade disasters available resources are very important which includes mock drills, fire extinguishers, response teams etc.

Training to the school staffs as well as students about the use of available resources serve as major control check for various manmade disasters. Alertness of the school management regarding various incoming hazards, getting the experts' advice, checking the predictions by government organizations etc mitigate the risks of various disasters.

Monitoring of the disaster management plan and any update if necessary is put into the plan makes it more effective. First Aid kits immediately provide medical assistance to the victims of disasters while reviewing the existing disaster management plan makes it more effective.

Mid Day Meal Disasters:



X axis= Perceptions of the school management for Mid-day meal disaster, Y axis= Responses recorded

Table 5.19: Perceptions of the school management about the management of mid day meal Disaster as man-made disasters in schools

Available Resources: 40% Private School reported Available Resources while 40% Government School reported Available Resources as perceptions of school management about managing Mid-day meal disaster as Man Made Disasters.

Training: 20% Private School reported Training while 20% Government School reported Training as perceptions of school management.

Alertness: 20% Private School reported Alertness while 60% Government School reported Alertness as perceptions of school management.

First Aid: 60% Private School reported First Aid while 80% Government School reported First Aid as perceptions of school management about managing Manmade Disasters.

Monitoring: 40% Private School reported Monitoring while 20% Government School reported Monitoring as perceptions of school management.

Review: 60% Private School reported Review while 20% Government School reported Review as perceptions of school management about managing Mid-day meal disaster as Manmade Disasters.

Analysis:

Fish Bone Analysis of the research question leads to following diagram:

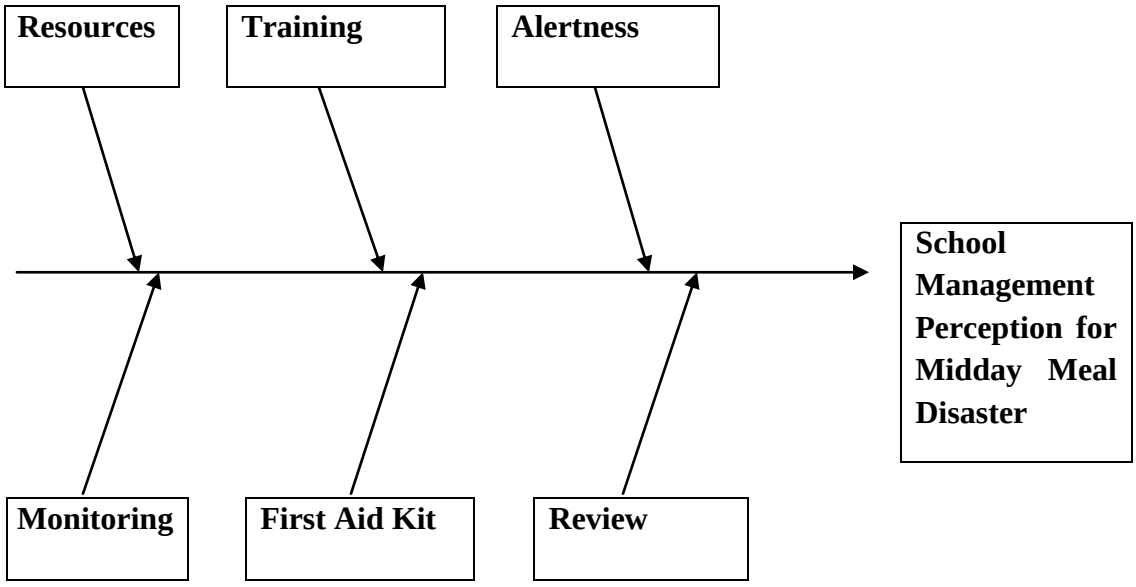


Figure 5.19: Fish Bone Analysis of Perceptions of School management about management of mid day meal disaster as manmade disasters in Schools

As per the perceptions of school management, for the management of mid day meal disaster as manmade disasters available resources are very important which includes hygiene, first aid kit, ambulance etc.

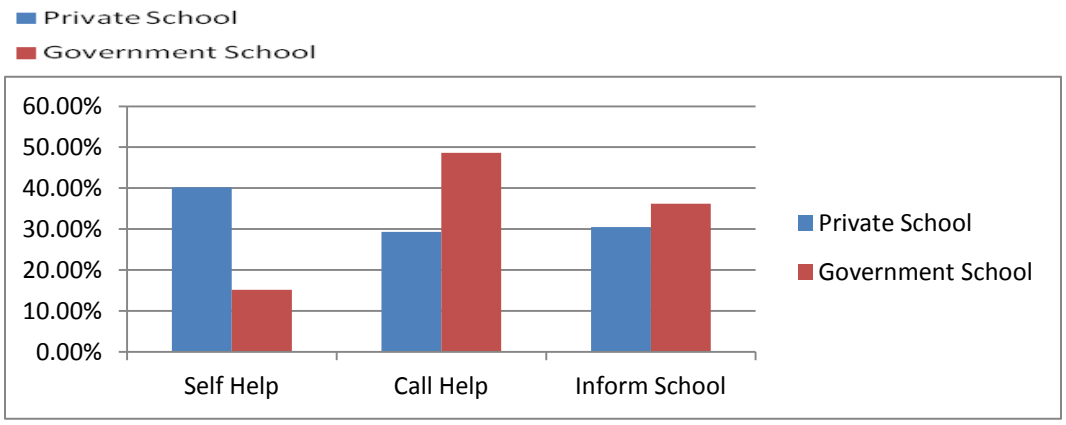
Training to the school staffs as well as students about the use of available resources serve as major control check for various manmade disasters. Alertness of the school management regarding various incoming hazards, getting the experts' advice, checking the predictions by government organizations etc mitigate the risks of various disasters.

Monitoring of the disaster management plan and any update if necessary is put into the plan makes it more effective. First Aid kits immediately provide medical assistance to the victims of disasters while reviewing the existing disaster management plan makes it more effective.

Research Question: What are the Perceptions of the school students about management of manmade disasters in schools?

School fire:

Case I: When Fire is detected



X axis= Perceptions of the school students for managing school fire, Y axis= Responses recorded

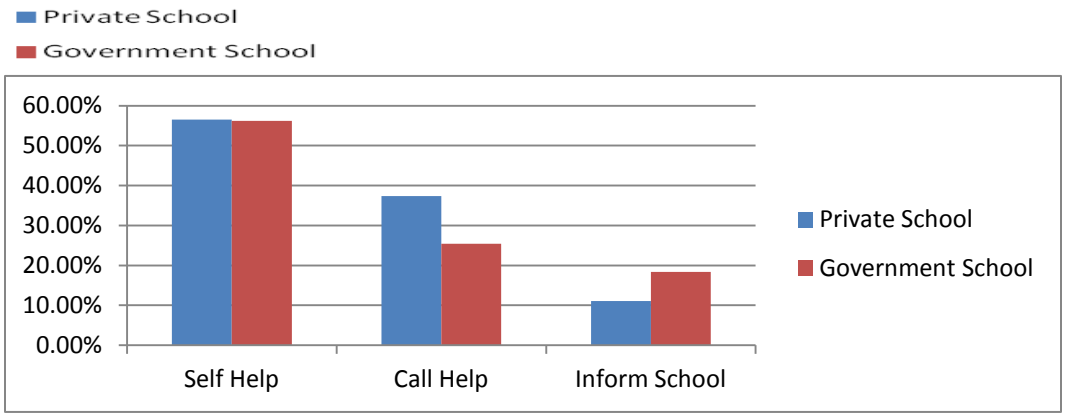
Table 5.20: Perceptions of the school students about the management of school fire as man-made disaster in schools

- **Self help:** 40.20 % Private School reported self help while 15.00% Government School reported Self help as perceptions of school students.
- **Call Help:** 29.30% Private School reported Call help while 49.00% Government School reported call help as perceptions of school students.
- **Inform Authority:** 30.50% Private School reported Informing Authority while 36.00% Government School reported Informing Authority as perceptions of school students about managing school fire.

Analysis:

As per the perceptions of school students, for the management of school fire when fire is detected students prefer for self help. Sometimes students call help from others like police, ambulance, local people etc. and inform authorities for resources that help in proper management of the situation like principal, teachers, school disaster management team etc.

Case II: When Surrounded in Fire



X axis= Perceptions of the school management for managing school fire, Y axis= Responses recorded

Table 5.21: Perceptions of the school students about the management of school fire as man-made disaster in schools

- **Self help:** 56.50 % Private School reported self help while 56.00% Government School reported Self help as perceptions of school students.
- **Call Help:** 37.40% Private School reported Call help while 25.00% Government School reported call help as perceptions of school students.
- **Inform Authority:** 11.10% Private School reported Informing Authority while 18.00% Government School reported Informing Authority as perceptions of school students about managing school fire.

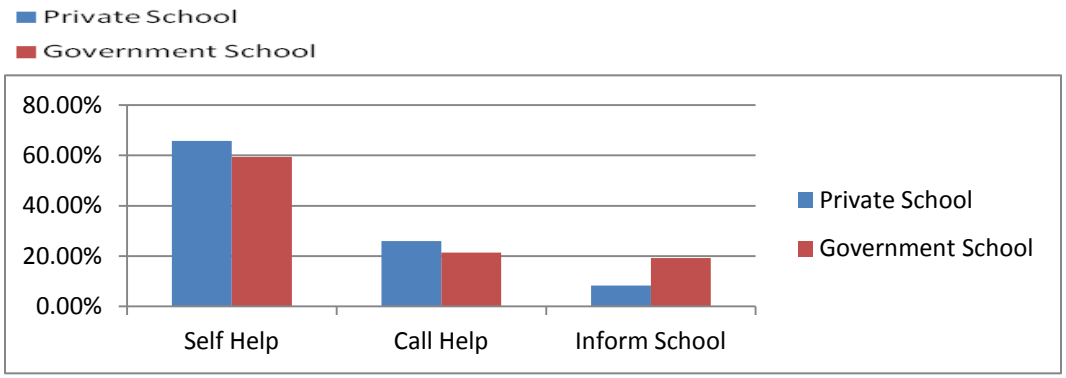
Analysis:

As per the perceptions of school students, for the management of school fire when students are surrounded in fire, students prefer for self help that includes escape from disaster site, use of fire extinguishers, water resources etc for themselves and others.

Sometimes students call help from others like police, ambulance, local people, parents etc.

Sometimes students prefer to inform authorities for resources that help in proper management of the situation like principal, teachers, school disaster management team etc.

Case III: When Sibling is surrounded in Fire



X axis= Perceptions of the school management for managing school fire, Y axis= Responses recorded

Table 5.22: Perceptions of the school students about the management of school fire as man-made disaster in schools

- **Self help:** 65.70 % Private School reported self help while 59.00% Government School reported Self help as perceptions of school students.
- **Call Help:** 26.00% Private School reported Call help while 21.00% Government School reported call help as perceptions of school students.
- **Inform Authority:** 8.30% Private School reported Informing Authority while 19.00% Government School reported Informing Authority as perceptions of school students about managing school fire.

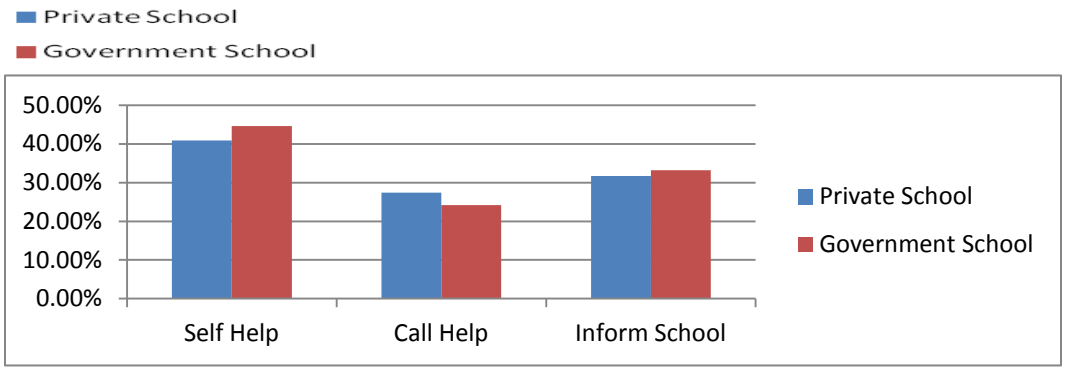
Analysis:

As per the perceptions of school students, for the management of school fire when sibling is surrounded in fire, students prefer for self help that includes helping out of sibling, escape from disaster site with sibling, use of fire extinguishers, water resources etc for siblings.

Sometimes students call help for siblings from others like police, ambulance, local people, parents etc.

Sometimes students prefer to inform authorities for resources that help in proper management of the situation like principal, teachers, school disaster management team etc.

Road Accident:



X axis= Perceptions of the school students for managing Road accidents, Y axis= Responses recorded

Table 5.23: Perceptions of the school students about the management of Road accident as man-made disaster in schools

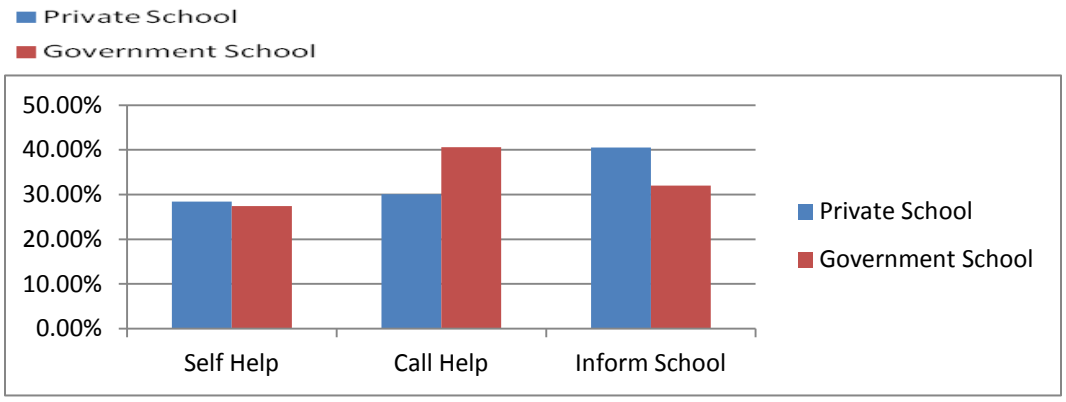
- **Self help:** 40.90% Private School reported Self help while 45.00% Government School reported Self help as perceptions of school students about managing Road accident.
- **Call Help:** 27.40% Private School reported Call help while 24.00% Government School reported call help as perceptions of school students.
- **Inform Authority:** 31.70% Private School reported Informing Authority while 33.00% Government School reported Informing Authority as perceptions of school students about managing Road accident.

Analysis:

Immediately after road accidents, information to authority serves as quick measure for arrangement of all resources and mitigation of the risk. Sometimes students prefer for self help which is a part of community based disaster management.

Students call for help from the nearby areas and from the people, sometimes they call to police or ambulance by means of telephone call for help. First aid serves as immediate relief to the patients who have met with road accidents.

Transport Disaster:



X axis= Perceptions of the school students for managing Transport Disaster, Y axis= Responses recorded

Table 5.24: Perceptions of the school students about the management of Transport Disaster as man-made disaster in schools

- **Self help:** 28.40% Private School reported self help while 27.00% Government School reported Self help as perceptions of school students.
- **Call Help:** 30.10% Private School reported Call help while 41.00% Government School reported call help as perceptions of school students.
- **Inform Authority:** 40.50% Private School reported Informing Authority while 32.00% Government School reported Informing Authority as perceptions of school students about managing Transport disaster.

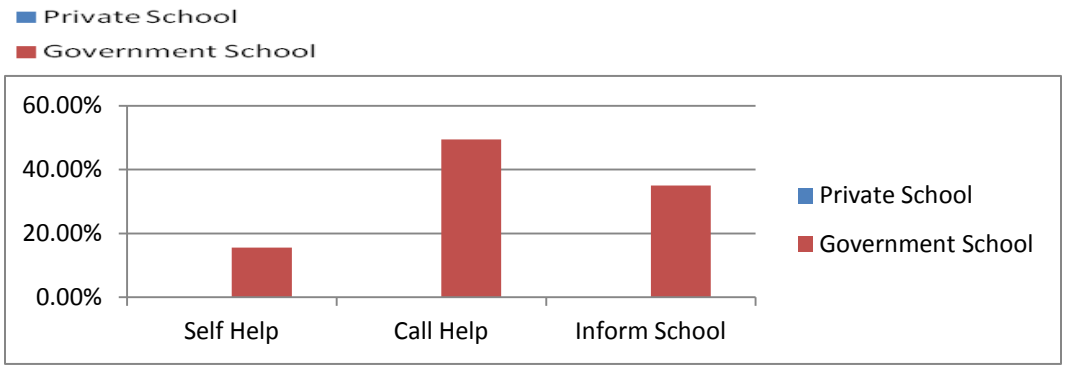
Analysis:

Information to authority which includes principal, teachers, disaster management teams etc that helps in quick collection of resources to combat disaster situations.

Some students prefer self help to their class mates or other injured persons like carrying the victims to hospitals, providing first aid to them etc.

Some students prefer calling for help to different organizations like police, ambulance, parents, school management etc. for effective management of the situation.

Mid-day Meal Disaster



X axis= Perceptions of the school students for managing Mid-day meal disasters, Y axis= Responses recorded

Table 5.25: Perceptions of the school students about the management of Midday meal disaster as man-made disaster in schools

- **Self help:** No Private School reported self help while 15.60% Government School reported Self help as perceptions of school students.
- **Call Help:** No Private School reported call help while 49.40% Government School reported call help as perceptions of school students.
- **Inform Authority:** No Private School reported informing authority while 35.00% Government School reported informing authority as perceptions of school students.

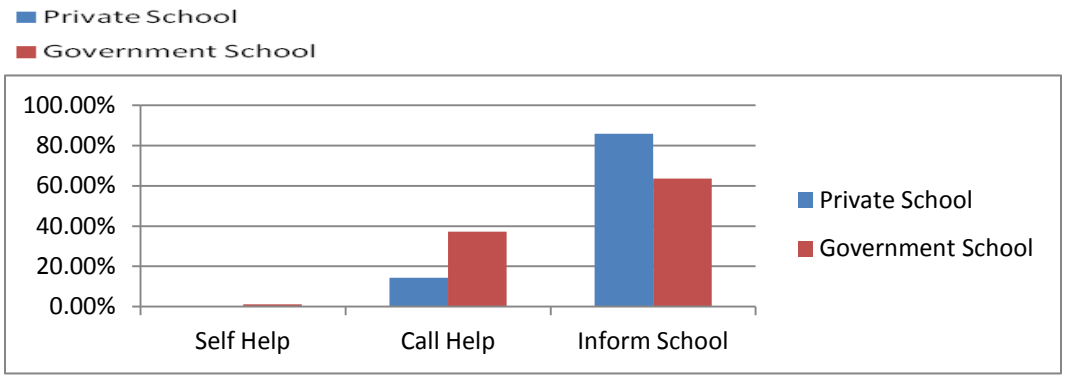
Analysis:

While some students think of informing the authority when any disaster occurs while other think of self help to the injured persons while other students think of calling help from nearby places or outside.

Some students rely on first aid as immediate response and relief mechanism while some students think of written documented disaster management plan about what to do in such conditions.

Implementation of disaster management plan and periodic review of it makes a better plan for management of various manmade disasters.

Theft as Manmade Disaster



X axis= Perceptions of the school students for Theft, Y axis= Responses recorded

Table 5.26: Perceptions of the school students about the management of Theft as man-made disaster in schools

- **Self help:** No Private School reported self help while 1.20% Government School reported Self help as perceptions of school students.
- **Call Help:** 14.40% Private School reported Call help while 37.20% Government School reported call help as perceptions of school students.
- **Inform Authority:** 85.80% Private School reported Informing Authority while 63.60% Government School reported Informing Authority as perceptions of school students about managing theft.

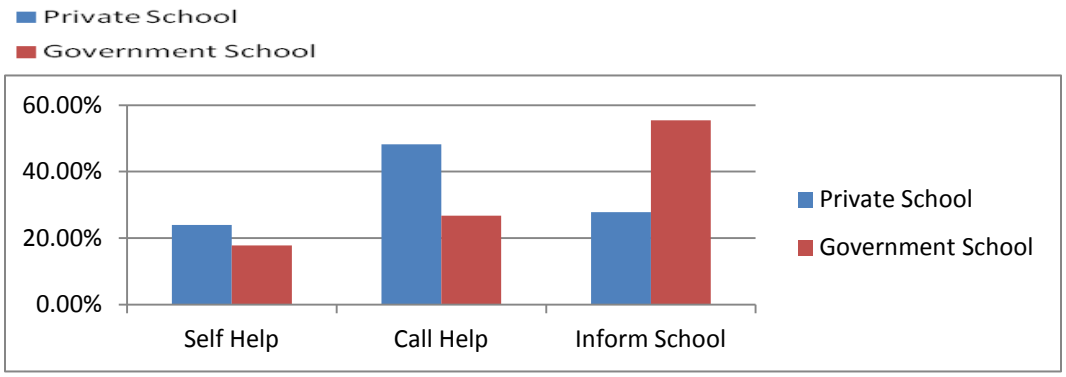
Analysis:

As per the perceptions of school students, for the management of theft as manmade disaster in school, some students prefer to inform authority like principal, teachers, and school disaster management team etc. so that proper action is taken.

While some students prefer to call help from others like police, ambulance, local people, parents etc.

Sometimes students prefer for self help like combating the situation, protecting the resources of schools, assessing the situation, protecting the lives of fellow students etc.

Naxalite Attack as Manmade Disaster



X axis= Perceptions of the school students for managing Naxalite Attack, Y axis= Responses recorded

Table 5.27: Perceptions of the school students about the management of Naxalite attack as man-made disaster in schools

- **Self help:** 24.00% Private School reported self help while 17.80% Government School reported Self help as perceptions of school students.
- **Call Help:** 48.20% Private School reported Call help while 26.80% Government School reported call help as perceptions of school students.
- **Inform Authority:** 27.80% Private School reported Informing Authority while 55.40% Government School reported Informing Authority as perceptions of school students about managing Naxalite attack.

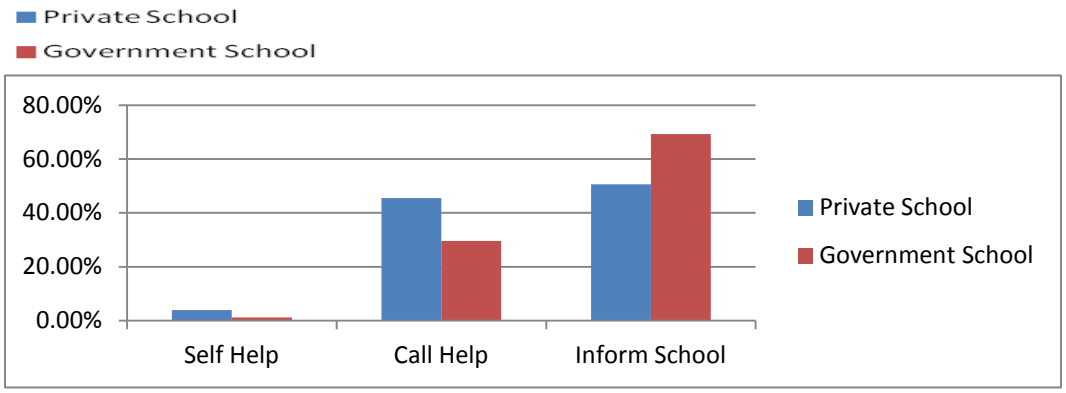
Analysis:

As per the perceptions of school students, for the management of Naxalite attack as manmade disaster in school, some students prefer to inform authority like principal, teachers, and school disaster management team etc. so that proper action is taken.

While some students prefer to call help from others like police, ambulance, local people, parents etc.

Sometimes students prefer for self help like combating the situation, protecting the resources of schools, assessing the situation, protecting the lives of fellow students etc.

Building Disaster:



X axis= Perceptions of the school students for managing Building Disasters, Y axis= Responses recorded

Table 5.28: Perceptions of the school students about the management of building disaster as man-made disaster in schools

- **Self help:** 3.90%% Private School reported Self help while 1.20% Government School reported Self help as perceptions of school students.
- **Call Help:** 45.50% Private School reported Call help while 29.60% Government School reported call help as perceptions of school students.
- **Inform Authority:** 50.60% Private School reported Informing Authority while 69.20% Government School reported Informing Authority as perceptions of school students about managing building disaster.

Analysis:

As per the perceptions of school students, for the management of building disaster in school, some students prefer to inform authority like principal, teachers, and school disaster management team etc. so that proper action is taken.

While some students prefer to call help from others like police, ambulance, local people, parents etc.

Sometimes students prefer for self help like escaping the situation, protecting the resources of schools, assessing the situation, protecting the lives of fellow students etc.

Research Question: What are the Psychological Responses of School Children for various Man-made Disasters?

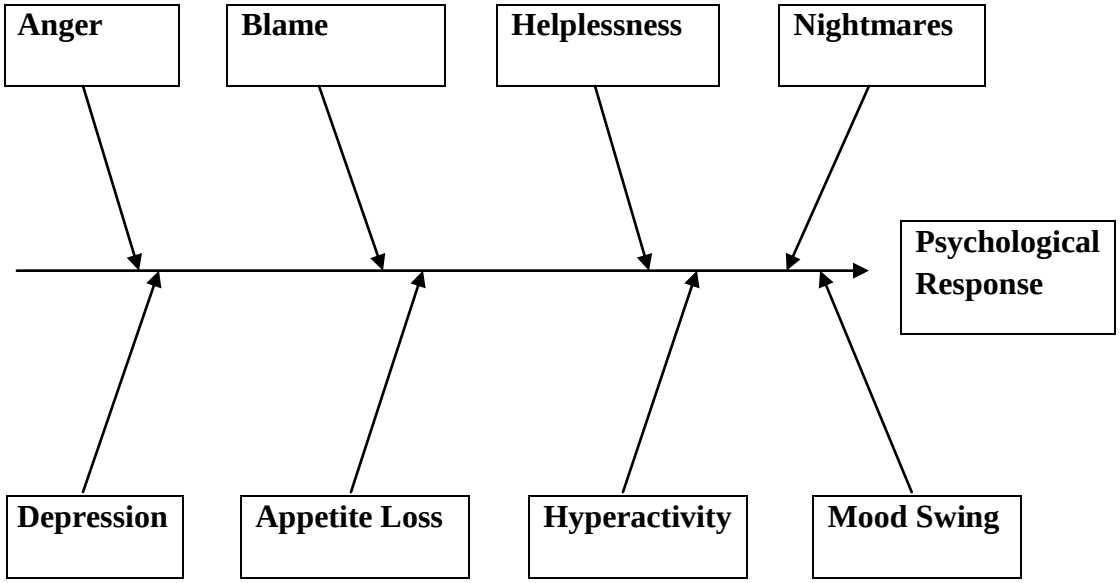


Figure 5.20: Fish Bone Analysis of Psychological Responses by School Children for various Man-made Disasters

As per the responses of school children of secondary schools of Government and Private Schools, Psychological responses at pre disaster, during disaster and post disaster phases may be referred above in the figure.

Psychological response of school children during disaster phase may result in the feeling of anger towards the incident, helplessness for self and others, blame to people such as self, parents, authorities, god etc.

During Post-disaster phase is over, the psychological responses of children result in Nightmares about various disasters, depression of various intensities, loss of appetite, hyperactivity and mood swings at various situations.

In these situations, children lose their equilibrium and their behavior becomes abnormal. The situation becomes very stressful and traumatic. Many Children suffer from post-trauma stress after the incident is over. The psychological response may be affected by prior experience, emotional strength and individual feelings of the children.

Research Question: What are the Stress Management Responses by School Children for various Man-made Disasters?

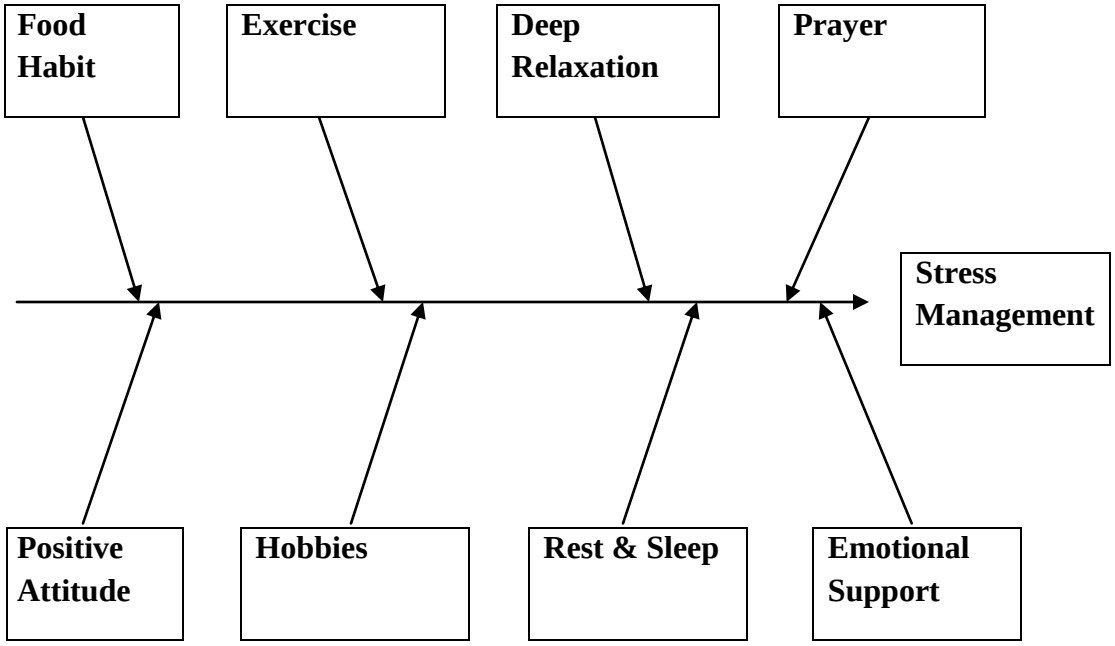


Figure 5.21: Fish Bone Analysis of Stress Management Responses by School Children for various Man-made Disasters

As per the responses of school children of secondary schools of Government and Private Schools, the response for stress management include development of healthy food habits to provide necessary energy to the body to manage stress.

Regular exercise helps a person to manage stress, deep relaxation methods include meditation, yoga etc. while prayer increases hope and optimism, manages stress through awareness of self direction.

Children responses include developing positive attitude towards life and they should not loose pride and self respect. Many people find relaxation b y spending time pursuing favorite activities or following hobbies.

Children responses include regular rest and sleep to recoup energy and revitalization for body and emotional support from known and loved ones. Sometimes, children suffer from feeling of loneliness and insecurity among them.

Research Question: What are the Panic Management Responses by School Children for various Man-made Disasters?

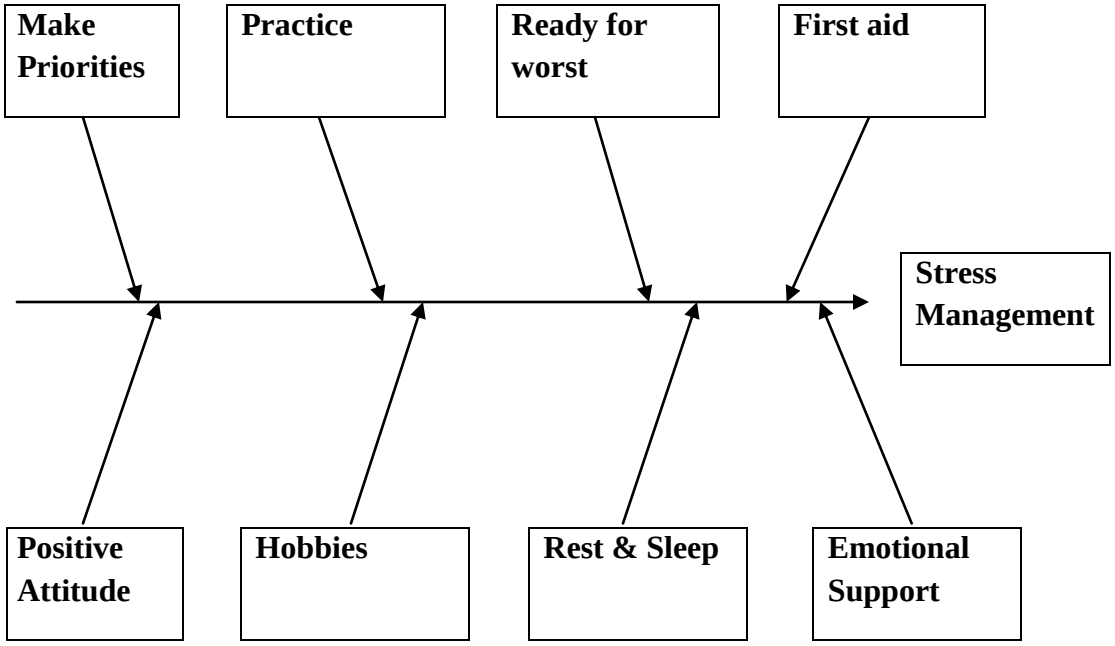


Figure 5.22: Fish Bone Analysis of Panic Management Responses by School Children for various Man-made Disasters

As per the responses of school children of secondary schools of Government and Private Schools, the response for Panic Management include making priorities what to save first whether goods, wealth or lives. The regular practice of skills like drill exercises, drowning exercises etc. to handle panic situation.

Children response include imagination of worst situation like any disaster where the losses could be evaluated and creates a situation that does not cause blind panic. By providing first aid among the sufferers, the fear during the panic can be minimized.

Development of positive attitude helps in panic management by concentrating on present, forgetting the past and creating better balance between activities and feelings. Panic is reduced by doing something which gives pleasure to the sufferers. Regular rest and sleep revitalizes the body and reduces panic while emotional support helps people from the feeling of loneliness and reduces panic.

Research Question: What are the Disaster Preparedness Measures by School Management for various Man-made Disasters?

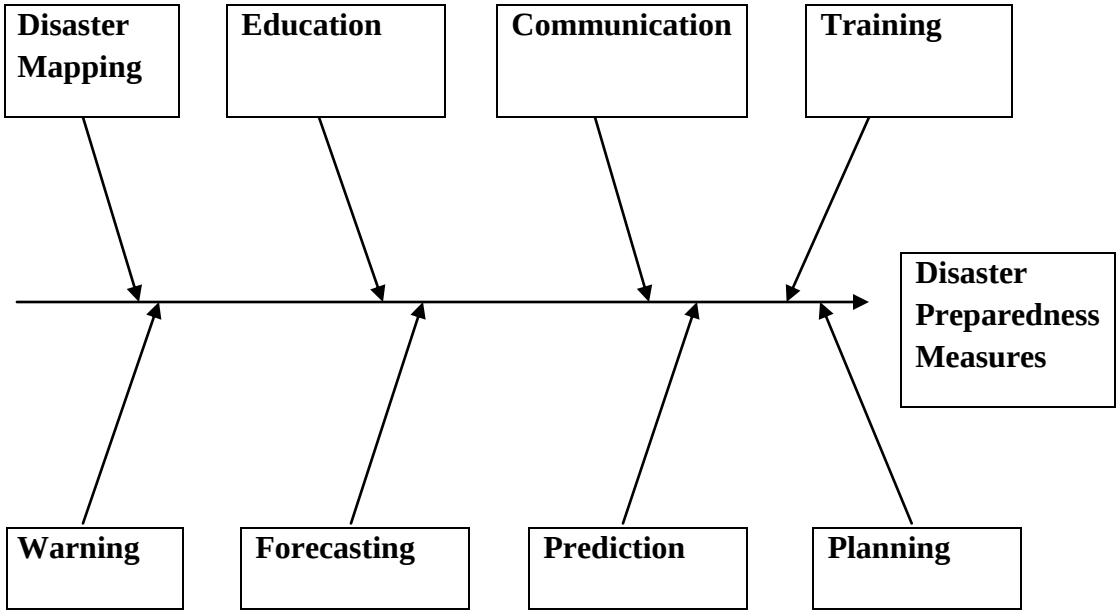


Figure 5.23: Fish Bone Analysis of Disaster Preparedness Measures by School Management for various Man-made Disasters

As per the responses of school Management of secondary schools of Government and Private Schools, the response for disaster preparedness include disaster mapping to assess the impact of disaster on population and environment. Education implies learning that makes people aware and knowledgeable; it orients them to manage situations and provides them with several alternatives.

School management response includes communication which is a process of knowledge transfer to the community regarding disaster risk, preparedness and mitigation. Another response includes training which improves the performance of people involved in managing the crisis.

As per the responses of school management, warnings need to be user specific to withstand different types of disasters and forecasting of an anticipated disaster event, especially area specific as well as time specific. Predictions of human-induced disasters include human error, mechanical fault or organizational failure and planning may be short term or long term.

Research Question: What are the Community Based Disaster Preparedness Plan Strategies by School Staffs for various Man-made Disasters?

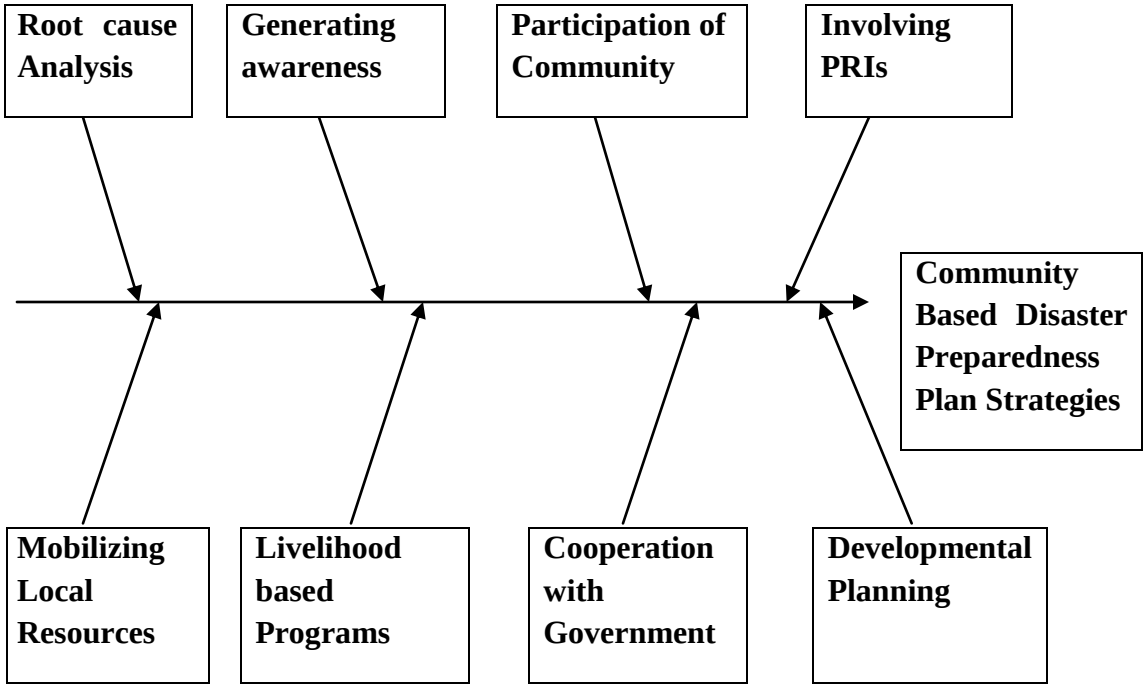


Figure 5.24: Fish Bone Analysis of Community Based Disaster Preparedness Plan Strategies by School Staffs for various Man-made Disasters

As per the responses of school Staffs of secondary schools of Government and Private Schools, the response for Community Based Disaster Preparedness Plan strategies include analyzing the root causes of vulnerability to disaster, generating awareness amongst community members regarding risks involved in various types of disasters.

Responses include participation of community at grass root levels which helps in identification of problems and generation of solutions, organizing local people in disaster task forces, committees and groups.

Other responses include mobilization of local resources, traditional wisdoms, hazard warning signals etc. Livelihood based programs prior to disasters or after disasters which could help in sustainability of the community, planned cooperation with all government and non government agencies and strategic developmental planning to bring together forces to achieve optimum results

Research Question: What are the Latest Technologies in Disaster Preparedness according to Disasters Management Experts for various Man-made Disasters?

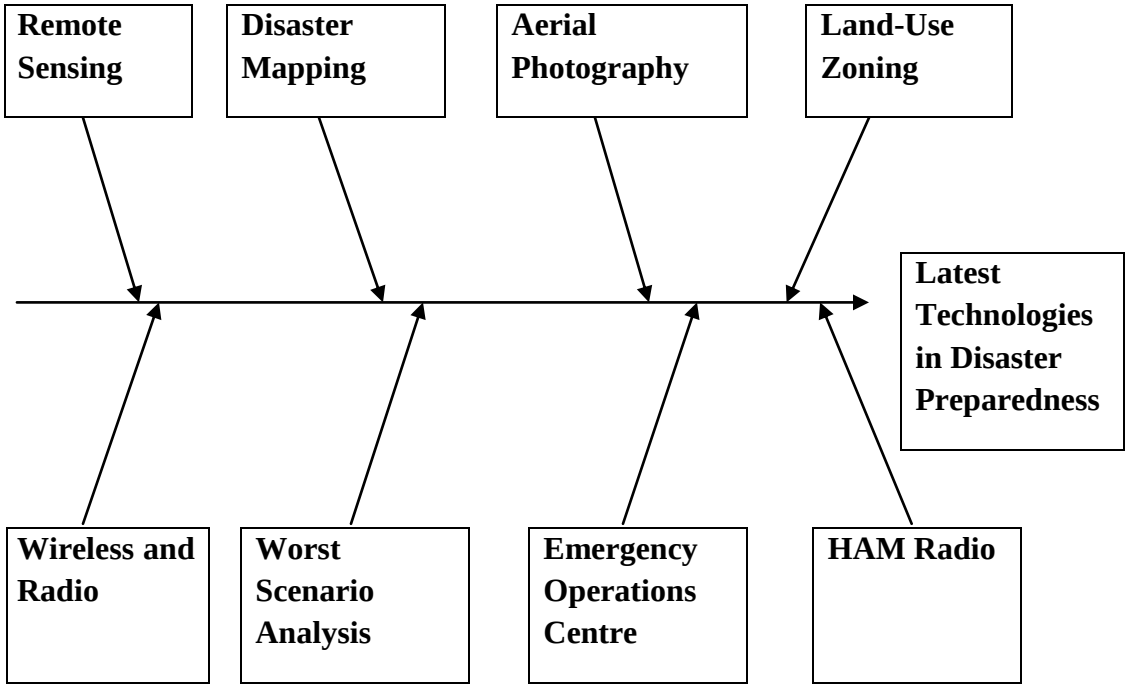


Figure 5.25: Fish Bone Analysis of Latest Technologies in Disaster Preparedness by Disasters Management Experts for various Man-made Disasters

As per the responses of Disaster Management experts of secondary schools of Government and Private Schools, the response for latest technologies in disaster preparedness include remote sensing which analyzes satellite images through digital image processing and interpretation, disaster mapping which is graphic representation of physical location in geographic terms.

As per the responses of the experts, aerial photography is used for the purpose of site analysis and operations support, Land-use zoning mitigate disasters by discouraging settlements in disaster prone areas, wireless and radio technologies are very useful in disaster preparedness. Emergency Operations Centre is also known as control room is the main centre from where all disaster activities are coordinated. Amateur (Ham) facilitates direct two-way contact with people and radio license is provided by government.

Research Question: What are the Disaster Preparedness Planning for Man-made Disasters by Parents for various Man-made Disasters?

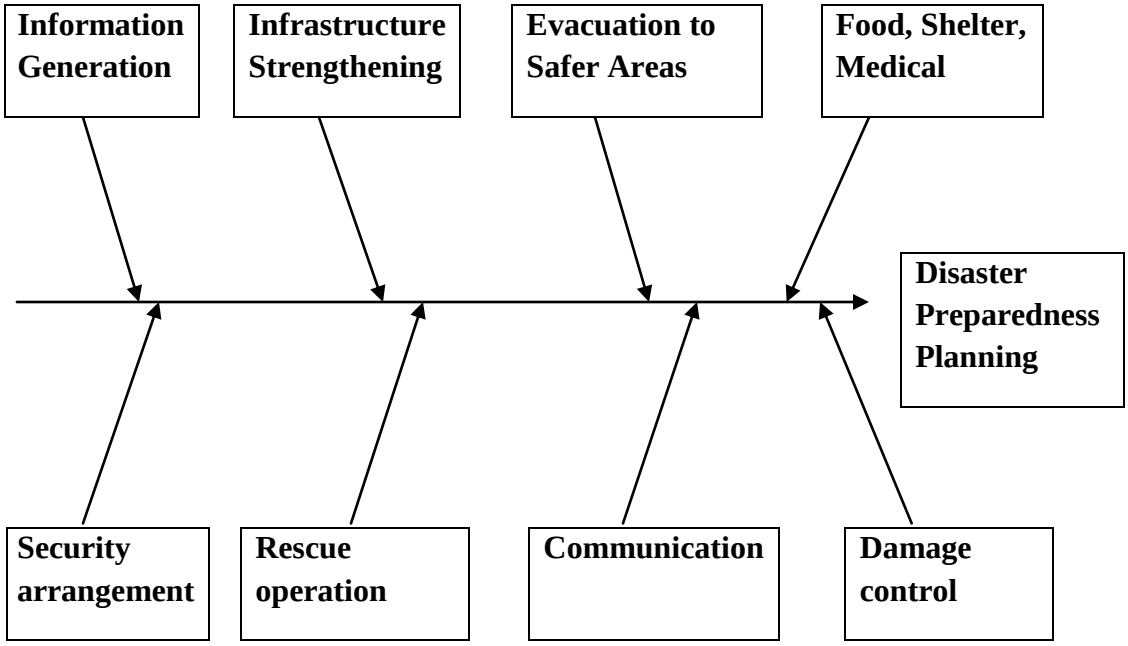


Figure 5.26: Fish Bone Analysis of Disaster Preparedness Planning for Man-made Disasters by Parents for various Man-made Disasters

As per the responses of Parents of the children of secondary schools of Government and Private Schools, the response for Disaster Preparedness Planning for Man-made Disasters include generation of information about various man-made disasters, strengthening of infrastructures such as buildings, arrangement of resources etc.

Other responses include identification of safer areas and evacuation in case of disasters, provision of food, shelter, medical aids to sufferers, arrangement of security for the rescuers and sufferers and rescue operations for the children who come across the incidence of various man-made disasters.

As per the responses of the parents, effective communication is very important at the time of disasters between students and other stakeholders of the schools such as teachers, non teaching staffs and school management. The damage control is very important in case of man-made disasters in schools.

5.4 Case Studies on Man-made Disasters

5.4.1 Case study on School Fire as Man-made disaster

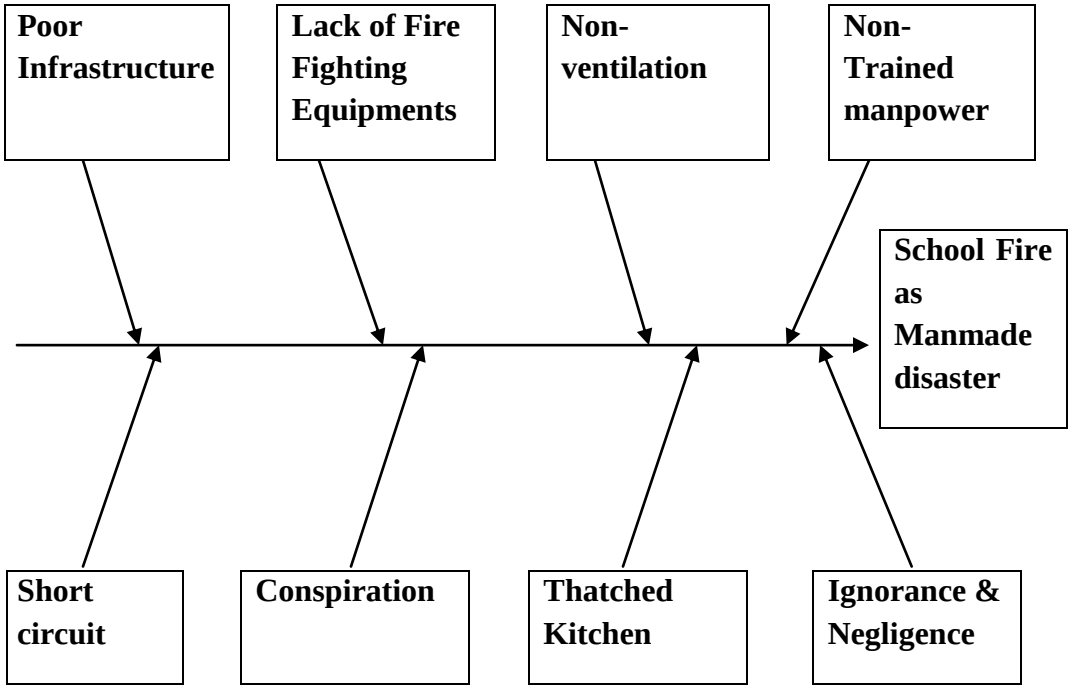


Figure 5.27: Fish Bone Analysis of root causes and factors intensifying severity in the case study for School Fire as Man-made Disasters

The case study included the fire tragedy of 2004 Kumbakonam school fire accident in Thanjavur district of Tamil Nadu in which 94 students of Krishna English medium school were burnt to death as the thatched roof caught fire on 16th July 2004. The main causes for Kumbakonam school fire accident were thatched structure for kitchen close to the class rooms of children, inadequate exit facilities, no fire fighting equipments, non-ventilation, teachers not trained for disaster management, non-enforcing of rules by authorities etc.

As per NBC fire fighting standards, buildings intended for educational occupancy shall not be used for any hazardous occupancy which was violated by the school. At least two separate exits shall be available in every floor area which was absent in the Krishna English medium school. Storage of volatile flammable liquids shall be restricted which were in use in the school at the time of accident.

There shall be a fire extinguisher, hose reel, wet riser, yard hydrant, automatic sprinkler system, manual alarm system and adequate water supply which was absent in the school.

The lessons learnt from the case study are inclusion of disaster management in school curriculum, development of training modules, training of teachers and students, preparation of disaster management plans, awareness and preparedness, safety of building both in structural and non-structural ways etc. The trial of the case ended with conviction of 10 people out of which one got life term, one for two years jail and rest 8 for five years jail. This proved a lesson for all the stakeholders of schools to be prepared for the coming disasters and do the all necessary measures to mitigate the effects of coming disasters.

The respondents from secondary schools claim that they have all the facilities and infrastructures in their premises, but on physical verification it was found that fire extinguishers were present in the school but refilling on due date was not done in most of schools. Training to teachers and students were not given as to how fire extinguishers are used, hose pipes are used, mock fire drills etc. Fire exits are not marked in most of schools for exit in case of fire accidents, first aid training are not given, building codes are not followed in most of the schools which could lead to future man-made disasters of school fire in various schools.

The root causes of school fire as man-made disaster from case study include the false tactics of the school management to bring the other two school students i.e. Sri Krishna Aided Primary School, Saraswathy Nursery and Primary School to the aided primary school of Sri Krishna Girls High School to mislead the inspecting authorities about the student-teacher ratio. The school was not inspected for three years, had no fire exits, no fire fighting equipments, no building codes, teachers were not trained in fire-fighting etc. The education department officials were accused of negligence of their duties and the lower level officers for conspiring with the officials for obtaining and renewing the licenses.

5.4.2 Case Study on Transport Disaster

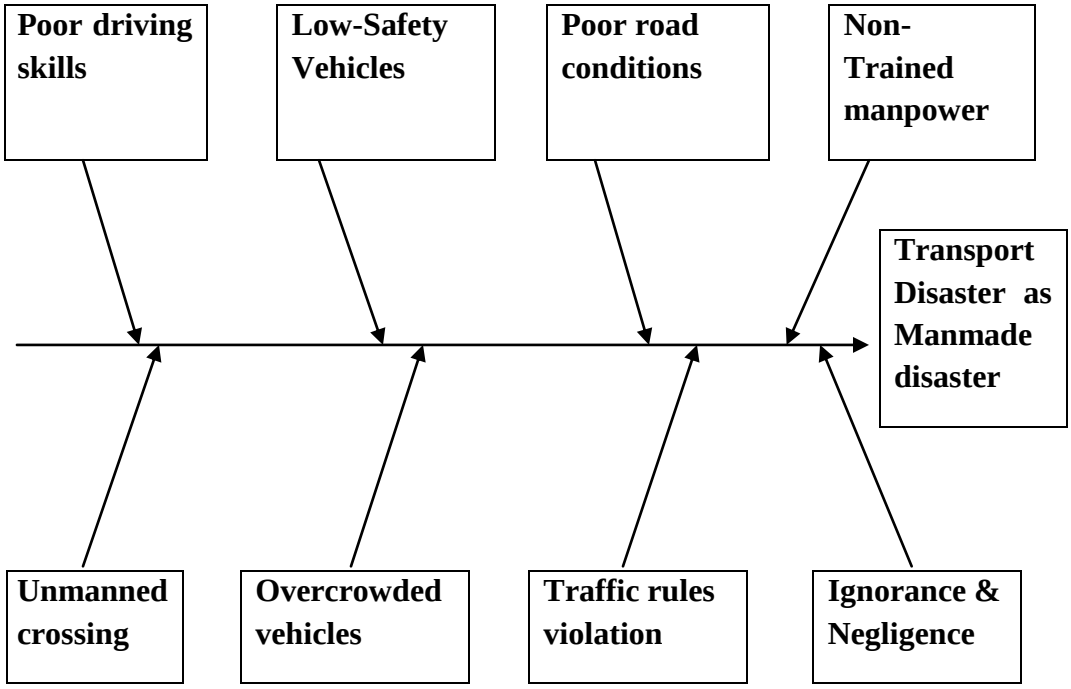


Figure 5.28: Fish Bone Analysis of root causes and factors intensifying severity in the case study for Transport disaster as Man-made Disasters

The case study on transport disaster include UP's Kushinagar incident of death of 13 school students when train collided with school van at unmanned railway crossing on 26 April, 2018. The main cause of accident was the ignorance of driver for using earphones while driving and ignoring warnings of Gate Mitra at unmanned railway crossing. The seven seater vehicle accommodated seventeen students which were overcrowded and the driver violated the traffic rules which led to the traffic accident.

As per the central Government initiatives, National Road Safety Policy was approved and National Road Safety Council was constituted along with district road safety committees. As per 4 Es of road safety which include Education, Enforcement, Engineering, Emergency care etc. there shall be enforcement to use seat belts and helmets, developing medical care facilities, checking of vehicle fitness etc which were absent in the vehicle.

The lessons learnt from case study are enforcement of heavy fines or penalties on traffic rule violation, stringent check of overloading, use of road safety devices such as helmets, seat belts etc. heavy penalty on drunken driving, annual fitness certificate for school buses and culmination of permits for overloading etc. are required to manage the transport disasters effectively.

As per the responses from the present study on the case study related to Transport disaster as Man-made disaster, the respondents from secondary schools claim that they have all the preparedness for transport disaster but on physical verification it was found that schools do not take care of fitness certificates of vehicles, they don't perform the alcohol testing of drivers while some schools involve their vehicle staffs in works of gardening, painting, taking care of children etc so that they don't involve in drunken driving cases, first aid kits in schools vehicles are not up to date with all items, fire extinguishers are not refilled after due date, driving staffs are not trained, overloading is done in buses which could lead to future transport disaster.

The root causes of transport disaster as man-made disaster from case study include poor driving skills of drivers and sometimes without driving license and seat belts, rash driving includes racing with other vehicles, use of low safety vehicles, and non-maintenance of vehicles without fitness certificate, drivers and cleaners who are not trained for transportation of school students and involve in drinking alcohol or playing cards. The vehicles sometimes overcrowd the students i.e. carry more students than the capacity of the vehicle. Violation of traffic rules result in transport disasters like jumping the red light, over speeding, overtaking from wrong side, not using safety equipments like seat belts etc. The ignorance of school management while recruiting drivers and cleaners, outsourcing vehicles from outside, maintaining fitness certificate of own vehicles, continuously checking the safety gadgets in vehicles such as fire extinguishers, first aid kits, availability of teachers in vehicles with students time to time alcohol check of drivers and cleaners etc.

5.4.3 Case Study on Mid-day meal Disaster

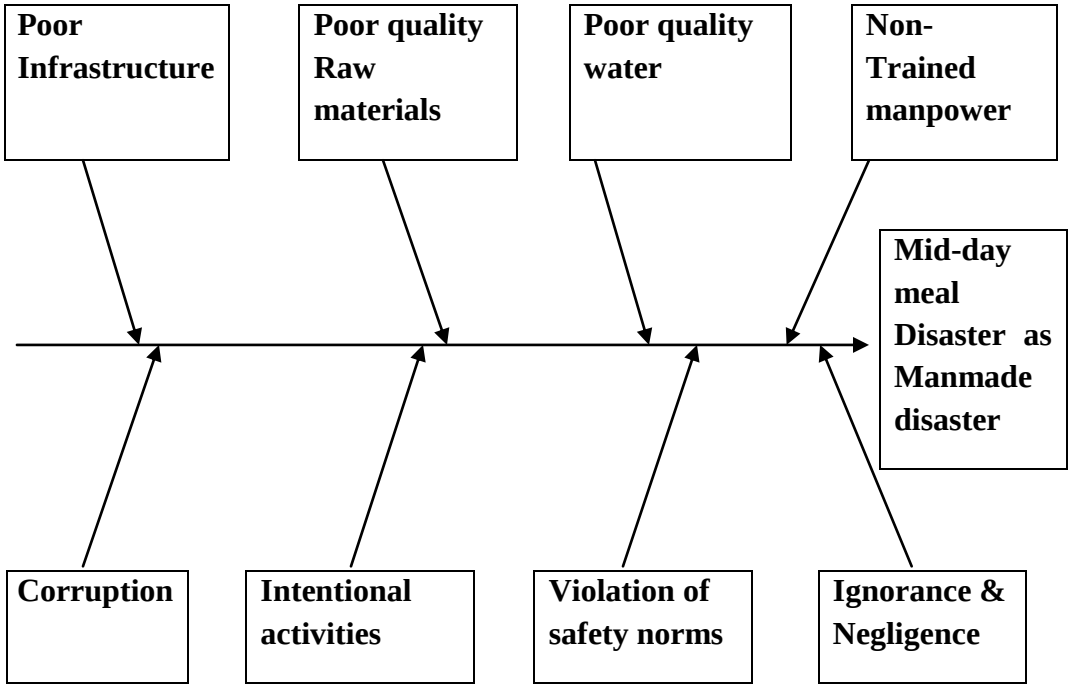


Figure 5.29: Fish Bone Analysis of root causes and factors intensifying severity in the case study for Mid-day disaster as Man-made Disasters

The case study on Mid-day meal disaster includes death of 23 students in the village of Dharmashati Gandaman in the Saran district of Bihar after eating a Mid-day meal contaminated with pesticide. As per the reports of officials the cooking oil was stored in container formerly used to store pesticides and purchased by the local grocery store owned by husband of headmistress. As per the forensic reports, cooking oil contained very high levels of monocrotophos, an agricultural pesticide.

As per the Guidelines on Food Safety and Hygiene for School level kitchens under Mid-day meal scheme, Government of India, Ministry of Human Resource Development, food prepared for children should be free from food adulterants, contamination pathogens, artificial non-food grade colours and other additives. Safety measures should be taken during preparation of food, during cooking, testing of mid-day meals etc. There should be proper cleaning of cooking areas,

utensils, equipments etc. Maintenance of hygiene, cleanliness, health check-up of cookers should be done, pest control should be done etc.

The lessons learnt from a case study on Mid-day meal disaster are hygienic maintenance of kitchen in the clean ventilated area, ensuring continuous supply of potable water, arrangement of clean utensils, provision of efficient drainage, proper constructed chimneys and clean serving area is required for preparedness for Mid-day meal disaster. The maintenance of quality of raw materials used in preparation of food is very crucial and the quality of drinking water could control the mid-day meal disasters.

As per the responses from the present study on the case study related to Mid-day meal disaster as Man-made disasters on physical verification, it was found that the kitchens of most government schools did not meet infrastructural requirements for examples hygienic condition was not maintained in kitchen, proper drainage was not present, fuel for cooking were not stored in proper way, cleanliness while preparation and serving was not maintained, pest control was not done due to which rodents, lizards etc could be seen in kitchens and chances of Mid-day meal disaster was evident in those situations.

The root causes of mid-day meal disaster as man-made disaster from case study include ignorance of the school headmistress as it was reported that cooking oil was discolored and smelling bad but no action was taken. One of the causes was corruption as the cooking oil was supplied from the grocery store headmistress's husband. The immediate action of first aid was not given to the students as the training was not imparted to them. The students were taken to hospital by their parents not by school management as availability of ambulance was not there. The violation of safety norms while preparation of foods led to such disasters, ignorance and negligence of school management during procurement of raw materials, potable water, and supervision during preparation of food and tasting of food were also the chief causes of mid day meal disaster.

5.4.4 Case Study on School Building Disaster

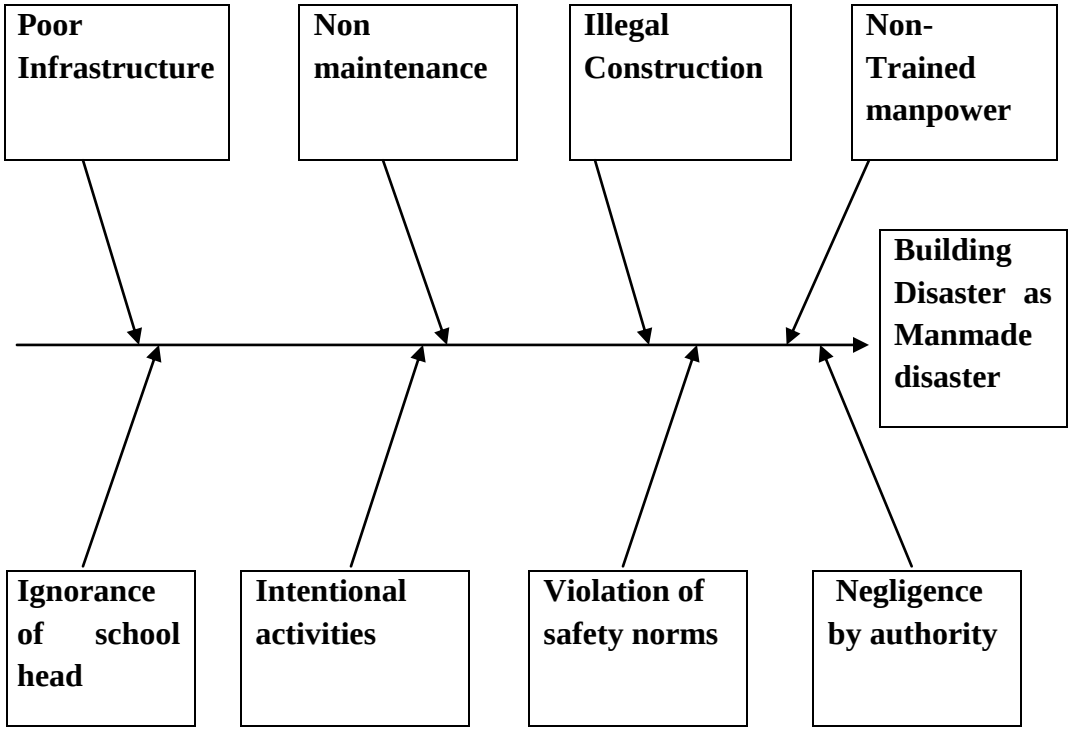


Figure 5.30: Fish Bone Analysis of root causes and factors intensifying severity in the case study for Building disaster as Man-made Disasters

The case study on school building disaster includes death of two girl students due to collapse of dais in New Century Public school of Kukatpally, Hyderabad on 02.08.2018. The disaster occurred when the students were practicing karate in the school auditorium. The management of the school was absconding after the incident. The investigation led by experts of Jawaharlal Nehru Technological University (JNTU) constituted by Greater Hyderabad Municipal Corporation (GHMC) to study of structural stability of school building. As per the investigation, it was evident that the building was built 10 years ago and dais was built five years ago. The committee doubted the quality of the dais if the iron rods or cement was used in building the structure. The school obtained GHMC permission only for the building and not for dais. The school created unauthorized structure in the school which resulted in the man-made disaster.

As per the Bureau of Indian Standards (BIS), the specifications on general building requirements, structural design, building materials, fire and life safety etc have been specified based on what schools should be constructed. The other aspects include lighting, ventilation, electrical, acoustics, water supply, drainage and sanitation, gas supply and display structures. There should be quality check of the building materials, documents related to building and fire fighting system so that future man-made disaster could be avoided.

The lessons learnt from the case study on building disaster include approval of building plan by competent authority, quality check of building materials, fire and general exit in case of disasters, space requirement for different parts of schools, space requirements for staircase, corridors, doorways etc. is required for preparedness for man-made disasters.

As per the responses from the present study on the case study related to school building disaster as man-made disaster on physical verification, it was found that most schools were constructed in congested areas, provisions for exits were not properly designed, fire exits were not marked, fire fighting alarms were installed but they were not working, due to poor maintenance there has been incidences of falling of some portions of building over students, approval and permissions have been taken by school management on document basis. Safe points are not marked in schools as to where students should gather after any disaster. The maintenance work is not done in most of schools, cracks are seen in the walls, ceilings etc. Drainage facility is most of schools are not up to the mark, causing seepage and damage to the building infrastructure.

The root causes of school building meal disaster as man-made disaster from case study include poor infrastructure of schools, illegal construction without taking approval from authorities, non maintenance of existing building, non follow of the building codes or safety norms, ignorance of school head related to these situations and negligence by authorities etc.

5.5 Summary

The chapter discusses the responses obtained from respondents on school fire, road accident, transport disaster, mid day meal disaster, theft and Naxalite attack, building disaster etc. The chapter presents an analysis of the responses obtained from stakeholders of schools which include school management head, teachers, non-teaching staffs, parents, experts, students etc. on different man-made disasters in Ranchi district of Jharkhand and analysis has been given through Fish-Bone diagram which includes discussions on qualitative aspects of various manmade disasters. The chapter discusses various research questions, their responses, psychological behavior and perceptions of respondents of Private and Government secondary schools in Ranchi district of Jharkhand and the analysis is given by Fish-Bone diagrams. The research findings have been discussed in the next chapter.

CHAPTER 6 RESEARCH FINDINGS

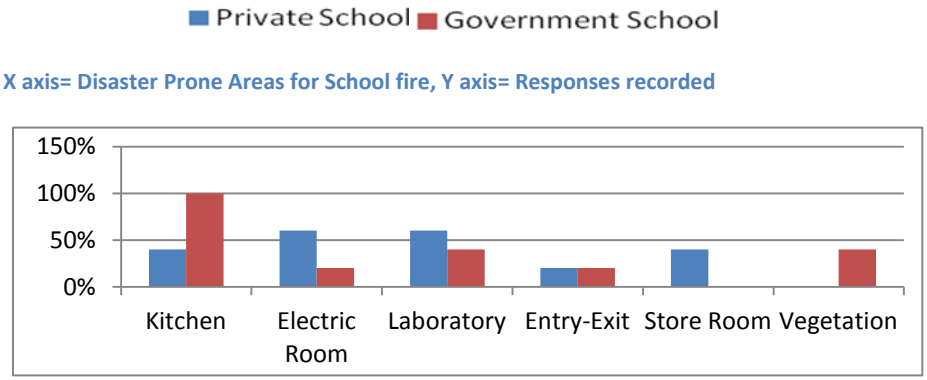
6.1 Overview

The present chapter highlights the research findings on various manmade disasters, qualitative findings on data analysis and quantitative findings on various manmade disasters thinking on the primary results and analysis with reference to the arguments made by other authors in the literature review. The chapter highlights the differences and similarities from the literature review described in the above chapters.

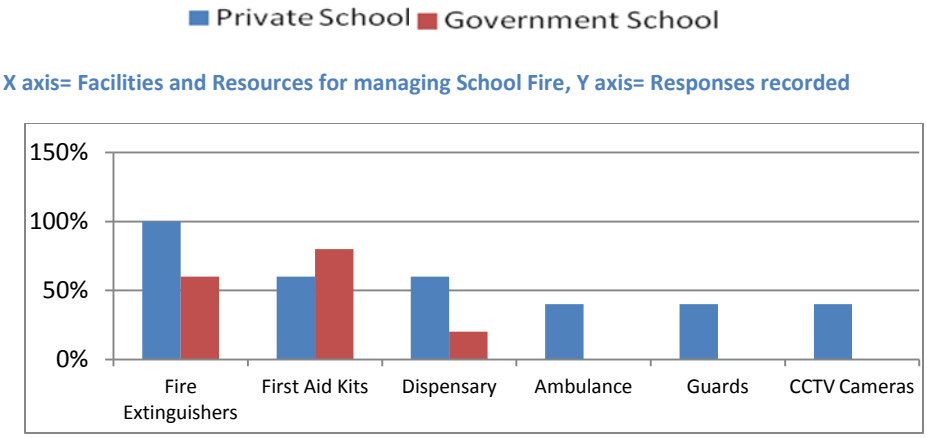
6.2 Research Findings on various Manmade Disasters

6.2.1 Research Findings on School Fire as Manmade Disasters

- **Disaster Prone areas identified for School Fire as manmade disaster:** The disaster prone areas identified for school fire as manmade disaster include Kitchen (40% Private School reported Kitchen while 100% Government School reported Kitchen), Electric rooms (60% Private School reported Electric Room while 20% Government School reported Electric room), Laboratory (60% Private School reported Laboratory while 40% Government School reported Laboratory), Entry-Exit system (20% Private School reported Entry-Exit while 20% Government School reported Entry-Exit), Store rooms (40% Private School reported Store room while No Government School reported Store room) and Vegetation nearby schools (No Private School reported Vegetation while 40% Government School reported Vegetation).

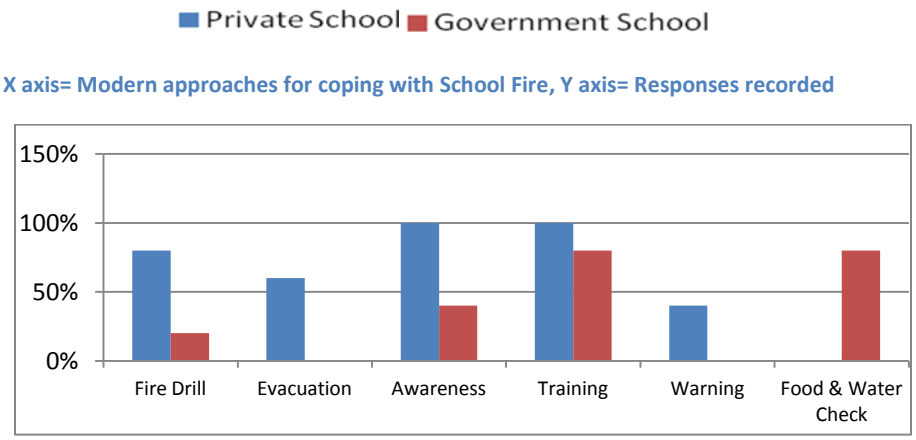


- **Facilities and Resources for managing School Fire as manmade disaster:** The facilities and resources for managing school fire as manmade disaster include fire extinguishers (100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers), first aid kits (60% Private School reported First aid kits while 80% Government School reported First aid kits), dispensary (60% Private School reported Dispensary while 20% Government School reported Dispensary), ambulance (40% Private School reported Ambulance while No Government School reported Ambulance), guards (40% Private School reported Guards while No Government School reported Guards) and CCTV cameras (40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras).



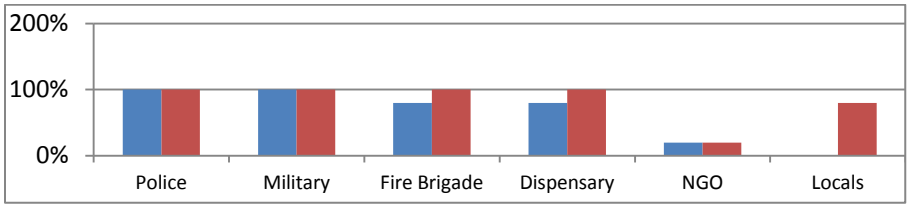
- **Modern approaches for coping with School Fire as manmade disaster:** The modern approaches for coping with school fire as manmade disaster include fire drill exercises (80% Private School reported Fire Drill while 20% Government School reported Fire Drill), evacuation during disasters (60% Private School reported Evacuation while No Government School reported Evacuation), awareness of different disasters (100% Private School reported Awareness while 40% Government School reported Awareness), training exercises (100% Private School reported Training while 80% Government

School reported Training), warning before disasters (40% Private School reported Warning while No Government School reported Warning) and quality check of different resources and conditions (No Private School reported food check while 80% Government School reported food & water check).



- **Community based preventive disaster management teams for mitigating School Fire as manmade disaster:** The community based disaster management teams identified for mitigating school fire as manmade disaster are police (100% Private School reported Police while 100% Government School reported Police), military (100% Private School reported Military while 100% Government School reported Military), fire brigade (80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade), dispensary (80% Private School reported Dispensary while 100% Government School reported Dispensary), NGO (20% Private School reported NGO while 20% Government School reported NGO) and local people (No Private School reported Locals while 80% Government School reported Locals).

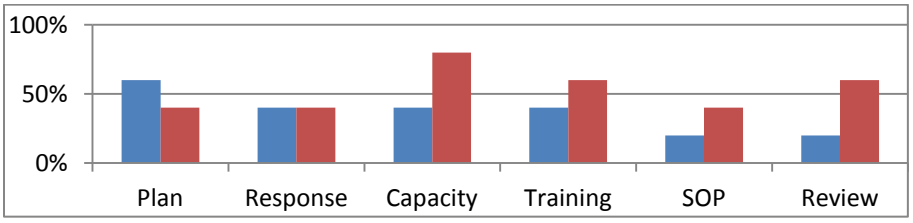
X axis= Community based preventive disaster management teams for mitigating School Fire,
Y axis= Responses recorded



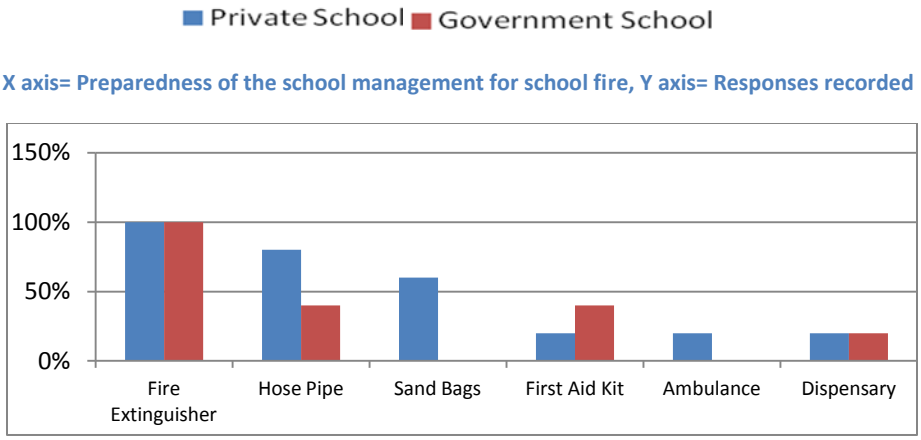
- **Traditional approaches for preparedness and mitigating the effects of School Fire as manmade disaster:** Traditional strategies for preparedness and mitigating the effects of school fire as manmade disaster include planning as per disaster management act (60% Private School reported Plan while 40% Government School reported Plan), response mechanism (40% Private School reported Response while 40% Government School reported Response), capacity building (40% Private School reported Capacity while 80% Government School reported Capacity), training exercises for students and other staffs of schools (40% Private School reported Training while 60% Government School reported Training), standard operating procedure (20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures) and review of plans designed for management of school fire as manmade disaster (20% Private School reported Review while 60% Government School reported Review).

X axis=Traditional approaches for preparedness and mitigating the effects of School Fire,

Y axis= Responses recorded

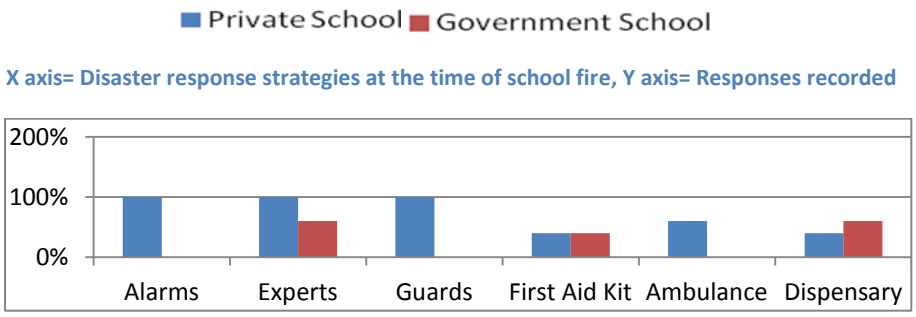


- **Preparedness of the school management for school fire as manmade disaster:** The resources available to the school for preparedness by school management for school fire includes fire extinguishers (100% Private School reported Fire extinguisher while 100% Government School reported Fire extinguisher), hose pipes (80% Private School reported Hose Pipes while 40% Government School reported Hose pipe), sand bags (60% Private School reported Sand Bags while No Government School reported Sand Bags), ambulance (20% Private School reported Ambulance while No Government School reported Ambulance), first aid kits (20% Private School reported First Aid Kits while 40% Government School reported First Aid Kits), dispensary (20% Private School reported Dispensary while 20% Government School reported Dispensary) etc.

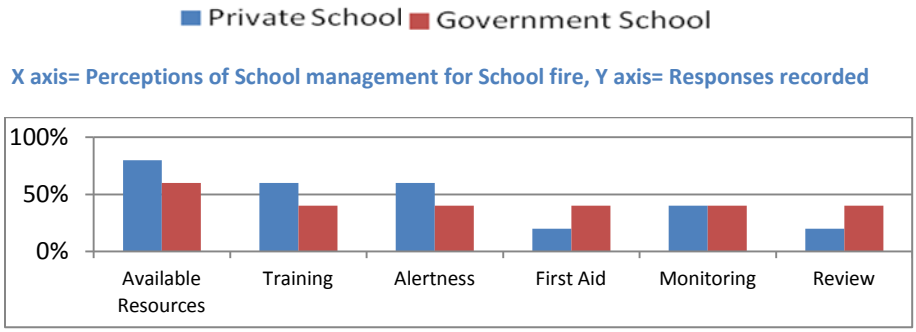


- **Disaster response strategies at the time of school fire as manmade disaster:** The various disaster response strategies at the time of school fire as manmade disaster include alarming systems (100% Private School reported Alarms while No Government Public School reported Alarms), expert's opinions (100% Private School reported Experts while 60% Government School reported Experts), guards (100% Private School reported Guards while No Government School reported Guards), first aid kits (40% Private School reported First Aid Kits while 40% Government reported First Aid Kits), availability of

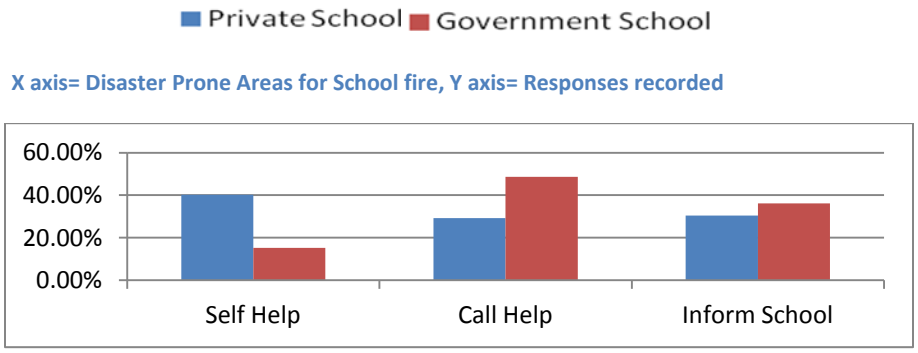
ambulance (60% Private School reported Ambulance while No Government Public School reported Ambulance), presence of dispensary in the school premises (40% Private School reported Dispensary while 60% Government School reported Dispensary) etc.



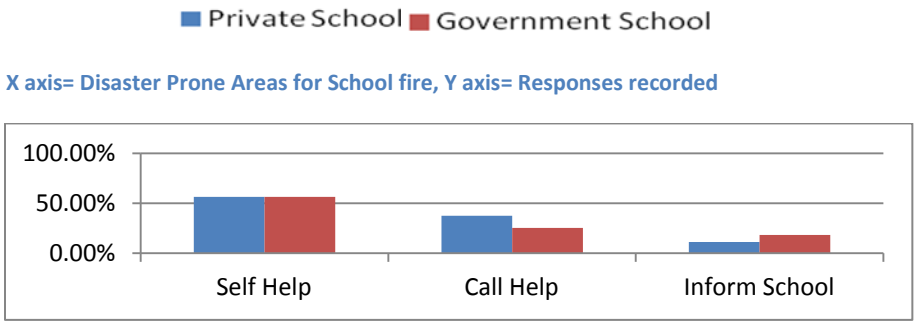
- **Perceptions of School management about management of school fire as manmade disaster:** As per the perceptions of school management, for the management of school fire as manmade disasters available resources (80% Private School reported Available Resources while 60% Government School reported Available Resources), training to students and staffs (60% Private School reported Training while 40% Government School reported Training), alertness (60% Private School reported Alertness while 40% Government School reported Alertness), monitoring (40% Private School reported Monitoring while 40% Government School reported Monitoring), first aid kit (20% Private School reported First Aid while 40% Government School reported First Aid) and review of existing disaster management plan is essential (20% Private School reported Review while 40% Government School reported Review).



- **Perceptions of School students about management of school fire as manmade disaster when fire is detected:** As per the perceptions of school students, for the management of school fire when fire is detected students prefer for self help (40.20 % Private School reported self help while 15.00% Government School reported Self help) that includes escape from disaster site, use of fire extinguishers, water resources etc for themselves and others. Sometimes students call help from others (29.30% Private School reported Call help while 49.00% Government School reported call help) like police, ambulance, local people, parents etc. Sometimes students prefer to inform authorities or school management at the time of disasters (30.50% Private School reported informing Authority while 36.00% Government School reported Informing Authority) which include principal, teachers, school disaster management team etc.

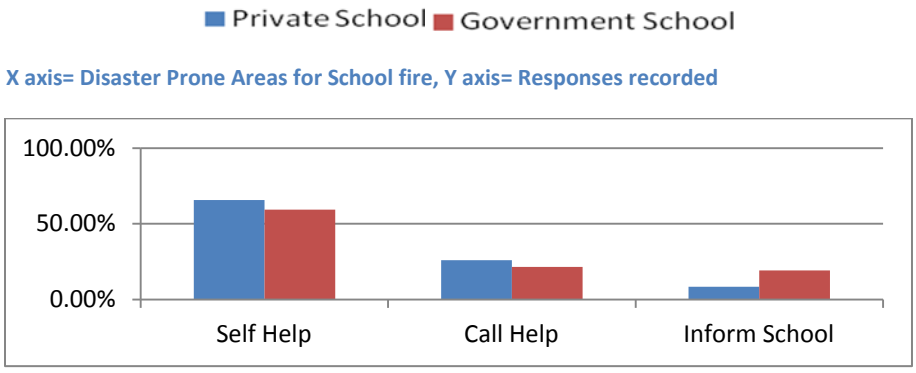


- **Perceptions of School students about management of school fire as manmade disaster when surrounded in fire:** As per the perceptions of school students, for the management of school fire when surrounded in fire students prefer for self help (56.50 % Private School reported self help while 56.00% Government School reported Self help), sometimes students call help from others (37.40% Private School reported Call help while 25.00% Government School reported call help), and sometimes students prefer to inform authorities (11.10% Private School reported Informing Authority while 18.00% Government School reported Informing Authority).



- **Perceptions of School students about management of school fire as manmade disaster when sibling is surrounded in fire:** As per the perceptions of school students, for the management of school fire when sibling is surrounded in fire students prefer for self help (65.70 % Private School reported self help while 59.00% Government School reported Self help), sometimes students call help from others (26.00% Private School reported Call help while 21.00% Government School reported call help), and sometimes students prefer to inform authorities (8.30% Private School reported Informing Authority while 19.00% Government School reported Informing Authority) as perceptions of school students about managing school fire.

  These are the perceptions in the form of responses recorded from students of different Government and Private Schools in personal interview conducted at various schools. Separate sessions were conducted for students.

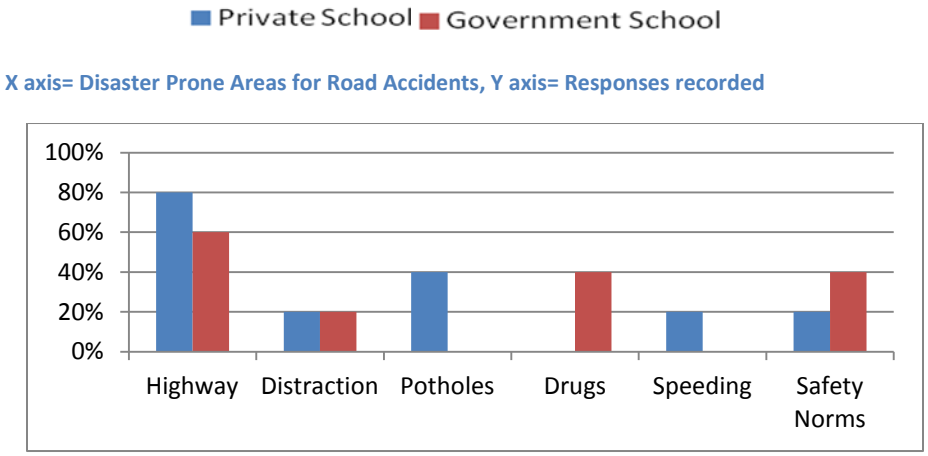


SL. No	Type of Man-made Disaster	Causes of Man-made Disasters	Strategies for Disaster Management	
			Private School	Government Schools
1.	School Fire	• Improper wiring in the school building • Loose connections • Overloading of electrical appliances • Short circuiting, accidents and intentional activities	• Proper use of available resources for school fire • Training to students and staffs • Alertness for school fire • Monitoring for school fire • Alarming system for school fire • Opinion of experts for prevention of school fire. • Guards for prevention of school fire. • Presence of ambulance in school premises. • Presence of fire extinguishers. • Presence of Hose pipes. • Presence of sand bags. • Disaster management plan for school fire. • Response mechanism for school fire. • Community based disaster management.	• Disaster Management planning for school fire. • Capacity building for school fire. • Training to students and staffs • Standard operating procedures for school fires. • Review of disaster management plan. • Presence of first aid kits in school • Presence of dispensary in school • Community based approach for school fire.

Table 6.1: Strategies for disaster management in case of School Fire

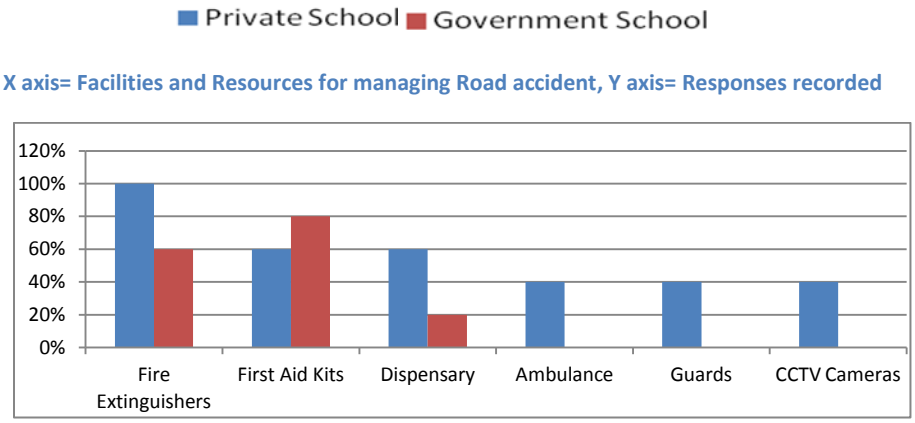
6.2.2 Research Findings on Road Accidents as Manmade Disasters

- **Disaster Prone areas identified for Road accidents as manmade disaster:** The disaster prone areas identified for road accidents as manmade disasters include nearness to Highway (80% Private School reported Highway while 60% Government School reported Highway), Distractions for drivers (20% Private School reported Distractions while 20% Government School reported Distractions), Potholes (40% Private School reported Potholes while No Government School reported Potholes), Drug abuse for drivers (No Private School reported Drugs while 40% Government School reported Drugs), Speeding during driving (20% Private School reported Speeding while No Government School reported Speeding) and non compliance of safety norms and traffic rules (20% Private School reported Non compliance of safety Norms while 40% Government School reported Non compliance of safety norms).



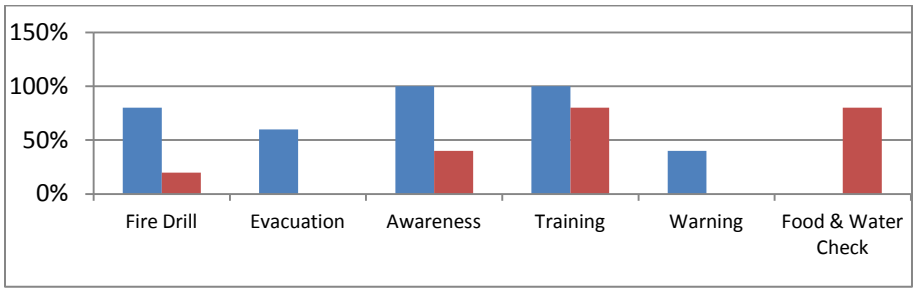
- **Facilities and Resources for managing Road accident as manmade disaster:** The facilities and resources for managing road accident as manmade disaster include fire extinguishers (100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers), first aid kits (60% Private School reported First aid kits while 80% Government School reported First aid kits),

dispensary (60% Private School reported Dispensary while 20% Government School reported Dispensary), ambulance (40% Private School reported Ambulance while No Government School reported Ambulance), guards (40% Private School reported Guards while No Government School reported Guards) and CCTV cameras (40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras).



- **Modern approaches for coping with Road accident as manmade disaster:** The modern approaches for coping with road accident as manmade disaster include fire drill exercises (80% Private School reported Fire Drill while 20% Government School reported Fire Drill), evacuation during disasters (60% Private School reported Evacuation while No Government School reported Evacuation), awareness of different disasters (100% Private School reported Awareness while 40% Government School reported Awareness), training exercises (100% Private School reported Training while 80% Government School reported Training), warning before disasters (40% Private School reported Warning while No Government School reported Warning) and quality check of different resources and conditions (No Private School reported food check while 80% Government School reported food & water check).

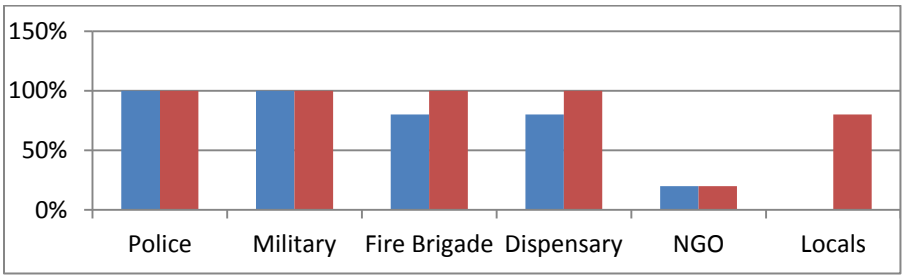
X axis= Modern approaches for coping with Road accident, Y axis= Responses recorded



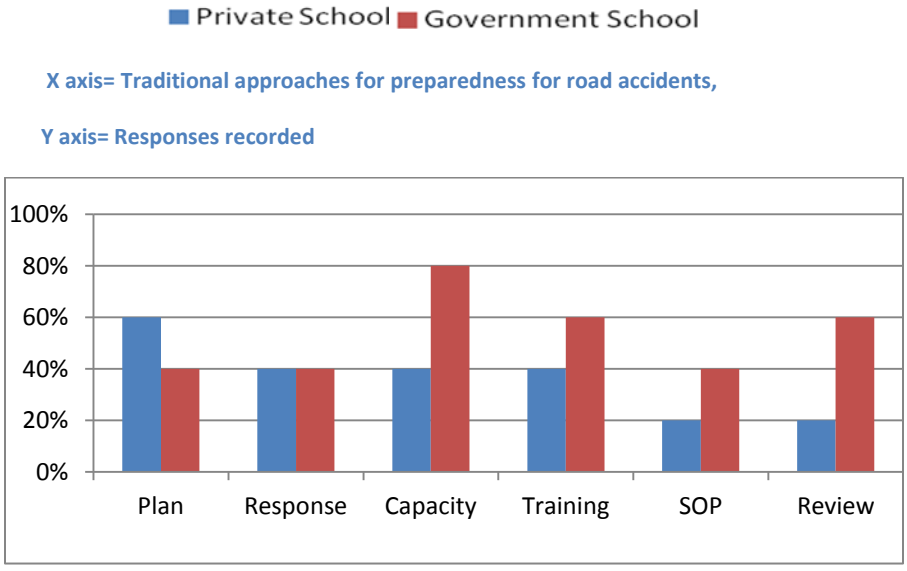
- **Community based preventive disaster management teams for mitigating Road accident as manmade disaster:** The community based disaster management teams identified for mitigating road disaster as manmade disaster are police (100% Private School reported Police while 100% Government School reported Police), military (100% Private School reported Military while 100% Government School reported Military), fire brigade (80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade), dispensary (80% Private School reported Dispensary while 100% Government School reported Dispensary), NGO (20% Private School reported NGO while 20% Government School reported NGO) and local people (No Private School reported Locals while 80% Government School reported Locals).

X axis= Community based preventive disaster management teams for road accidents

Y axis= Responses recorded

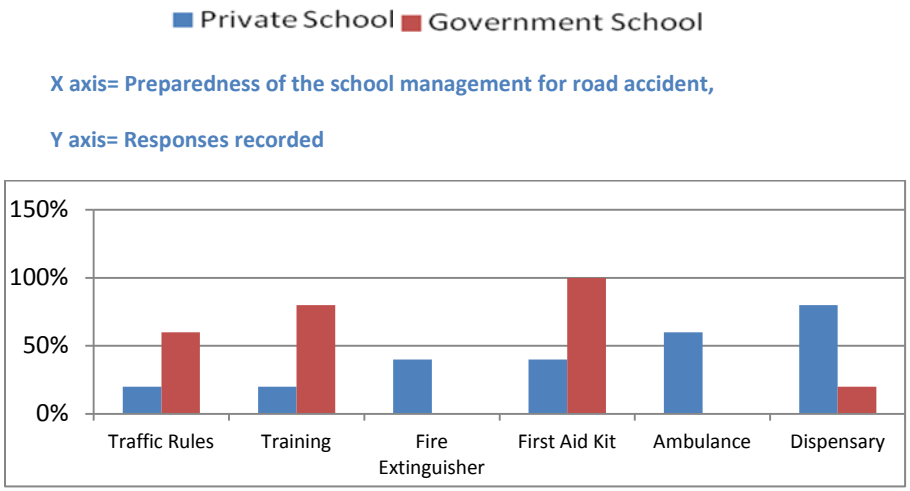


- **Traditional approaches for preparedness and mitigating the effects of Road accident as manmade disaster:** Traditional strategies for preparedness and mitigating the effects of road accident as manmade disaster include planning as per disaster management act (60% Private School reported Plan while 40% Government School reported Plan), response mechanism (40% Private School reported Response while 40% Government School reported Response), capacity building (40% Private School reported Capacity while 80% Government School reported Capacity), training exercises for students and other staffs of schools (40% Private School reported Training while 60% Government School reported Training), standard operating procedure (20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures) and review of plans designed for management of school fire as manmade disaster (20% Private School reported Review while 60% Government School reported Review).



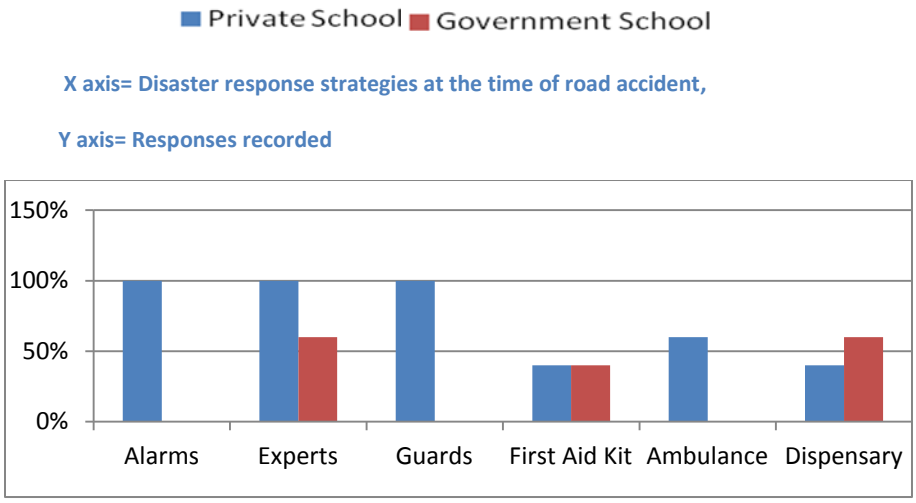
- **Preparedness of the school management for road accident as manmade disaster:** The resources available to the schools for preparedness by school management for road accident includes ambulance (60% Private School reported Ambulance while No

Government School reported Ambulance), first aid kit (40% Private School reported First Aid Kits while 100% Government School reported First Aid Kits), dispensary, fire extinguishers (40% Private School reported Fire extinguisher while No Government School reported Fire extinguisher), training to students and supporting staffs (20% Private School reported Training while 80% Government School reported Training), imparting knowledge about traffic rules to students as well as transportation staffs (20% Private School reported Traffic Rules while 60% Government School reported Traffic Rules), dispensary (80% Private School reported Dispensary while 20% Public School reported Dispensary) etc.

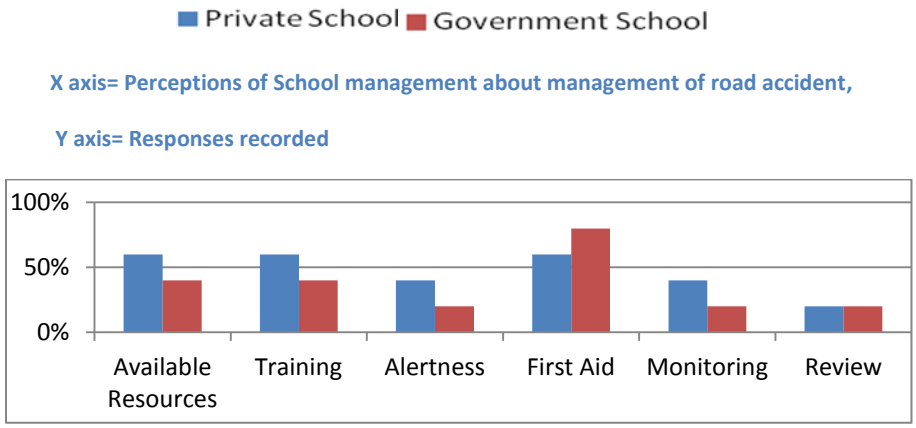


- **Disaster response strategies at the time of road accident as manmade disaster:** The various disaster response strategies at the time of road accident as manmade disaster include alarming systems (100% Private School reported Alarms while No Government Public School reported Alarms), expert's opinions (100% Private School reported Experts while 60% Government School reported Experts), guards (100% Private School reported Guards while No Government School reported Guards), first aid kits (40% Private School reported First Aid Kits while 40% Government reported First Aid Kits), availability of ambulance (60% Private School reported Ambulance

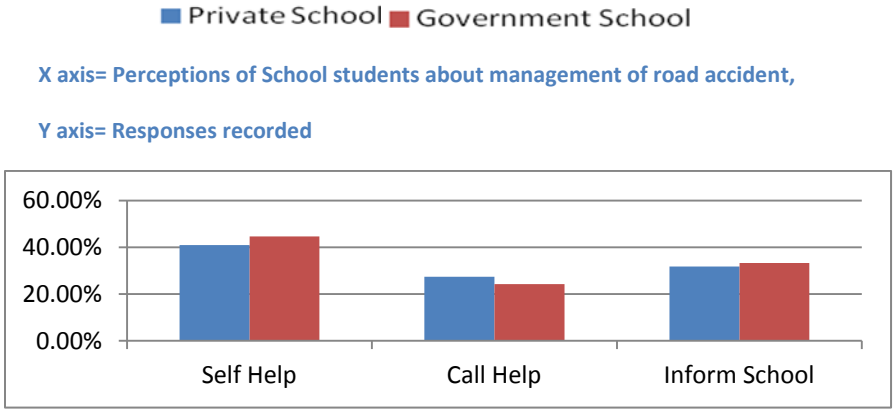
while No Government Public School reported Ambulance), presence of dispensary in the school premises (40% Private School reported Dispensary while 60% Government School reported Dispensary) etc.



- **Perceptions of School management about management of road accident as manmade disaster:** As per the perceptions of school management, for the management of road accident as manmade disasters available resources are very important which includes mock drills, fire extinguishers, response teams etc (60% Private School reported Available Resources while 40% Government School reported Available Resources). Training to school staffs and students (60% Private School reported Training while 40% Government School reported Training), alertness for accidents (40% Private School reported Alertness while 20% Government School reported Alertness), continuous monitoring (40% Private School reported Monitoring while 20% Government School reported Monitoring), presence of first aid kits (60% Private School reported First Aid while 80% Government School reported First Aid) and review of existing disaster management plans etc (20% Private School reported Review while 20% Government School reported Review).



- **Perceptions of School students about management of road accident as manmade disaster:** Students call for help from the nearby areas and from the people (27.40% Private School reported Call help while 24.00% Government School reported call help), sometimes they call to police or ambulance by means of telephone call for help. First aid serves as immediate relief to the patients who have met with road accidents. Immediately after road an accident, information to authority serves as quick measure for arrangement of all resources and mitigation of the risk (31.70% Private School reported Informing Authority while 33.00% Government School reported Informing Authority). Sometimes students prefer for self help which is a part of community based disaster management (40.90% Private School reported Self help while 45.00% Government School reported Self help).

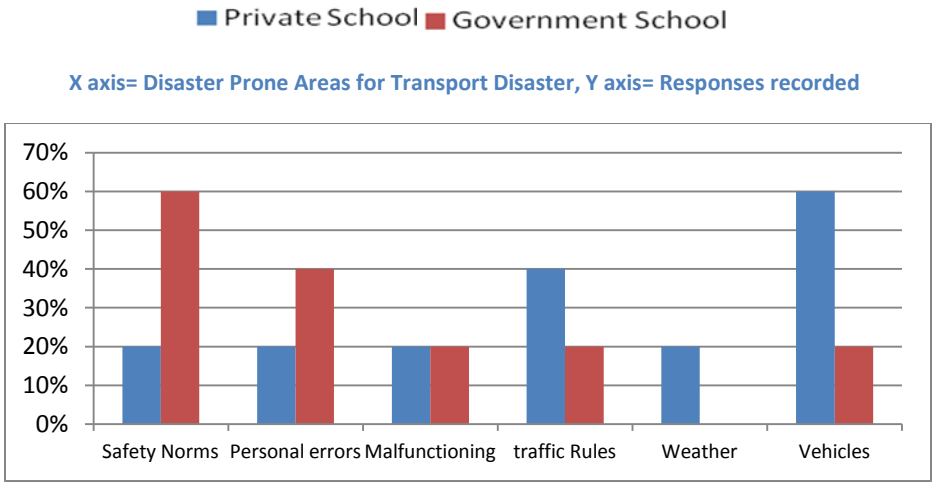


SL. No	Type of Man-made Disaster	Causes of Man-made Disasters	Strategies for Disaster Management	
			Private School	**Government Schools**
2.	Road Accident	• Nearness to highway • Distractions for drivers • Potholes • Drug abuse for drivers • Speeding during driving • Non compliance of safety norms and traffic rules • Negligence on the part of school management.	• Presence of Ambulance in schools • Presence of Dispensary in premises. • Disaster Management Plan for Road accidents • Response mechanism for road accidents • Alarming system for road accidents • Prevention of road accidents by experts opinion • Alertness for road accidents • Monitoring for road accidents • Community based approaches	• Compliance to traffic rules by students. • Training to students and staffs • Presence of first aid kits in schools. • Presence of dispensary in schools. • Community based approaches

Table 6.2: Strategies for disaster management in case of Road Accidents

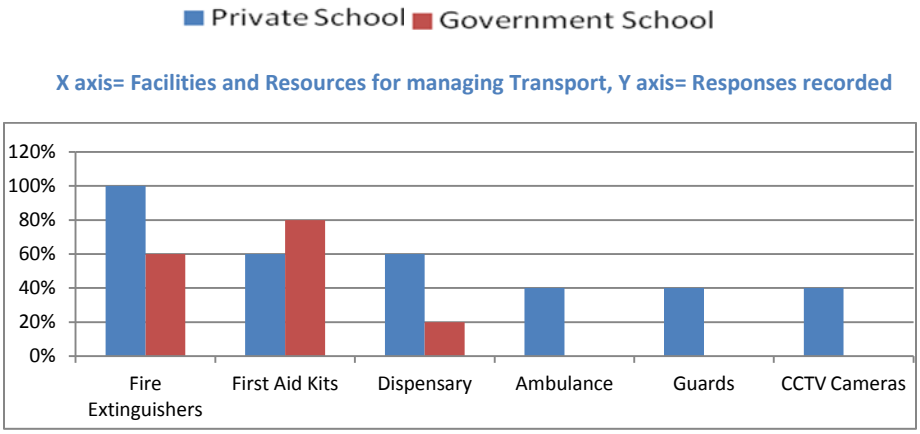
6.2.3 Research Findings on Transport Disaster as Manmade Disasters

- **Disaster Prone areas identified for Transport disaster as manmade disaster:** The disaster prone areas identified for transport disaster as manmade disaster include non compliance to safety norms (20% Private School reported Safety Norms while 60% Government School reported Safety Norms), personal errors (20% Private School reported Personal errors while 40% Government School reported Personal errors), malfunctioning of vehicles (20% Private School reported Malfunctioning while 20% Government School reported Malfunctioning), non observance of traffic rules (40% Private School reported Traffic rules while 20% Government School reported Traffic rules), weather condition (20% Private School reported Weather while No Government School reported weather) and non maintenance of vehicles (60% Private School reported Vehicles while 20% Government School reported Vehicles).

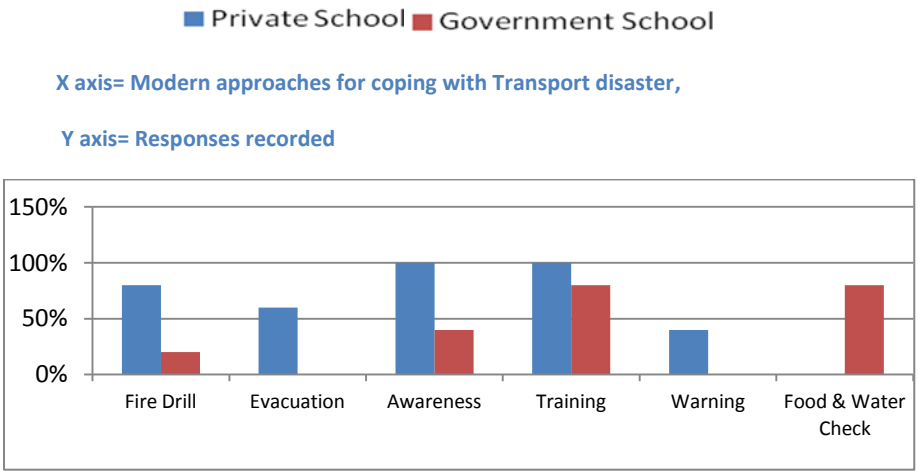


- **Facilities and Resources for managing Transport disaster as manmade disaster:** The facilities and resources for managing transport disaster as manmade disaster include fire extinguishers (100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers), first aid kits (60% Private School reported First aid kits while 80% Government School

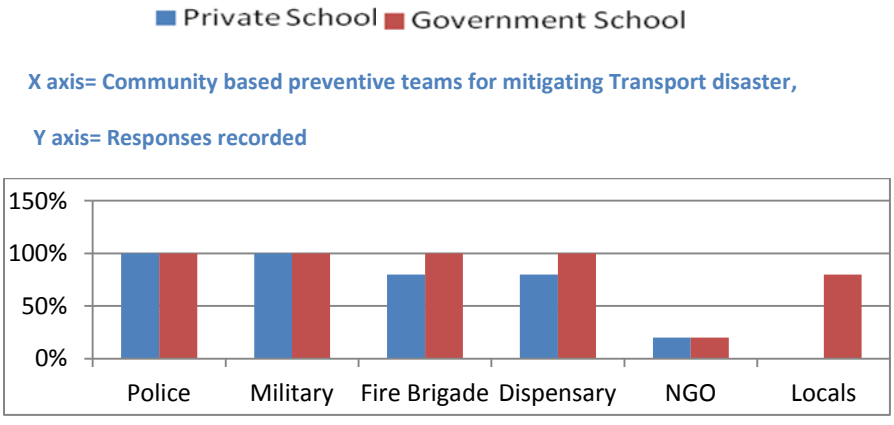
reported First aid kits), dispensary (60% Private School reported Dispensary while 20% Government School reported Dispensary), ambulance (40% Private School reported Ambulance while No Government School reported Ambulance), guards (40% Private School reported Guards while No Government School reported Guards) and CCTV cameras (40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras).



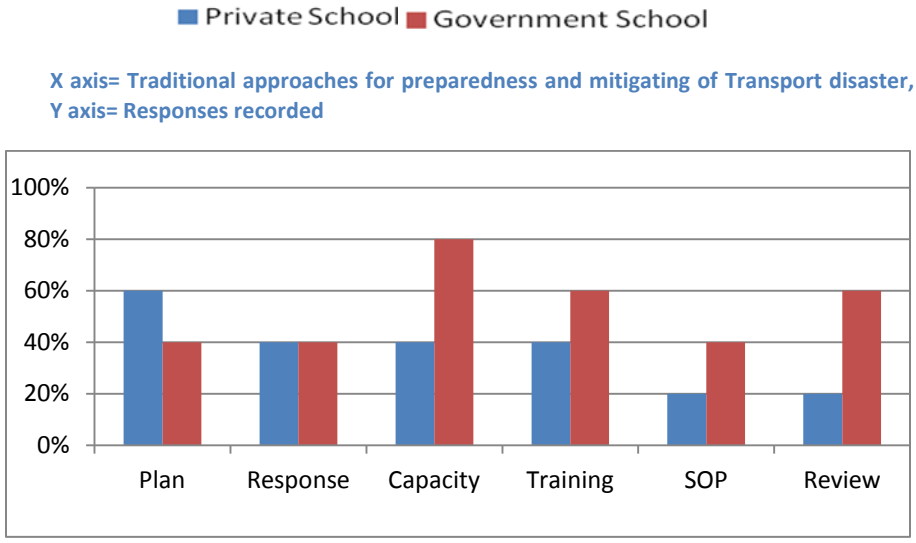
- **Modern approaches for coping with Transport disaster as manmade disaster:** The modern approaches for coping with transport disaster as manmade disaster include fire drill exercises (80% Private School reported Fire Drill while 20% Government School reported Fire Drill), evacuation during disasters (60% Private School reported Evacuation while No Government School reported Evacuation), awareness of different disasters (100% Private School reported Awareness while 40% Government School reported Awareness), training exercises (100% Private School reported Training while 80% Government School reported Training), warning before disasters (40% Private School reported Warning while No Government School reported Warning) and quality check of different resources and conditions (No Private School reported food check while 80% Government School reported food & water check).



❖ **Community based preventive disaster management teams for mitigating Transport disaster as manmade disaster:** The community based disaster management teams identified for mitigating transport disaster as manmade disaster are police (100% Private School reported Police while 100% Government School reported Police), military (100% Private School reported Military while 100% Government School reported Military), fire brigade (80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade), dispensary (80% Private School reported Dispensary while 100% Government School reported Dispensary), NGO (20% Private School reported NGO while 20% Government School reported NGO) and local people (No Private School reported Locals while 80% Government School reported Locals).

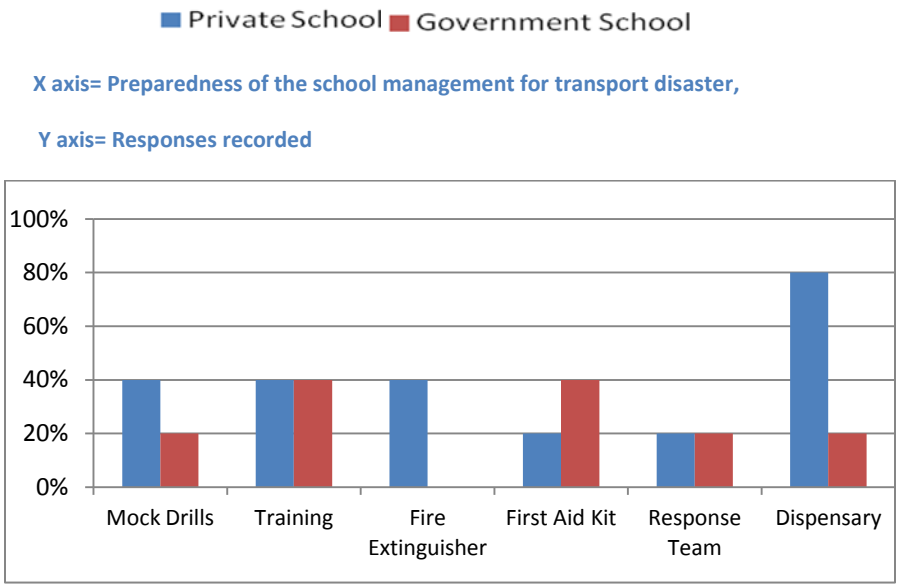


- **Traditional approaches for preparedness and mitigating the effects of Transport disaster as manmade disaster:** Traditional strategies for preparedness and mitigating the effects of transport disaster as manmade disaster include planning as per disaster management act (60% Private School reported Plan while 40% Government School reported Plan), response mechanism (40% Private School reported Response while 40% Government School reported Response), capacity building (40% Private School reported Capacity while 80% Government School reported Capacity), training exercises for students and other staffs of schools (40% Private School reported Training while 60% Government School reported Training), standard operating procedure (20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures) and review of plans designed for management of school fire as manmade disaster (20% Private School reported Review while 60% Government School reported Review).



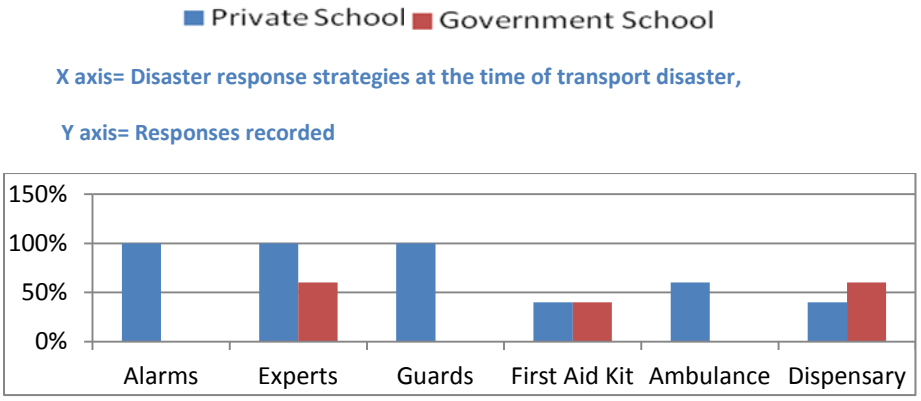
- **Preparedness of the school management for transport disaster as manmade disaster:** The resources available to the schools for preparedness by school management for transport safety includes mock drills (40% Private School reported Mock Drills while 20%

Government School reported Mock Drills), training to students as well as support staffs (40% Private School reported Training while 40% Government School reported Training as preparedness), fire extinguishers (40% Private School reported Fire extinguisher while No Government School reported Fire extinguisher), response teams (20% Private School reported Response Team while 20% Government School reported Response Team), first aid kits (20% Private School reported First Aid Kits while 40% Government School reported First Aid Kits), dispensary (80% Private School reported Dispensary while 20% Government School reported Dispensary), providing information to students and staffs about road safety etc.



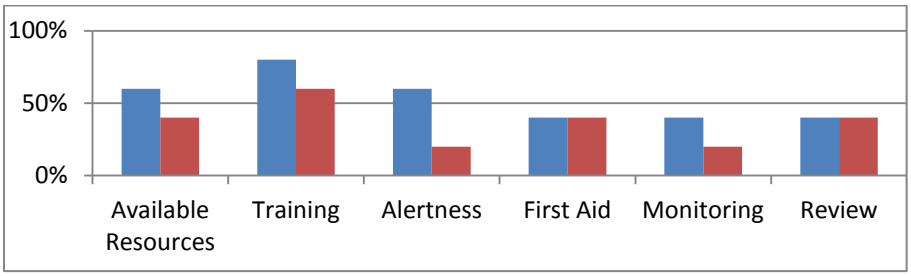
- **Disaster response strategies at the time of transport disaster as manmade disaster:** The various disaster response strategies at the time of transport disaster as manmade disaster include alarming systems (100% Private School reported Alarms while No Government Public School reported Alarms), expert's opinions (100% Private School reported Experts while 60% Government School reported Experts), guards (100% Private School reported Guards while No Government School reported Guards), first aid kits (40% Private

School reported First Aid Kits while 40% Government reported First Aid Kits), availability of ambulance (60% Private School reported Ambulance while No Government Public School reported Ambulance), presence of dispensary in the school premises (40% Private School reported Dispensary while 60% Government School reported Dispensary) etc.



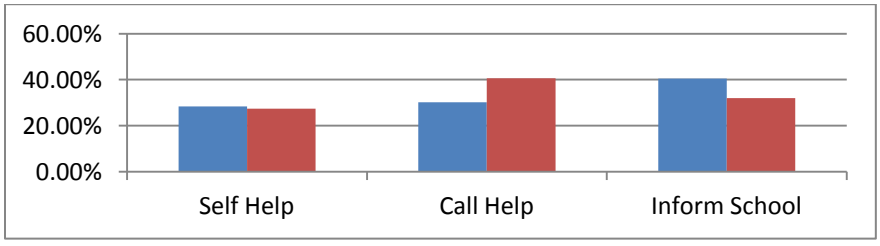
- **Perceptions of School management about management of transport disaster as manmade disaster:** As per the perceptions of school management, for the management of transport safety as manmade disasters available resources are very important which includes mock drills, fire extinguishers, response teams etc (60% Private School reported Available Resources while 40% Government School reported Available Resources). Training to school staffs and students (80% Private School reported Training while 60% Government School reported Training), alertness for accidents (60% Private School reported Alertness while 20% Government School reported Alertness), continuous monitoring (40% Private School reported Monitoring while 20% Government School reported Monitoring), presence of first aid kits (40% Private School reported First Aid while 40% Government School reported First Aid), review of existing disaster management plans (20% Private School reported Review while 20% Government School reported Review), arranging funds for disaster management activities etc.

X axis= Perceptions of School management for transport disaster, Y axis= Responses recorded



- **Perceptions of School students about management of transport disaster as manmade disaster:** Information to authority which includes principal, teachers, disaster management teams etc that helps in quick collection of resources to combat disaster situations (40.50% Private School reported Informing Authority while 32.00% Government School reported Informing Authority). Some students prefer self help to their class mates or other injured persons like carrying the victims to hospitals, providing first aid to them etc (28.40% Private School reported self help while 27.00% Government School reported Self help). Some students prefer calling for help to different organizations like police, ambulance, parents, school management etc. for effective management of the situation (30.10% Private School reported Call help while 41.00% Government School reported call help).

X axis= Perceptions of School students for transport disaster, Y axis= Responses recorded

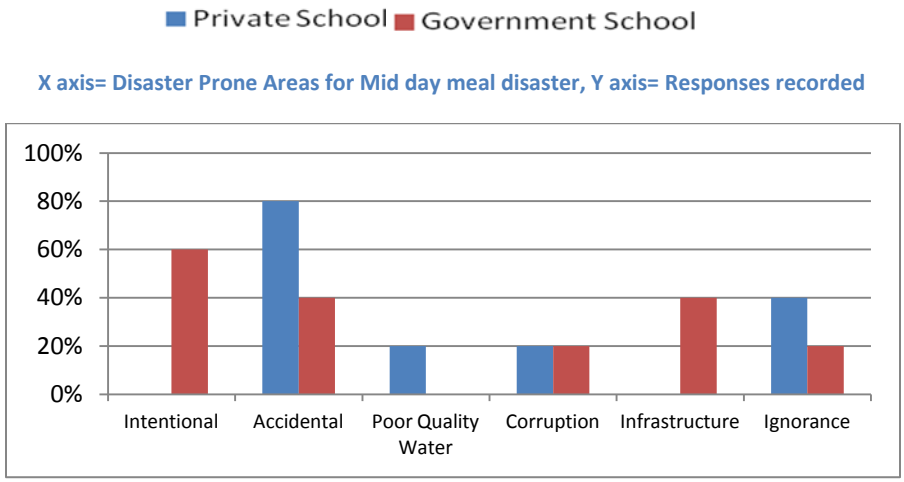


SL. No	Type of Man-made Disaster	Causes of Man-made Disasters	Strategies for Disaster Management	
			Private School	Government Schools
3.	Transport Disasters	• Non compliance to safety norms • Personal errors • malfunctioning of vehicles • non observance of traffic rules • weather condition and non maintenance of vehicles	• Guards to check transport disasters • Experts opinions to prevent disasters • Ambulance presence in premises • Drills for students • Training to students • Development of disaster plan • Community based approaches	• Capacity building • Training to staffs and students • Standard Operating procedure for transport disasters • Review of Disaster Management Plan • Presence of Dispensary in schools • Mock drills in schools • Training to staffs and students. • Community based approaches

Table 6.3: Strategies for disaster management in case of Transport Disasters

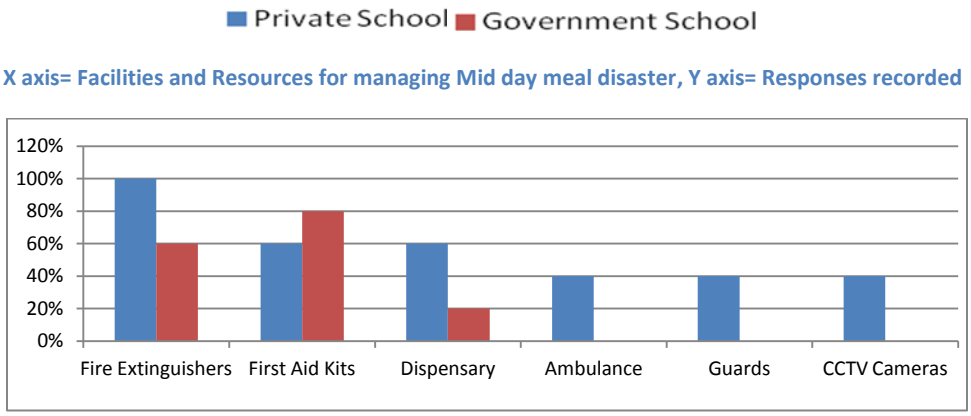
6.2.4 Research Findings on Mid day Meal Disaster as Manmade Disasters

- **Disaster Prone areas identified for Mid day meal disaster as manmade disaster:** The disaster prone areas identified for mid day meal disaster as manmade disaster include intentional activities like adulteration (No Private School reported Intentional while 60% Government School reported Intentional activities), accidental activities (80% Private School reported Accidental while 40% Government School reported Accidental activities), bad quality meals (20% Private School reported poor quality water while No Government School reported poor quality water issues), corruption (20% Private School reported Corruption while 20% Government School reported Corruption activities), poor infrastructural facilities (No Private School reported Infrastructure while 40% Government School reported Infrastructure) and ignorance of the staffs (40% Private School reported Ignorance while 20% Government School reported Ignorance activities).



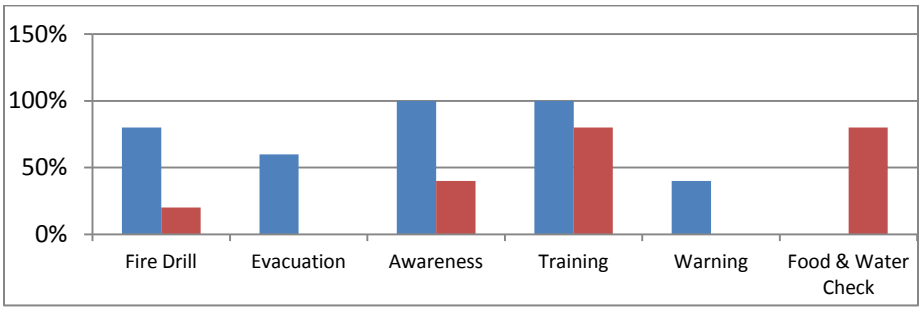
- **Facilities and Resources for managing Mid day meal disaster as manmade disaster:** The facilities and resources for managing mid day meal disaster as manmade disaster include fire extinguishers (100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers), first aid kits (60% Private School

reported First aid kits while 80% Government School reported First aid kits), dispensary (60% Private School reported Dispensary while 20% Government School reported Dispensary), ambulance (40% Private School reported Ambulance while No Government School reported Ambulance), guards (40% Private School reported Guards while No Government School reported Guards) and CCTV cameras (40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras).



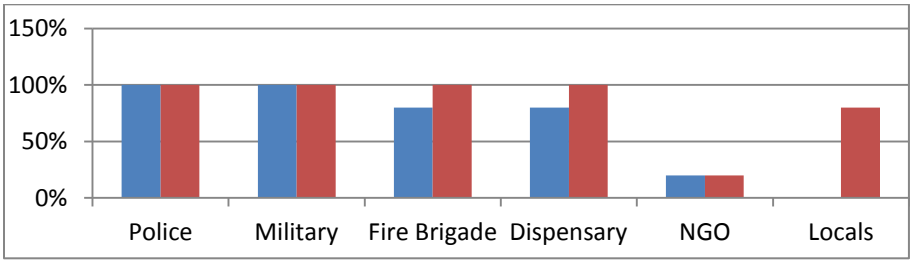
❖ **Modern approaches for coping with midday meal disaster as manmade disaster:** The modern approaches for coping with transport disaster as manmade disaster include fire drill exercises (80% Private School reported Fire Drill while 20% Government School reported Fire Drill), evacuation during disasters (60% Private School reported Evacuation while No Government School reported Evacuation), awareness of different disasters (100% Private School reported Awareness while 40% Government School reported Awareness), training exercises (100% Private School reported Training while 80% Government School reported Training), warning before disasters (40% Private School reported Warning while No Government School reported Warning) and quality check of different resources and conditions (No Private School reported food check while 80% Government School reported food & water check).

X axis= Modern approaches for coping with midday meal disaster, Y axis= Responses recorded



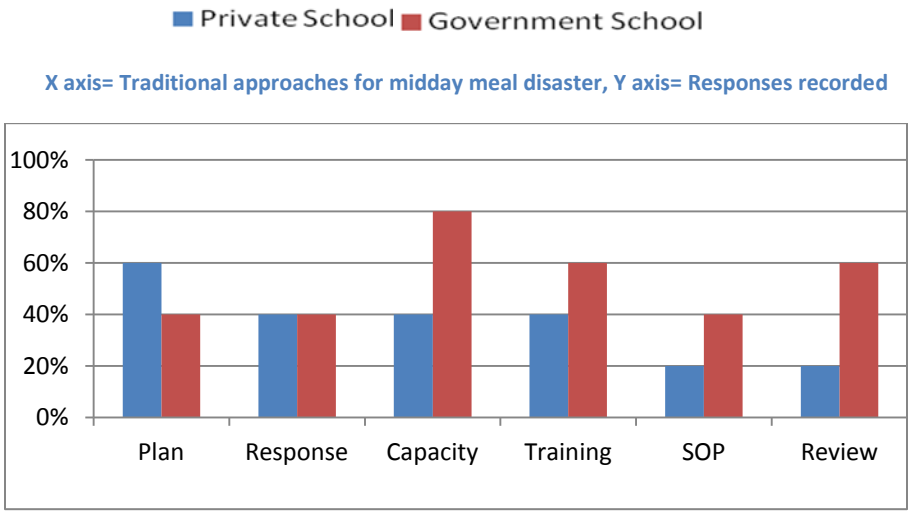
- **Community based preventive disaster management teams for mitigating midday meal disaster as manmade disaster:** The community based disaster management teams identified for mitigating mid day meal disaster are police (100% Private School reported Police while 100% Government School reported Police), military (100% Private School reported Military while 100% Government School reported Military), fire brigade (80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade), dispensary (80% Private School reported Dispensary while 100% Government School reported Dispensary), NGO (20% Private School reported NGO while 20% Government School reported NGO) and local people (No Private School reported Locals while 80% Government School reported Locals).

X axis= Community based teams for midday meal disaster, Y axis= Responses recorded



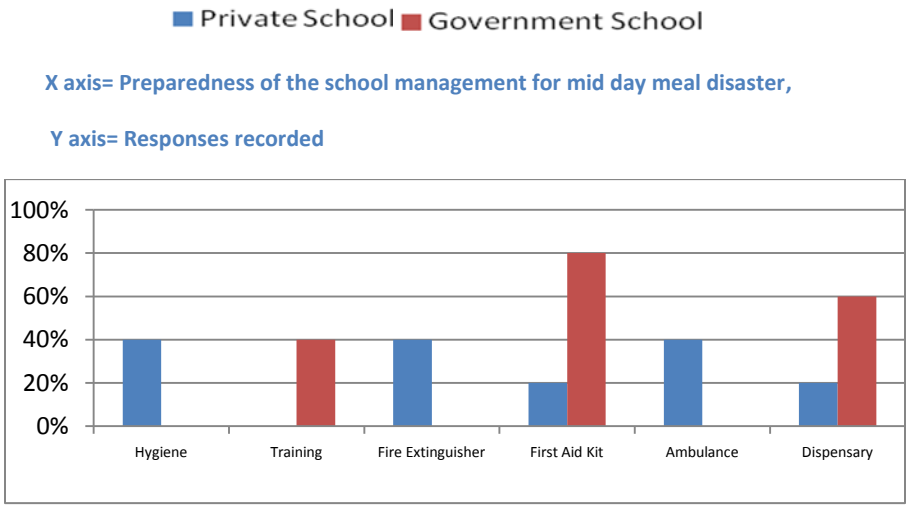
- **Traditional approaches for preparedness and mitigating the effects of midday meal disaster as manmade disaster:** Traditional

strategies for preparedness and mitigating the effects of mid day meal disaster as manmade disaster include planning as per disaster management act (60% Private School reported Plan while 40% Government School reported Plan), response mechanism (40% Private School reported Response while 40% Government School reported Response), capacity building (40% Private School reported Capacity while 80% Government School reported Capacity), training exercises for students and other staffs of schools (40% Private School reported Training while 60% Government School reported Training), standard operating procedure (20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures) and review of plans designed for management of school fire as manmade disaster (20% Private School reported Review while 60% Government School reported Review).



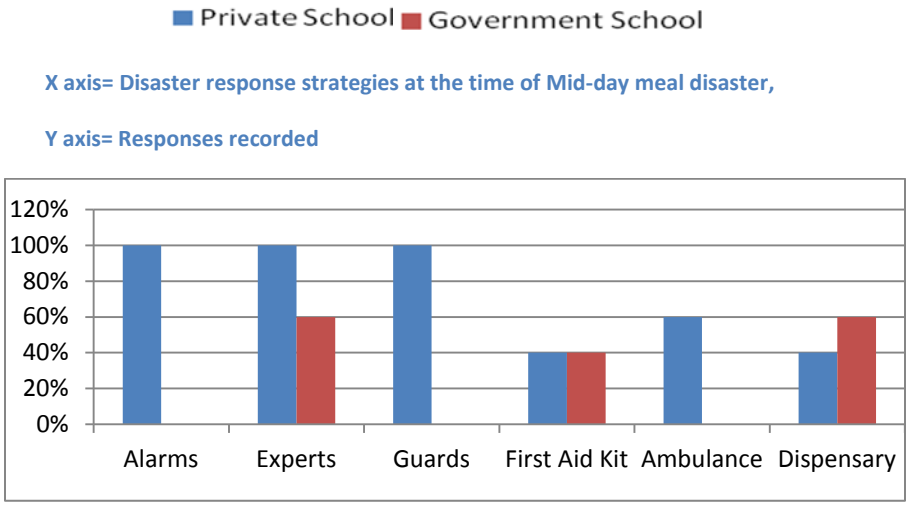
- **Preparedness of the school management for mid day meal disaster as manmade disaster:** The resources available to the schools for preparedness by school management for mid day meal disaster includes maintenance of hygiene in kitchen and in area where food is serves (40% Private School reported Hygiene while No Government School reported Hygiene), training to the staffs how good quality food is prepared and served to students etc (No Private School reported

Training while 40% Government School reported Training). The other resources include fire extinguishers used to control fires in kitchen and adjacent areas (40% Private School reported Fire extinguisher while No Government School reported Fire extinguisher). Water sources such as hand pumps, wells, water storage, hose pipes, sand bags etc for extinguishing fire, first aid kits which provide immediate relief to the burning cases (20% Private School reported First Aid Kits while 80% Government School reported First Aid Kits), ambulances (40% Private School reported Ambulance while No Government School reported Ambulance) and dispensary (20% Private School reported Dispensary while 60% Government School reported Dispensary). The quality checks procedures involving school staffs and external evaluators to test the quality of prepared food and to prevent any adulteration activities.

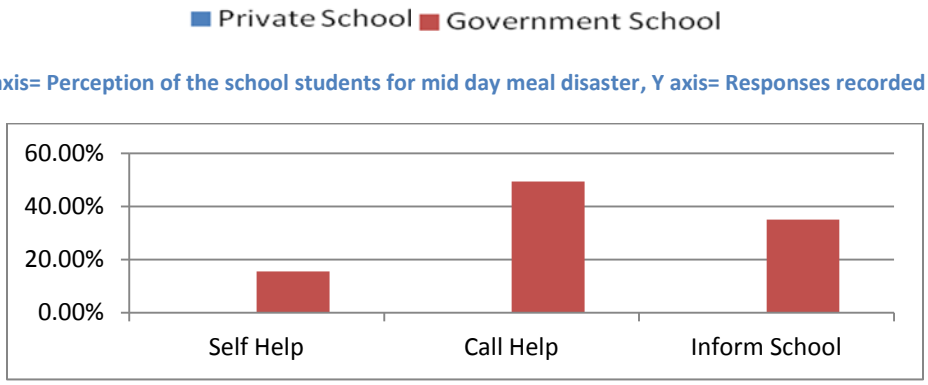


- **Disaster response strategies at the time of Mid-day meal disaster as manmade disaster:** The various disaster response strategies at the time of Mid-day meal disaster as manmade disaster include alarming systems (100% Private School reported Alarms while No Government Public School reported Alarms), expert's opinions (100% Private School reported Experts while 60% Government School reported Experts), guards (100% Private School reported Guards while No

Government School reported Guards), first aid kits (40% Private School reported First Aid Kits while 40% Government reported First Aid Kits), availability of ambulance (60% Private School reported Ambulance while No Government Public School reported Ambulance), presence of dispensary in the school premises (40% Private School reported Dispensary while 60% Government School reported Dispensary) etc.



- **Perception of the school students for mid day meal disaster as manmade disaster:** While some students think of informing the authority when any disaster occurs (No Private School reported informing authority while 35.00% Government School reported informing authority) while other think of self help to the injured persons (No Private School reported self help while 15.60% Government School reported Self help) while other students think of calling help from nearby places or outside (No Private School reported call help while 49.40% Government School reported call help). Some students rely on first aid as immediate response and relief mechanism while some students think of written documented disaster management plan about what to do in such conditions. Implementation of disaster management plan and periodic review of it makes a better plan for management of various manmade disasters.

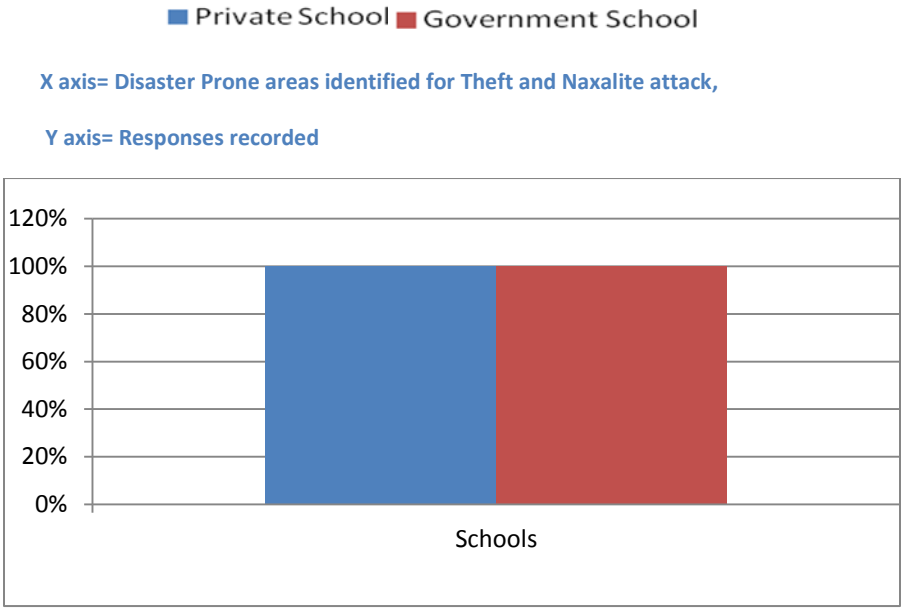


SL. No	Type of Man-made Disasters	Causes of Man-made Disasters	Strategies for Disaster Management	
			Private School	Government Schools
4.	Mid-day meal Disasters	• Intentional activities like adulteration • Accidental activities • Bad quality meals • Corruption • Poor infrastructural facilities • Ignorance of the staffs	• Alarming system • Experts opinion to prevent disasters • Security Personnel • Ambulance use • Maintenance of Hygiene • Fire extinguishers use	• Use of First Aid Kits • Presence of Dispensary • Capacity Building • Review of Plans • Training to staffs and students • Community based approaches

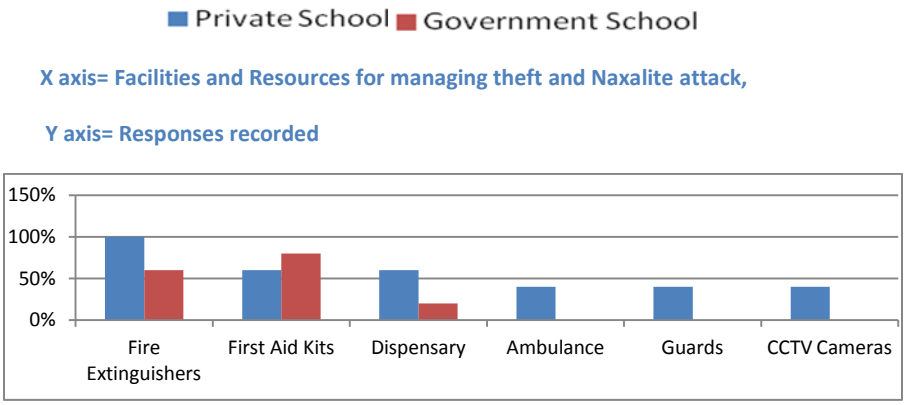
Table 6.4: Strategies for disaster management in case of Mid-day meal Disasters

6.2.5 Research Findings on Theft and Naxalite Attack as Manmade Disasters

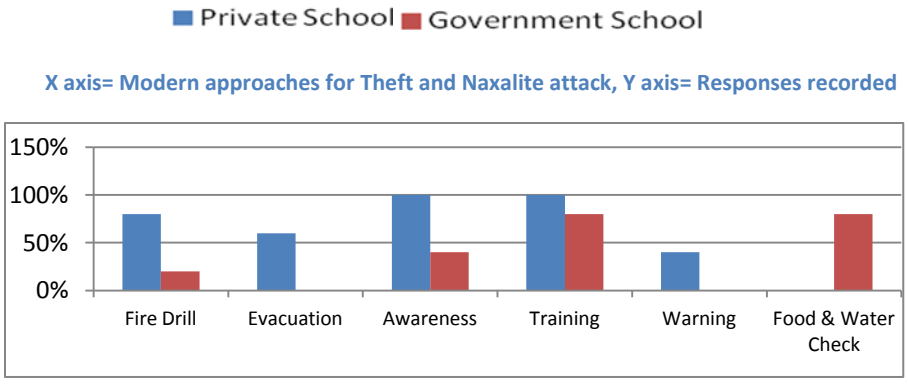
- **Disaster Prone areas identified for Theft and Naxalite attack as manmade disaster:** The disaster prone areas identified for theft and Naxalite attack as manmade disaster include 100 % Government and 100 % Private schools premises.



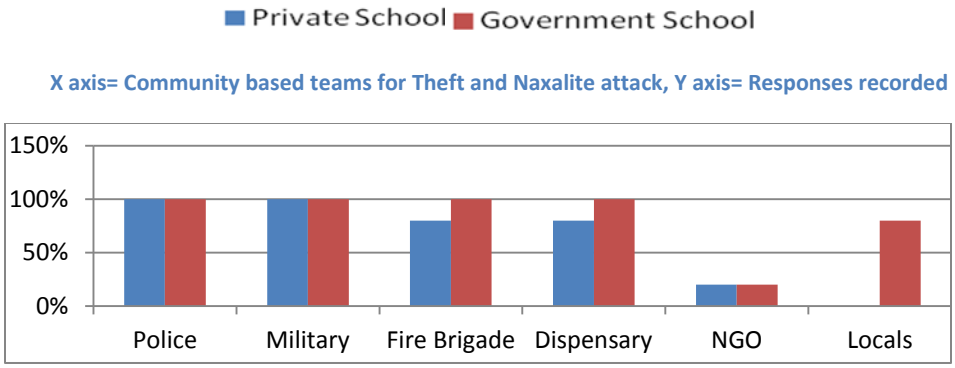
- **Facilities and Resources for managing theft and Naxalite attack as manmade disaster:** The facilities and resources for managing theft and Naxalite attack as manmade disaster include fire extinguishers (100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers), first aid kits (60% Private School reported First aid kits while 80% Government School reported First aid kits), dispensary (60% Private School reported Dispensary while 20% Government School reported Dispensary), ambulance (40% Private School reported Ambulance while No Government School reported Ambulance), guards (40% Private School reported Guards while No Government School reported Guards) and CCTV cameras (40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras).



❖ **Modern approaches for coping with Theft and Naxalite attack as manmade disaster:** The modern approaches for coping with theft and Naxalite attack as manmade disaster include fire drill exercises (80% Private School reported Fire Drill while 20% Government School reported Fire Drill), evacuation during disasters (60% Private School reported Evacuation while No Government School reported Evacuation), awareness of different disasters (100% Private School reported Awareness while 40% Government School reported Awareness), training exercises (100% Private School reported Training while 80% Government School reported Training), warning before disasters (40% Private School reported Warning while No Government School reported Warning) and quality check of different resources and conditions (No Private School reported food check while 80% Government School reported food & water check).

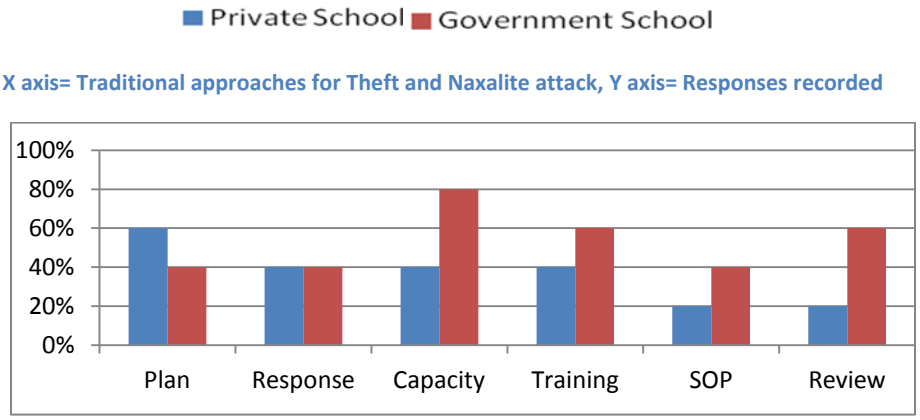


- **Community based preventive disaster management teams for mitigating Theft and Naxalite attack as manmade disaster:** The community based disaster management teams identified for mitigating theft and Naxalite attack as manmade disaster are police (100% Private School reported Police while 100% Government School reported Police), military (100% Private School reported Military while 100% Government School reported Military), fire brigade (80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade), dispensary (80% Private School reported Dispensary while 100% Government School reported Dispensary), NGO (20% Private School reported NGO while 20% Government School reported NGO) and local people (No Private School reported Locals while 80% Government School reported Locals).

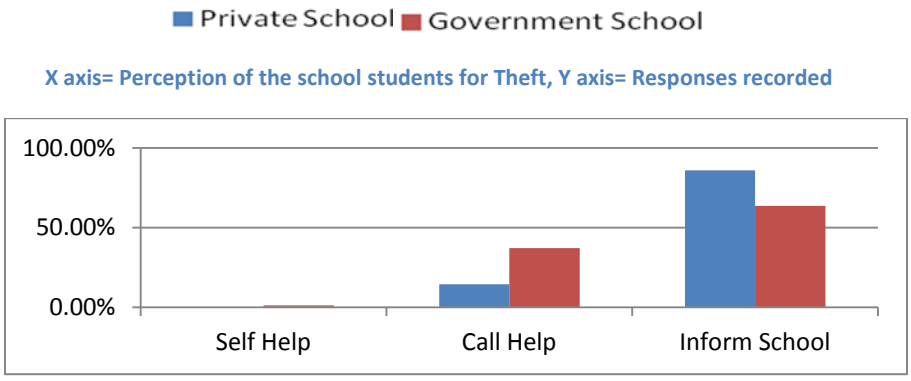


- **Traditional approaches for preparedness and mitigating the effects of Theft and Naxalite attack as manmade disaster:** Traditional strategies for preparedness and mitigating the effects of theft and Naxalite attack as manmade disaster include planning as per disaster management act (60% Private School reported Plan while 40% Government School reported Plan), response mechanism (40% Private School reported Response while 40% Government School reported Response), capacity building (40% Private School reported Capacity while 80% Government School reported Capacity), training exercises for students and other staffs of schools (40% Private School

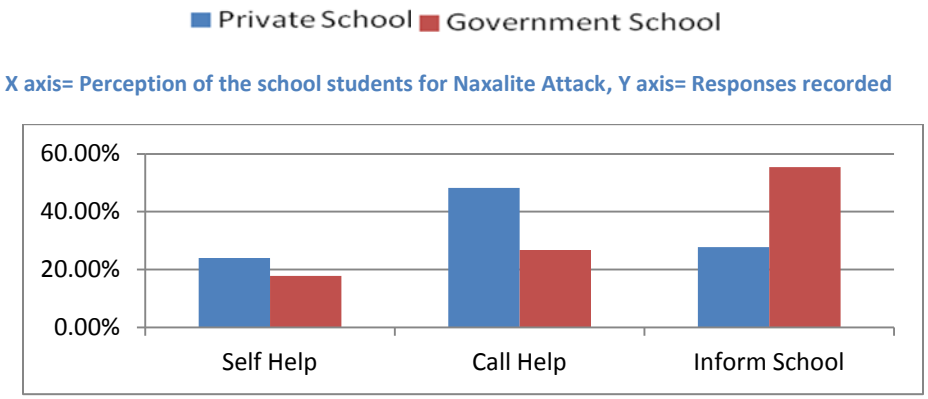
reported Training while 60% Government School reported Training), standard operating procedure (20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures) and review of plans designed for management of school fire as manmade disaster (20% Private School reported Review while 60% Government School reported Review).



- **Perception of the school students for Theft as manmade disaster:** While some students think of informing the authority when any disaster occurs (85.80% Private School reported Informing Authority while 63.60% Government School reported Informing Authority) while other think of self help (No Private School reported self help while 1.20% Government School reported Self help) while other students think of calling help from nearby places or outside (14.40% Private School reported Call help while 37.20% Government School reported call help).



❖ **Perception of the school students for Naxalite Attack as manmade disaster:** While some students think of informing the authority when any disaster occurs (27.80% Private School reported Informing Authority while 55.40% Government School reported Informing Authority) while other think of self help (24.00% Private School reported self help while 17.80% Government School reported Self help) while other students think of calling help from nearby places or outside (48.20% Private School reported Call help while 26.80% Government School reported call help).



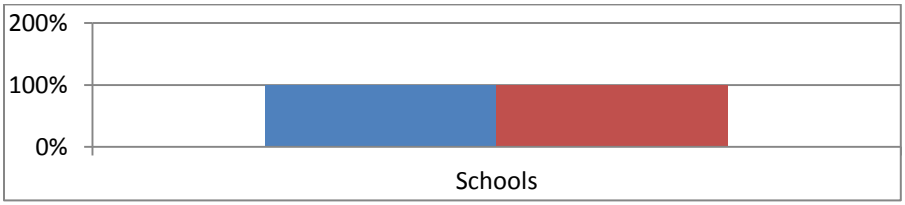
SL. No	Type of Man-made Disaster	Causes of Man-made Disasters	Strategies for Disaster Management	
			Private School	Government Schools
5.	Theft and Naxalite Attack as Manmade Disasters	• Miscellaneous	• Drill Exercises • Evacuation in case of attacks • Awareness among students • Training to staffs and students • Warning system • Planning document for attacks	• Capacity building for attacks • Training to staffs and students • Standard Operating Procedure for attacks • Review of existing plans • Response for attacks

Table 6.5: Strategies for disaster management in case of Theft & Naxalite attack

6.2.6 Research Findings on Building Disaster as Manmade Disasters

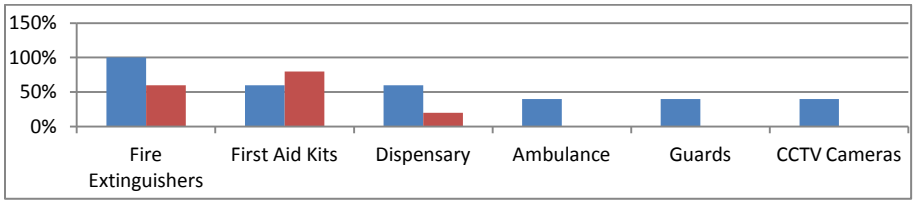
- **Disaster Prone areas identified for Building disaster as manmade disaster:** The disaster prone areas identified for building disaster as manmade disaster include government and public schools where bad conditions of building can result into disaster.

X axis= Disaster Prone areas identified for Building disaster, Y axis= Responses recorded

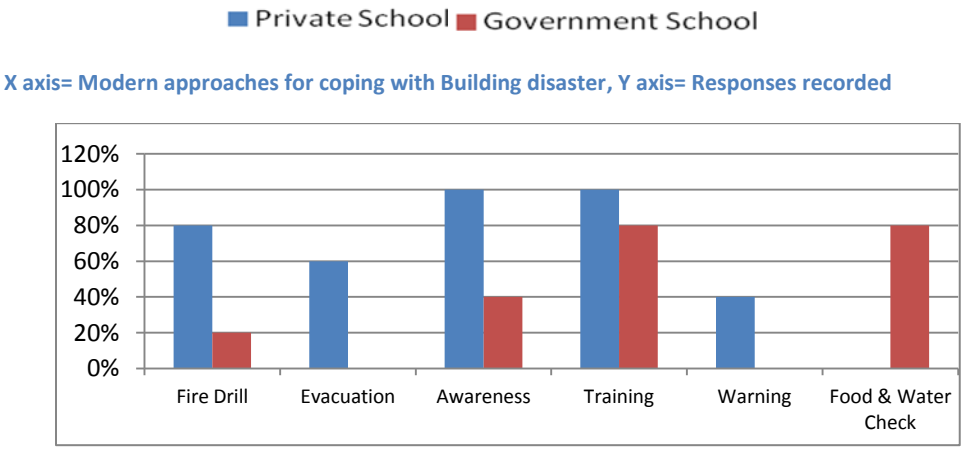


- **Facilities and Resources for managing building disaster as manmade disaster:** The facilities and resources for managing building disaster as manmade disaster include fire extinguishers (100% Private School reported Fire Extinguishers while 60% Government School reported Fire Extinguishers), first aid kits (60% Private School reported First aid kits while 80% Government School reported First aid kits), dispensary (60% Private School reported Dispensary while 20% Government School reported Dispensary), ambulance (40% Private School reported Ambulance while No Government School reported Ambulance), guards (40% Private School reported Guards while No Government School reported Guards) and CCTV cameras (40% Private School reported CCTV Cameras while No Government School reported CCTV Cameras).

X axis= Facilities and Resources for managing building disaster, Y axis= Responses recorded

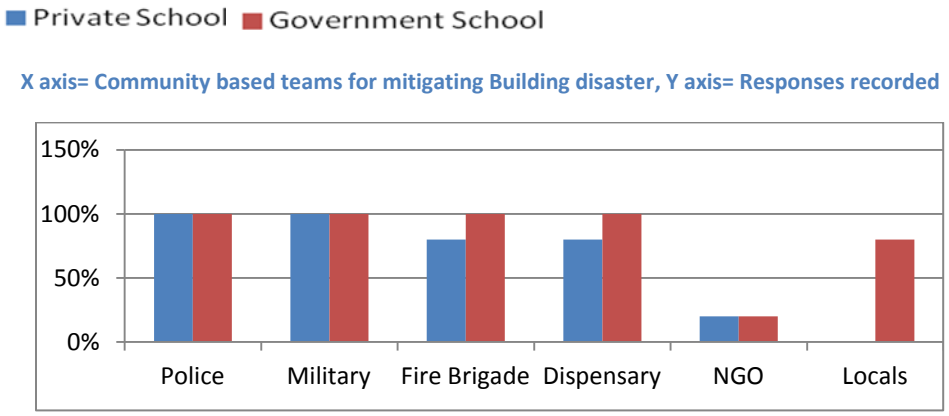


❖ **Modern approaches for coping with Building disaster as manmade disaster:** The modern approaches for coping with building disaster as manmade disaster include fire drill exercises (80% Private School reported Fire Drill while 20% Government School reported Fire Drill), evacuation during disasters (60% Private School reported Evacuation while No Government School reported Evacuation), awareness of different disasters (100% Private School reported Awareness while 40% Government School reported Awareness), training exercises (100% Private School reported Training while 80% Government School reported Training), warning before disasters (40% Private School reported Warning while No Government School reported Warning) and quality check of different resources and conditions (No Private School reported food check while 80% Government School reported food & water check).



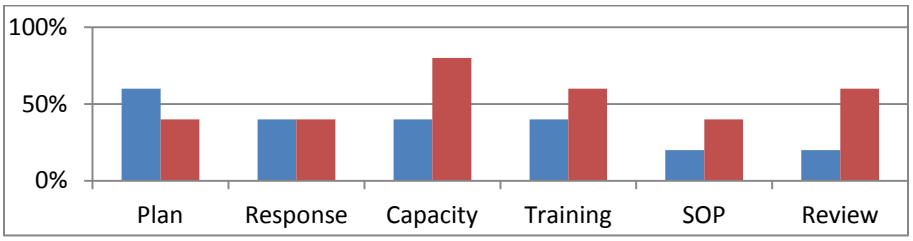
❖ **Community based preventive disaster management teams for mitigating Building disaster as manmade disaster:** The community based disaster management teams identified for mitigating building disaster as manmade disaster are police (100% Private School reported Police while 100% Government School reported Police), military (100% Private School reported Military while 100% Government School reported Military), fire brigade (80% Private School reported Fire Brigade while 100% Government School reported Fire Brigade),

dispensary (80% Private School reported Dispensary while 100% Government School reported Dispensary), NGO (20% Private School reported NGO while 20% Government School reported NGO) and local people (No Private School reported Locals while 80% Government School reported Locals).



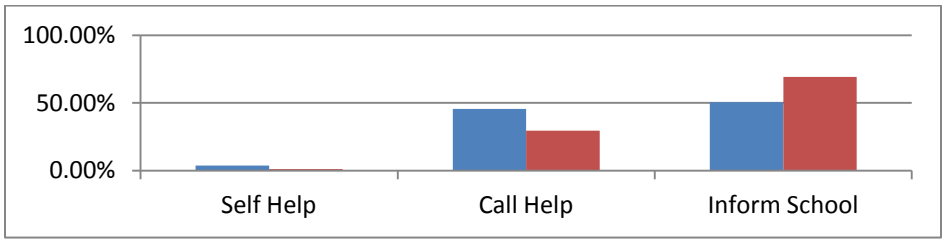
- **Traditional approaches for preparedness and mitigating the effects of Building disaster as manmade disaster:** Traditional strategies for preparedness and mitigating the effects of building disaster as manmade disaster include planning as per disaster management act (60% Private School reported Plan while 40% Government School reported Plan), response mechanism (40% Private School reported Response while 40% Government School reported Response), capacity building (40% Private School reported Capacity while 80% Government School reported Capacity), training exercises for students and other staffs of schools (40% Private School reported Training while 60% Government School reported Training), standard operating procedure (20% Private School reported Standard Operating Procedures while 40% Government School reported Standard Operating Procedures) and review of plans designed for management of school fire as manmade disaster (20% Private School reported Review while 60% Government School reported Review).

X axis= Traditional approaches for Building disaster, Y axis= Responses recorded



- **Perception of the school students for Building Disaster as manmade disaster:** While some students think of informing the authority when any disaster occurs (50.60% Private School reported Informing Authority while 69.20% Government School reported Informing Authority) while other think of self help (3.90%% Private School reported Self help while 1.20% Government School reported Self help) while other students think of calling help from nearby places or outside (45.50% Private School reported Call help while 29.60% Government School reported call help).

X axis= Perception of the school students for Building Disaster, Y axis= Responses recorded



SL. No	Type of Man-made Disaster	Causes of Man-made Disasters	Strategies for Disaster Management	
			Private School	Government Schools
6.	Building Disasters	• Non-maintenance of buildings • Poor infrastructural facilities • Ignorance of the staffs • Non compliance to safety norms	• Evacuation of staffs and students • Awareness among students and staffs • Training to staffs and students • Warning before building disaster • Planning for building disasters • Community based approach	• Quality Check of Buildings • Training of staffs and students • Capacity Building • Review of Building Plans • Community based approaches

Table 6.6: Strategies for disaster management in case of Building Disasters

6.3 Summary

The chapter discusses research findings on school fire, road accident, transport disaster, mid day meal disaster, theft and naxalite attack, building disaster etc. The chapter includes the discussions on qualitative and quantitative aspects of research findings on various manmade disasters. It discusses the primary results and analyses the arguments made by other authors in the literature review.

CHAPTER 7 CONCLUSIONS & RECOMMENDATIONS

7.1 Overview

This chapter discusses the conclusions and also how objectives have been met. The various subheadings briefly describe the concluding statements related to various manmade disasters such as school fire, road accident, transport disaster, mid day meal disaster, theft and Naxalite attack, building disaster etc. It includes case studies, focused group discussions, recommendations on various conclusions, intellectual contributions of the research, limitations of the research and various scopes for future research. The thesis is summarized in the form of concluding statements and recommendations for future study are also discussed in this chapter.

7.2 Conclusions and Recommendations on School Fire as Manmade Disasters

The research can be concluded by revisiting the objectives of the research and finding out whether the research has fulfilled these objectives or not.

The first objective was to identify the types of manmade disasters in Government and Private Schools in Ranchi. To answer this, in depth personal interview was conducted with school heads, students, teachers etc of the schools. The conclusion of the discussion resulted in identification of school fire as manmade disasters by both Government as well as Private schools in Ranchi area of Jharkhand. According to the respondents, 20% of the private schools suffered from the school fire hazard while no government school suffered from the school fire hazard.

The second objective was to identify the sources and causes of school fire as manmade disaster in Government and Private Schools in Ranchi. The conclusion resulted in different sources of school fire like kitchen, electric room, laboratory, store room and vegetation near to the school which readily catches fire. The causes of school fire include improper wiring in the school building, loose connections, overloading of electrical appliances, short circuiting, accidents and intentional activities which could result in a school fire.

The third objective was to analyze different approaches for coping with the identified manmade disasters in Government and Private Schools in Ranchi. The conclusion included two approaches namely traditional or existing and modern approaches. The traditional approaches include planning of measures for fire fighting, measures for responding to the situation, capacity building of the school in terms of skills, knowledge and resources, and training of the stakeholders of the schools, development of the standard operating procedures and review of the overall plan. The modern approaches for management of school fire includes fire drill exercises for the stakeholders of the schools, evacuation measures at the time of fire hazards, awareness of the stakeholders of the schools in terms of acts and plays, training by the experts, warning measures like installation of fire alarms etc, quality check of the electrical systems, loading of electrical appliances, short circuiting etc. The community based disaster management approach includes coordinated efforts of police, military, fire brigade, doctors of dispensary, people of NGOs, participation of local people like Panchayat people, parents etc. The facilities and resources for managing school fire as manmade disaster include fire extinguishers, first aid kits, dispensary, ambulance, security guards and CCTV cameras etc.

The fourth objective was to analyze the perceptions of school head, students and teachers with regard to management of school fire as manmade disaster. The perceptions of schools head include the various resources available to the school for preparedness by school management for school fire includes fire extinguishers, hose pipes, sand bags, ambulance, first aid kit, dispensary etc. The concluding statements of teachers for managing school fire as manmade disaster include available resources, training to students and staffs, alertness, monitoring, first aid kit and review of existing disaster management plan is essential. As per school staffs, the various disaster response strategies at the time of school fire as manmade disaster include alarming systems, expert's opinions, guards, first aid kit, availability of ambulance, presence of dispensary in the school premises etc.

As per the perceptions of school students, for the management of school fire when fire is detected students prefer for self help that includes escape from disaster site, use of fire extinguishers, water resources etc for themselves and others. Sometimes students call help from others like police, ambulance, local people, parents etc. Sometimes students prefer to inform authorities or school management at the time of disasters which include principal, teachers, school disaster management team etc.

7.3 Conclusions and Recommendations on Road Accidents

The first objective was to identify the types of manmade disasters in Government and Private Schools in Ranchi. To answer this, in depth personal interview was conducted with school heads, students, teachers etc of the schools. The conclusion of the discussion resulted in identification of road accidents as manmade disasters by both Government as well as Private schools in Ranchi area of Jharkhand.

The second objective was to identify the sources and causes of road accidents as manmade disasters in Government and Private Schools in Ranchi. The conclusion resulted in different sources of road accidents like nearness to highway, distractions for drivers, potholes, drug abuse for drivers, speeding during driving and non compliance of safety norms and traffic rules. The causes of road accidents include negligence on the part of school management in guiding the students to cross the roads, obey the traffic rules etc.

The third objective was to analyze different approaches for coping with the identified manmade disasters in Government and Private Schools in Ranchi. The conclusion included two approaches namely traditional or existing and modern approaches. The traditional approaches include planning of measures as per disaster management act, response mechanism for road accidents, capacity building in terms of skill, knowledge and resources, training exercises for students, teachers and other staffs of schools, standard operating procedure in the form of written documents and review of plans designed for management of road accident as manmade disaster.

The modern approaches for management of road accidents as manmade disaster include mock drill exercises, evacuation during disasters, awareness about different disasters, training exercises, warning before disasters and quality check of different resources and conditions. The community based disaster management approach includes coordinated efforts of police, military, fire brigade, doctors of dispensary, people of NGOs, participation of local people like Panchayat people, parents etc. The facilities and resources for managing road accidents manmade disaster include fire extinguishers, first aid kits, dispensary, ambulance, guards and CCTV cameras.

The fourth objective was to analyze the perceptions of school head, students and teachers with regard to management of road accidents as manmade disaster. The perceptions of schools head include the various resources available to the school for preparedness by school management such as ambulance, first aid kit, dispensary, fire extinguishers, training to students and supporting staffs, imparting knowledge about traffic rules to students as well as transportation staffs, arranging mock drills in the school campus for prevention and response for road accidents, providing information to students and staffs about road safety etc.

The concluding statements of teachers for managing road accidents as manmade disaster include available resources, training to students and staffs, alertness of the students and staffs, monitoring of the disaster management plan, first aid kit and review of existing disaster management plan is essential. As per school staffs, the various disaster response strategies at the time of road accidents as manmade disaster include alarming systems which includes installation of digital alarms or manual alarms based on prediction, expert's opinions on road accidents, guards to help students in crossing roads, first aid kit, availability of ambulance, presence of dispensary with qualified doctors and nurses in the school premises etc. The perceptions include mock drills, fire extinguishers, response teams etc, training to school staffs and students, alertness for accidents, continuous monitoring, presence of first aid kits and review of existing disaster management plans etc.

As per the perceptions of school students, for the management of road accidents, Students call for help from the nearby areas and from the people, sometimes they call to police or ambulance by means of telephone call for help. First aid serves as immediate relief to the patients who have met with road accidents. Immediately after road accidents, information to authority serves as quick measure for arrangement of all resources and mitigation of the risk. Sometimes students prefer for self help which is a part of community based disaster management.

7.4 Conclusions and Recommendations on Transport Disaster

The first objective was to identify the types of manmade disasters in Government and Private Schools in Ranchi. To answer this, in depth personal interview was conducted with school heads, students, teachers etc of the schools. The conclusion of the discussion resulted in identification of transport disaster as manmade disasters by both Government as well as Private schools in Ranchi area of Jharkhand.

The second objective was to identify the sources and causes of road accidents as manmade disasters in Government and Private Schools in Ranchi. The conclusion resulted in different sources of transport disasters like nearness to highway, distractions for drivers, potholes, drug abuse for drivers, speeding during driving and non compliance of safety norms and traffic rules. The causes of transport disasters include non compliance to safety norms, personal errors, malfunctioning of vehicles, non observance of traffic rules, weather condition and non maintenance of vehicles.

The third objective was to analyze different approaches for coping with the transport disaster in Government and Private Schools in Ranchi. The conclusion included two approaches namely traditional or existing and modern approaches. The traditional approaches include planning for transport disaster, response mechanism at the time of transport disaster, capacity building in terms of skills, knowledge and resources, training exercises staffs of schools, standard operating procedure and review of plans for management of transport disaster.

The modern approaches for management of transport disaster as manmade disaster include mock drill exercises for stakeholders of schools, evacuation during disasters, awareness about different disasters, training exercises, forecasting warning before disasters and quality check of different resources and conditions.

The community based disaster management approach includes coordinated efforts of police, military, fire brigade, doctors of dispensary, people of NGOs, participation of local people like Panchayat people, parents etc. The facilities and resources for managing transport disasters include fire extinguishers, first aid kits, dispensary, ambulance, guards and CCTV cameras.

The fourth objective was to analyze the perceptions of school head, students and teachers with regard to management of transport disaster as manmade disaster. The perceptions of schools head include the various resources available to the school for preparedness by school management such as mock drills, training to students as well as support staffs, fire extinguishers, response teams, first aid kits, dispensary, imparting knowledge about traffic rules to students as well as transportation staffs, arranging mock drills in the school campus for prevention and response for transport disaster, providing information to students and staffs about road safety etc.

The concluding statements of teachers for managing transport disasters as manmade disasters include mock drills, fire extinguishers, response teams etc. Imparting training to school staffs and students, alertness for accidents, continuous monitoring, presence of first aid kits, review of existing disaster management plans, arranging funds for disaster management activities etc. As per school staffs, the various disaster response strategies at the time of transport disaster as manmade disaster include alarming systems, expert's opinions on road accidents, guards, first aid kit, availability of ambulance, presence of dispensary in the school premises with qualified doctor, nurses and other supporting staffs of the schools or outside etc.

As per the perceptions of school students, for the management of transport disaster, Information to authority which includes principal, teachers, disaster management teams etc that helps in quick collection of resources to combat disaster situations. Some students prefer self help to their class mates or other injured persons like carrying the victims to hospitals, providing first aid to them etc. Some students prefer calling for help to different organizations like police, ambulance, parents, school management etc. for effective management of the situation.

7.5 Conclusions and Recommendations on Mid day Meal Disaster

The first objective was to identify the types of manmade disasters in Government and Private Schools in Ranchi. To answer this, in depth personal interview was conducted with school heads, students, teachers etc of the schools. The conclusion of the discussion resulted in identification of Mid-day Meal disaster as manmade disasters by both Government as well as Private schools in Ranchi area of Jharkhand.

The second objective was to identify the sources and causes of Mid-day Meal disaster as manmade disasters in Government and Private Schools in Ranchi. The conclusion resulted in different sources of Mid-day Meal disaster that include intentional activities like adulteration, accidental activities, bad quality meals, corruption, poor infrastructural facilities and ignorance of the staffs.

The third objective was to analyze different approaches for coping with the Mid-day Meal disaster in Government and Private Schools in Ranchi. The conclusion included two approaches namely traditional or existing and modern approaches. The traditional approaches include planning as per disaster management act, response mechanism with role of school staffs and students, capacity building in terms of resources essential for mitigating the effects of disasters, training exercises for students and other staffs of schools, standard operating procedure, arrangement of the funds for disaster management activities and review of plans designed for management of mid day meal disaster as manmade disaster.

The modern approaches for management of Mid-day Meal disaster as manmade disaster include checking the quality of food and drinking water, mock drill exercises, evacuation at the time of disasters, awareness about different disasters, training exercises, and warnings before disasters and quality check of different resources and conditions.

The community based disaster management teams identified for mitigating mid day meal disaster are police which can enquire the cause of the disaster and arrest the culprit, military if the disaster is of large scale and beyond the scope of local police, fire brigade if the disaster results in fire incidents, dispensary with qualified doctor, nurse and other supporting staffs, NGO which can check the quality of food and hygienic conditions of cooking area and local people which can support and help at the time of disasters.

The fourth objective was to analyze the perceptions of school head which include the various resources available to the school for preparedness by school management such as maintenance of hygiene in kitchen and in area where food is serves, training to the staffs how good quality food is prepared and served to students etc. The other resources include fire extinguishers used to control fires in kitchen and adjacent areas. Water sources such as hand pumps, wells, water storage, hose pipes, sand bags etc for extinguishing fire, first aid kits which provide immediate relief to the burning cases. The quality checks procedures involving school staffs and external evaluators to test the quality of prepared food and to prevent any adulteration activities.

The concluding statements of teachers for managing transport disasters as manmade disasters include fire extinguishers and other sources for extinguishing fire such as water from various sources, hose pipes, sand bags etc, first aid kits, dispensary in the premises with qualified doctor, nurse and other supporting staffs, ambulance to refer students or staffs to hospitals, guards to control the situation and CCTV cameras for monitoring and record the activities.

As per the perceptions of school students, for the management of Mid-day meal disaster, While some students think of informing the authority when any disaster occurs while other think of self help to the injured persons while other students think of calling help from nearby places or outside. Some students rely on first aid as immediate response and relief mechanism while some students think of written documented disaster management plan about what to do in such conditions. Implementation of disaster management plan and periodic review of it makes a better plan for management of various manmade disasters.

7.6 Conclusions and Recommendations on Theft and Naxalite Attack as Manmade Disasters

The first objective was to identify the types of manmade disasters in Government and Private Schools in Ranchi. To answer this, in depth personal interview was conducted with school heads, students, teachers etc of the schools. The conclusion of the discussion resulted in identification of Theft and Naxalite Attack as manmade disasters by both Government schools as well as Private schools in the Ranchi district of Jharkhand.

The second objective was to identify the sources and causes of Theft and Naxalite Attack as manmade disasters in Government and Private Schools in Ranchi. The conclusion resulted in different sources of Theft and Naxalite Attack disaster that include premises of Government and Private schools.

The third objective was to analyze different approaches for coping with the Theft and Naxalite Attack disaster in Government and Private Schools in Ranchi. The conclusion included two approaches namely traditional or existing and modern approaches. The traditional approaches include planning for theft and Naxalite attack as per disaster management act, response mechanism to theft and Naxalite activities, capacity building in terms of resources, knowledge and skill, training exercises for students and other staffs of schools, standard operating procedure and review of plans designed for management of theft and Naxalite attack as manmade disaster.

The modern approaches for coping with theft and Naxalite attack as manmade disaster include mock drill exercises in case of theft or Naxalite attacks, evacuation during theft and Naxalite attacks, awareness about different types of theft activities or Naxalite attacks, training exercises, warning before disasters and quality check of different resources and conditions.

The community based disaster management teams identified for mitigating theft and Naxalite attack as manmade disaster are coordinated efforts of police, military, fire brigade, dispensary, NGO and local people. The combined efforts of all sections of society lead to better and safe environment and minimize the theft and Naxalite activities.

The fourth objective was to analyze the perceptions of school head which include the various resources available to the school for preparedness by school management such as facilities and resources for managing theft and Naxalite attack as manmade disaster include fire extinguishers, first aid kits, dispensary with qualified doctor, nurses and other supporting staffs, ambulance, guards and CCTV cameras.

The concluding statements of teachers for managing theft and Naxalite attacks as manmade disasters include installation of alarming system such as alarms, guards to control the situation and CCTV cameras for monitoring and record the activities.

As per the perceptions of school students, for the management of theft and Naxalite attacks, While some students think of informing the authority such as police, school head when such activities occur while others think of self help to the injured persons, catch thieves or Naxalite etc. while other students think of calling help from nearby places or outside. Some students rely on first aid as immediate response and relief mechanism while some students think of written documented disaster management plan about what to do in such conditions or calling their parents.

7.7 Conclusion and Recommendations on Building Disaster

The first objective was to identify the types of manmade disasters in Government and Private Schools in Ranchi. To answer this, in depth personal interview was conducted with school heads, students, teachers etc of the schools. The conclusion of the discussion resulted in identification of building disaster as manmade disasters by both Government as well as Private schools in Ranchi area of Jharkhand.

The second objective was to identify the sources and causes of building disaster as manmade disasters in Government and Private Schools in Ranchi. The conclusion resulted in different sources of disaster prone areas identified for building disaster as manmade disaster that include government and public schools where bad conditions of building can result into disaster.

The third objective was to analyze different approaches for coping with the building disaster in Government and Private Schools in Ranchi. The conclusion included two approaches namely traditional or existing and modern approaches. The traditional approaches include planning as per disaster management act, response mechanism for building disaster, capacity building, training exercises for students and other staffs of schools, standard operating procedure and review of plans designed for management of building disaster as manmade disaster.

The modern approaches for coping with building disaster as manmade disaster include mock drill exercises, evacuation during disasters, awareness about different disasters, training exercises, warning before disasters and quality check of different resources and well maintained conditions of the building.

The community based disaster management teams identified for mitigating building disaster as manmade disaster are coordinated efforts of police, military, fire brigade, dispensary, NGO and local people whose participation leads to better preparedness and prevention of building disaster as manmade disaster. The activities of reconstruction could be done with the coordinated efforts of all.

7.8 Conclusion on Focused Group Discussion on Man-made Disasters

7.8.1 Psychological responses of school students

As per the psychological responses of school students during disaster phase, they may result in the feeling of anger towards the incident, helplessness for self and others, blame to people such as self, parents, authorities, god etc. During Post-disaster phase is over, the psychological responses of children result in Nightmares about various disasters, depression of various intensities, loss of appetite, hyperactivity and mood swings at various situations. Many Children suffer from post-trauma stress after the incident is over. The psychological response may be affected by prior experience, emotional strength and individual feelings of the children.

7.8.2 Stress management responses of school students

As per the stress management responses of school students during disaster phase, for stress management include development of healthy food habits to provide necessary energy to the body to manage stress. Regular exercise helps a person to manage stress, deep relaxation methods include meditation, yoga etc. while prayer increases hope and optimism, manages stress through awareness of self direction. Other responses include developing positive attitude towards life and they should not loose pride and self respect. Many people find relaxation by spending time pursuing favorite activities or following hobbies. While other responses include regular rest and sleep to recoup energy and revitalization for body and emotional support from known and loved ones. Sometimes, children suffer from feeling of loneliness and insecurity among them.

7.8.3 Panic management responses of school students

As per the panic management responses of school students which include making priorities what to save first whether goods, wealth or lives. The regular practice of skills like drill exercises, drowning exercises etc. to handle panic situation.

Other responses include imagination of worst situation like any disaster where the losses could be evaluated and creates a situation that does not cause blind panic. By providing first aid among the sufferers, the fear during the panic can be minimized. Development of positive attitude helps in panic management by concentrating on present, forgetting the past and creating better balance between activities and feelings. Panic is reduced by doing something which gives pleasure to the sufferers. Regular rest and sleep revitalizes the body and reduces panic while emotional support helps people from the feeling of loneliness and reduces panic.

7.8.4 Disaster preparedness planning responses by school management

As per the responses of the School management for disaster preparedness include disaster mapping to assess the impact of disaster on population and environment. Education implies learning that makes people aware and knowledgeable; it orients them to manage situations and provides them with several alternatives. Other response includes communication which is a process of knowledge transfer to the community regarding disaster risk, preparedness and mitigation. Other response includes training which improves the performance of people involved in managing the crisis. The issuance of warnings need to be user specific to withstand different types of disasters and forecasting of an anticipated disaster event, especially area specific as well as time specific. Prediction for human-induced disasters include human error, mechanical fault or organizational failure and disaster management planning may be short term or long term having aims and objectives, organizational structures and preparedness plans.

7.8.5 Community based disaster preparedness responses by school staffs

As per the responses of school staffs for Community Based Disaster Preparedness Plan strategies include analyzing the root causes of vulnerability to disaster, generating awareness amongst community members regarding risks involved in several types of disasters.

Other responses include participation of community at grass root levels which helps in identification of problems and generation of solutions, organizing local people in disaster task forces, committees and groups. While other responses include mobilization of local resources, traditional wisdoms, hazard warning signals etc. Livelihood based programs prior to disasters or after disasters which could help in sustainability of the community, planned cooperation with all government and non government agencies so that community based disaster planning could effectively take place.

7.8.6 Latest technologies in disaster preparedness responses by experts

As per the responses of disaster management experts for latest technologies in disaster preparedness include remote sensing which analyzes satellite images through digital image processing and interpretation, disaster mapping which is a graphical representation of physical location in geographic terms. As per the responses of the experts, aerial photography is used for the purpose of site analysis and operations support, Land-use zoning mitigate disasters by discouraging settlements in disaster prone areas, wireless and radio technologies are very useful in disaster preparedness, worst scenario analysis is a technique under which situations are analyzed under different conditions with various technologies. Emergency Operations Centre is also known as control room is the main centre from where all disaster activities are coordinated. Amateur (Ham) facilitates direct two-way contact with people and radio license is provided by government.

7.8.7 Disaster preparedness planning responses by parents

As per the response of Parents for Disaster Preparedness Planning for Man-made Disasters include generation of information about various man-made disasters, and strengthening of infrastructure such as building, lab etc. Responses include identification of safer areas and evacuation in case of disasters, provision of food, shelter, medical aids to sufferers, and arrangement of security for the rescuers and

sufferers and rescue operations for the children in various man-made disasters. Effective communication is very important at the time of disasters between students and other stakeholders of the schools such as teachers, non teaching staffs and school management. The damage control is very important in case of man-made disasters in schools.

7.9 Correlation of root causes of man-made disasters with perception Survey

7.9.1 Correlation of root causes of School fire with Perception Survey

The root causes of school fire as manmade disaster include poor infrastructure of school building, lack of fire fighting equipments, non-ventilation of class rooms and laboratories, non-trained manpower for fire fighting, short circuiting in electric rooms or appliances, Conspiration of the school management with the officials for the sake of getting approval, thatched kitchen which easily catch fire, ignorance of officials for not conducting regular inspection, negligence on the part of parents for not checking the building prior to admission of their wards.

The perception of school management for school fire includes availability of resources in the schools for fire fighting, training to stakeholders of schools for fire fighting, alertness for the school fire by means of plays, exhibition, demonstration etc. Presence of first aid kits in schools and review of existing disaster management plan are perceptions of school management for school fire. The perceptions of school students include self help if fire is detected, calling for help from outside and inform the authorities for resources.

There is contradiction in the root causes of school fire and perception survey from the respondents. The perception analysis shows how the respondents talk of prevention and preparedness for school fire but root causes show different reality. The root causes show the deficiencies in the schools which the school management does not want to disclose and children doesn't know much about it. But the news articles and case studies represent different picture of disaster management in schools.

SL. No	Type of Man-made Disaster	Root causes of Man-made Disasters	
		From Perception Survey	From Case Study Analysis
1.	School Fire	• Non-availability of resources in the schools for fire fighting • Non-trained stakeholders of schools for fire fighting • Non- alertness for the school fire by means of plays, exhibition, demonstration etc. • Absence of first aid kits in schools • Non-review of existing disaster management plan.	• Poor infrastructure of school building • Lack of fire fighting equipments • Non-ventilation of class rooms and laboratories • Non-trained manpower for fire fighting • Short circuiting in electric rooms or appliances • Conspiration of the school management with the officials for getting the approval • Thatched kitchen • Ignorance of officials for not conducting regular inspection • Negligence of parents for not checking the building prior to admission.

Table 7.1 Comparison of root causes from perception survey and case study for School Fire as man-made disaster

7.9.2 Correlation of root causes of Transport Disaster with Perception Survey

The root causes of transport disaster as man-made disaster include poor driving skills of drivers, use of low safety vehicles, poor conditions of roads, drivers and cleaners who are not trained for transportation of school students. The vehicles sometimes overcrowd the students i.e. carry more students than the capacity of the vehicle. Violation of traffic rules, unmanned railway crossing result in transport disasters. The ignorance and negligence of school management while recruiting drivers and cleaners and their alcohol check from time to time etc.

The perception of school management for transport disaster includes availability of resources in the schools for disaster prevention and preparedness, training to students for managing transport disaster, alertness for transport safety by means of plays, exhibition, demonstration etc. Presence of first aid kits in schools and review of existing disaster management plan are perceptions of school management for transport disaster. The perceptions of school students include self help if transport disaster occurs, calling for help from outside and inform the authorities for resources that help in management of the transport disaster. The perceptions of parents include effective communication between the children and other stakeholders of the schools to mitigate the effects of disasters and the opinion of disaster management experts is maintenance of Emergency Operation Center in schools to monitor the activities and take immediate action.

The perception analysis shows how the respondents talk of prevention and preparedness for transport disaster but root causes show different reality. The root causes show the deficiencies in the schools which the school management does not want to disclose and children doesn't know much about it. But the news articles and case studies represent different picture of disaster management in schools. Some school management are involving their drivers and cleaners in activities of schools such as gardening, taking care of children etc so that they do not involve in drinking alcohol or playing cards in free times.

SL. No	Type of Man-made Disaster	Root causes of Man-made Disasters	
		From Perception Survey	**From Case Study Analysis**
2.	Transport Disaster	• Non-maintenance of Emergency Operation Center • Non-communication between the children and others • Non availability of resources in the schools • Non training to students and driving staffs • Non alertness for transport safety • Absence of first aid kits in schools • Non-review of existing disaster management plan	• Poor driving skills of drivers • Use of low safety vehicles, • Poor conditions of roads, • Not trained drivers and cleaners • Overcrowded schools • Violation of traffic rules • Unmanned railway crossing • Ignorance and negligence of school management while recruiting drivers and cleaners • Non conductance of alcohol check of drivers and cleaners

Table 7.2 Comparison of root causes from perception survey and case study for Transport Disaster as man-made disaster

7.9.3 Correlation of root causes of Mid-day meal Disaster with Perception Survey

The root causes of mid-day meal disaster as man-made disaster include ignorance of the school management in monitoring of the activities related to mid-day meal preparation. Non availability of resources, training to staffs, corruption etc are other root causes of mid-day meal disaster. Non availability of ambulance, non training of first aid is other causes. The violation of safety norms while preparation of foods led to such disasters, ignorance and negligence of school management during procurement of raw materials, potable water, and supervision during preparation of food and tasting of food are also the chief causes of mid day meal disaster.

The perception of school heads for management of mid-day meal disaster includes availability of resources in the schools for disaster prevention and preparedness, training to staffs and students for managing disaster, alertness for mid-day meal disaster safety by means of plays, exhibition, demonstration etc. Presence of first aid kits in schools and review of existing disaster management plan are perceptions of school management. The perceptions of school students include self help if a disaster occurs, calling for help from outside and inform the authorities for resources that help in the management of the mid-day meal disaster.

The difference in the opinion of the respondents about management of man-made disaster differs from the root causes obtained from case study analysis. The school heads, staffs, teachers, students are of the opinion that they are prepared for the coming man-made disasters but root cause analysis shows the deficiency of schools in terms of resources, training etc for which the school with stakeholders suffer during and afterwards the disasters. The root cause analysis shows the negligence and ignorance of the school stakeholders while the perceptual analysis confirms their preparedness and measures to prevent the mid-day meal disaster as man-made disaster.

SL. No	Type of Man-made Disaster	Root causes of Man-made Disasters	
		From Perception Survey	From Case Study Analysis
3.	Mid-day meal Disasters	• Non- availability of resources in the schools • Non- trained staffs and students for managing disaster • Non-conductance of safety awareness by means of plays, exhibition, demonstration etc. • Absence of first aid kits in schools • Non- review of existing disaster management plan	• Ignorance of the school management • Non availability of resources • Non- trained staffs • Corruption • Non availability of ambulance • Non-training of first aid • Violation of safety norms • Negligence of school management during procurement of raw materials, • Poor quality potable water • Non-supervision during preparation of food and • Non-tasting of food by competent authority

Table 7.3 Comparison of root causes from perception survey and case study for Mid-day meal Disaster as man-made disaster

7.9.4 Correlation of root causes of School building Disaster Man-made disaster with Perception Survey and Case Study analysis

The root causes of school building disaster as man-made disaster include non availability of resources or poor infrastructure of schools, illegal construction without taking approval from authorities, non maintenance of existing building, non follow of the building codes or safety norms, ignorance of school head related to these situations and negligence by authorities etc.

The perception of school heads for management of school building disaster includes the availability of infrastructure of the schools for disaster prevention and preparedness, trained staffs and students for managing disaster, alertness and continuous monitoring for school building disaster, building safety by means of periodic inspection etc. Presence of first aid kits, ambulance and dispensary in schools, continuous review of existing disaster management plan and allocation of funds for disaster management are perceptions of school management. The perceptions of school students include self help during school building disaster occurs, calling for help from outside if they are trapped inside and inform the authorities for resources.

There is clear difference in the perception analysis of the stakeholders of schools and the root causes obtained from the case study analysis. The behavior analysis also represents a different picture about management of building disaster as man-made disaster in schools. The truth comes from the focused group discussion and the case study analysis that the schools have deficient resources and their preparation for coming disaster is not up to mark, although some have resources but the trained manpower is not there for proper use. The perception analysis and behavior analysis shows that the schools and their stakeholders claim that they are prepared for school building disaster and measures are taken to prevent the coming disasters whereas the case studies and root cause analysis show the deficiencies and loopholes of school management for managing building disaster as man-made disasters.

SL. No	Type of Man-made Disaster	Root causes of Man-made Disasters	
		From Perception Survey	**From Case Study Analysis**
4.	School Building Disaster	• Non-availability of building infrastructure • Non-trained staffs and students for managing disaster • Non-alertness and continuous monitoring for school building • Unsafe building due to poor safety • Absence of first aid kits, ambulance and dispensary in schools • Non-review of existing disaster management plan • Non-allocation of funds	• non availability of resources or poor infrastructure of schools, • Illegal construction without taking approval from authorities • Non-maintenance of existing building • Non-follow of the building codes or safety norms • Ignorance of school head related to these situations • Negligence by authorities

Table 7.4 Comparison of root causes from perception survey and case study for School building Disaster as man-made disaster

7.10 Intellectual Contributions out of the Research Data

This research is an original qualitative work on various Man-made disasters such as School fire, Road accidents, Transport disaster, Mid-day meal disaster, Theft and Naxalite attack, Building disasters etc.

The intellectual contributions out of research data on school fire includes arrangement of sand bags outside labs and classrooms, periodic refilling of fire extinguishers, periodic cutting of vegetation in nearby areas of schools, installation of fire alarms in laboratories, kitchen, electric rooms etc. Display of emergency contact numbers and disaster management plans in the notice boards and other prominent places of the schools also serve major help in preventing school fire as man-made disaster in schools. The periodic of organisation of expected and unexpected fire drills in schools, periodic inspection of fire exits of schools, preparation of fire exit maps by students themselves showing the route of fire exit and safety point.

The intellectual contributions out of research data on road accident include display of traffic rules on notice board and other prominent places in the schools, road safety education to children, display of emergency number and numbers of parents or guardians with students, safety audit of school routes, monitoring of students by school safety committee, formation of walking clubs with the involvement of students, parents and local people.

The intellectual contributions out of research data on transport disaster include identification of safest route for buses, alcohol testing for drivers and cleaners, fitness test for vehicles, engagement of drivers and in cleaners in works of schools such as gardening, cleaning, taking care of students etc so that they do not get involved in drinking alcohol or playing cards etc. Display of rules for riding a bus, entering a bus and exiting a bus in notice board or in school bus, periodic check of fire extinguishers, their refilling date and first aid kits could prevent transport disaster in schools.

The intellectual contributions out of research data on mid-day meal disaster include non-washing of plates with soil, using quality raw materials for cooking foods, maintenance of cleanliness and hygiene for cooking food, regular inspection of whole procedure at regular interval, maintenance of infrastructure for kitchen, use of LPG in place of coal or wood log for cooking, use of fresh and pure water for cooking and drinking purpose. Use of wall painting for measures to provide safe mi-day meal could be used, maintenance of daily register about who has cooked the food and who has tasted the food before giving to children etc.

The intellectual contributions out of research data on theft and naxalite attack as man-made disaster include provision of regular inspection by means of CCTV with recording facility, provision of locker in school in which valuables are kept, using of warning signs, by controlling access to school building, watching financial statements regularly etc. The measures for preventing naxalite attacks in schools include fencing of the schools, supervision by means of CCTVs, community based approach involving villagers, police and school safety committee.

The intellectual contributions out of research data on school building disaster include locating schools in non-congested areas, building schools with codes, following architect's plan, taking permission with competent authorities, display of laminated blueprints of schools in prominent places of schools, maintenance of existing structures etc.

7.11 Recommendations for Future Work

- The present research work is qualitative work taking the perceptions and psychological behaviour of respondents, while quantitative study can be taken using statistical tools in larger sample space.
- The survey can be conducted by increasing sample size of all categories in other regions of the state and country where most of public and Government schools are vulnerable to various manmade disasters.

- The research can be further extended and in-depth research can be carried out on adoption of some specific technologies which can result in better responses for prevention of manmade disasters.
- The research framework, which has been used in the research, can be used for research in other countries with similar socio-economic conditions as to Indian conditions.
- Future research can improve quality of the findings of this research by extending this study by including the comparison between schools of rural and urban areas for managing manmade disasters.
- Similar line of research can be conducted for natural disasters also where preparedness for disasters can be assessed in public and government schools for effective management with better strategies.
- Scope of manmade disasters can be increased and new manmade disasters can be included like air pollution, water pollution and soil pollution etc. with specific incidents like Chernobyl nuclear accident, oil spills etc.

7.12 Limitations of the Research

- The research covers only Man-made disasters confined to Government and Private Schools while the there are many Man-made disasters which are not applicable for schools.
- The research does not take into account the Natural disasters which are more destructive in comparison to Man-made disasters.
- The research is restricted to Ranchi district only having a small sample space of 373 respondents while the research could be performed in larger geographical area having more respondents so that more quantitative data could be gathered.
- There are many types of schools like kindergarten, primary, secondary and senior secondary, while the present research is limited to secondary schools and other types of schools are not covered.
- The research is qualitative perception analysis and psychological behaviour of different respondents and can be quantified with different statistical tools in the form of quantitative study.

7.13 Summary

The chapter discusses conclusions based on research questions on school fire, road accident, transport disaster, mid day meal disaster, theft and Naxalite attack, building disaster etc. The chapter includes the intellectual contribution out of the data from research to the society and future recommendations of the research study. It discusses the limitations of the research work in terms of selection of geographical region and dealing with kinds of disasters.

BIBLIOGRAPHY

Bibliography

1. Ahmad, M., & Murli, J. S. (2012). Disaster Management in Hospitals: Shifting Strategy towards Systems Approach. *Disaster & Development, Journal of the National Institute of Disaster Management, 6(1&2),* 1-10.
2. Alexander, D. E. (2014). *Principles of Emergency Planning and Management.* London: Oxford University Press.
3. Allen, K. (2003). Vulnerability Reduction and the Community Based Approach. *Natural Disasters and Development in a Globalizing World,* Pelling.
4. Alley, E. E. (Ed.). (1993). Combating the Vulnerability of Communities. *Natural Disasters: Protecting Vulnerable Communities*, London: Thomas Telford.
5. Anderson, D. R. (2000). Catastrophe Insurance and Compensation remembering Basic Principles. *CPCU Journal, 5 (2),* 76-89.
6. Anderson, M. B., & Woodrow, P. J. (1998). *Rising from the Ashes: Development Strategies in Times of Disasters.* London: Lynne Rienner Publishers.
7. Anderson. D. R., & John, W. (1968). Cultural Adaptation to Threatened Disaster. *Human Organizations*, 27.
8. Archer, D. (1960). Global Warming: Understanding the Forecast. Wiley: John wiley & Sons, Inc, 60.
9. Ariyabandu, M. (1999). *Defeating Disasters: Ideas for Action*. Sri Lanka: Duryog Nirvaran.
10. Barker, G. W., & Chapman, D. W. (Ed.). (1962). *Man and Society in Disaster.* New York: Basic Books.
11. Barnes, J. M. (2013). *School Disaster Needs for Students with Disabilities: Voices from the field (Master's thesis).* Los Angeles: University Of California.

12. Bhargava, G. (1992). *Environmental Challenges and Ecological Disaster-Global Perspective.* New Delhi: Mittal Publications.
13. Bhat, S., & Shah, Q. (2017). Disaster Profile of India: A Theoretical Understanding of Regional and Seasonal Perspective. *IRA-International Journal of Management & Social Sciences, 6(1),* 52-59.
14. Bhatti., & Amjad. (2003). Disaster Risk Reduction through Livelihood Concerns and Disaster Policy in South Asia. *Disaster Risk Reduction in South Asia,* New Delhi: Prentice Hall of India.
15. Blaikie, P., Cannon, T., davis, I., & Wisner, B. (1994). *At Risk: Natural hazards, People's vulnerability and Disasters.* London: Routledge.
16. Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2014). *At Risk: Natural Hazards, People's Vulnerability and Disasters,* London & New York: Routledge, Taylor and Francis group.
17. Carr., & Julliard, L. (1932). Disaster and the Sequence Pattern Concept of Social change. *American Journal of Sociology*, 38.
18. Carter, N. W. (2008). *Disaster management: a disaster manager's handbook.* Mandaluyong City, Phil.: Asian Development Bank.
19. Carter, W. N. (1992). *Disaster Management: A Disaster Manager's handbook.* Manila: Asian Development bank.
20. Chakraborty., Ritujoy., & Mehta, R. (2001). *Accidents and Insurance.* Autocar. Retrieved from http://www.indiacar.com.
21. Chopra, R. (2016). Environmental Degradation in India: Causes and Consequences. *International Journal of Applied Environmental Sciences, 11(6),* 1593-1601.
22. Coburn, A. W., Spence, R. J. S., & Pomonis, P. W. (1994). *Vulnerability and Risk Assessment. Disaster Management Training Programme,* Cambridge Architectural Research Limited, U.K : Artifax Services.
23. Coburn, A.W. (1991). *Geographic Analysis for Disaster Prevention and Preparedness.* Retrieved at http://www.Proventionconortium.org.

24. Correspondent. (2006). *Student crushed under school bus*. The Telegraph. Retrieved from https://www.telegraphindia.com/1060518/asp/ranchi/story_6237834.asp.
25. Correspondent. (2012). *Bus in gorge, three injured.* The Telegraph India. Retrieved from https://www.telegraphindia.com/1090329/jsp/jharkhand/story_10740305.jsp.
26. Correspondent. (2013). *Lizard in food: 40 children hospitalized in Ranchi.* The Hindu. Retrieved from http://www.thehindu.com/todays-paper/tp-in-school/lizard-in-food-40-children-hospitalised-in ranchi/article4882681.ece.
27. Correspondent. (2015). *9-yr-old girl dies in school.* The Telegraph India. Retrieved from https://www.telegraphindia.com/1150408/jsp/jharkhand/story_13270.jsp.
28. Cuny, F. (1983). *Disasters and Development.* New York: Oxford University Press.
29. Dhar, T. N. (2004). *Disaster Management: Policies and Imperatives. Training Programme on Disaster Management*, Department of Public Administartion, University of Lucknow.
30. Directorate General Civil Defence, Ministry of Home Affairs, Government of India. (2004). *Compendium of Recommendations of the Standing Fire Advisory Committee/Council*, New Delhi.
31. Disaster Management Division, Ministry of Home Affairs, Government of India. (2013). *Manual on Administration of State Disaster response Fund and National Disaster response fund.* New Delhi.
32. Disaster Risk Reduction, Governance and Development. (2004). *UN/ISDR. Africa Educational series, 2(4).*
33. Erramilli, B. P. (2008). *Disaster Management in India: Analysis of Factors Impacting Capacity Building* (Master's thesis). Georgia State University.

34. Fernando, N.B.J. (2001). *Disaster Mitigation: Experiences and Reflections.* New Delhi: Prentice Hall of India.
35. Form, W. H., & Nosow, S. (1958). *Community in Disaster*. University of Michigan.
36. Gates, A. E., & Ritchie, D. (2007). *Encyclopedia of Earthquakes and Volcanoes.* New York: Facts on File.
37. Gauthamadas, U. (2006). *Community Based Disaster Management. First India Disaster Management Congress*, Tata Institute of Social Sciences, Mumbai, 1-21.
38. Ghosh, S. N. (1997). *Flood Control and Drainage Engineering*, (2nd Ed.). USA: A. A. Balkema Publishers.
39. Gireesan, K. (2013). Disaster Preparedness and Risk Reduction: Significance of Empowering Panchayati Raj Institute. *Disaster & Development, Journal of the National Institute of Disaster Management, New Delhi. 7(1&2),* 146-163.
40. Goel, S. L. (2006). Encyclopedia of Disaster Management. *Management of Man-Made Disasters*, New Delhi: Deep & Deep Publications.
41. Gosling, L. & Edwards, M. (1995). *Toolkits: A Practical Guide to Assessment, Monitoring, Review and Evaluation.* London: Save the Children Fund.
42. Goyet, C. V., Marti, R. Z., & Osorio, C. (2006). *Natural Disaster Mitigation and Relief.* In D.T Jamison, J.G Breman, A.R Measham, et al., (Eds.). Washington (DC): *The International Bank for Reconstruction and Development / The World Bank;* New York: Oxford University Press.
43. Goyet, V. C., Marti, Z. R., & Osorio, C. (2006). *Natural Disaster Mitigation and Relief. Disease Control Priorities in Developing Countries, (2nd ed.).* New York: Oxford University Press.
44. Grist, R. E. (2007). *The Changing Paradigm of Emergency Management: Improving Professional Development for the Emergency Manager (Master's thesis).* Portland State University.

45. Gurtner, Y., Cottrell, A., & King, D. (2011). *PRE & RAPID: Community Impact Assessment for Disaster Recovery.* Centre for Disaster Studies, James Cook University.
46. Halder, D. (2006). *Urban Transport in India: Crisis and cure*. New Delhi: Bokwell.
47. Hamilton J. I., & Viscusi, W. K. (1999). *Calculating Risks: The Spatial and Political Dimensions of Hazardous Waste policy*. Massachusetts: The MIT Press.
48. Harris, G. (2015). Nepal School System Left Shattered in Aftermath of Quake. *The New York Times*. Retrieved from https://www.nytimes.com/2015/05/14/world/asia/nepal-earthquake-shatters-school-system.html.
49. Harun-al-Rashid, A. K. M. (2002). *The Role of Early Warning in Community Preparedness.* International Seminar on Disaster Preparedness and Mitigation, UNDP, CII, Government of India, New Delhi.
50. Hermann, J. (2007). *Disaster Response Planning & Preparedness: Phases of Disaster.* New York Disaster Interfaith Services (NYDIS).
51. Hosseini, M., & Izadkhah, Y. O. (2006). Earthquake Disaster Risk Management Planning in Schools. *Disaster Prevention and Management, 15(4),* 649-661.
52. Jarraud, M. (2004). *WMO's Role in Disaster Mitigation and Response-Challenges and Opportunities. Natural Disaster Mitigation,* Institute of Engineers, New Delhi, India.
53. Kaul, D., Ayaz, M., & Kumar, L. S. N. (2016). Disaster Management in India. *International Journal of Humanities and Social Sciences, 6(1),* 1-8.
54. Kumar, R. (2015). School bus kills boy - speeding vehicle torched. *The Telegraph.* Retrieved from https://www.telegraphindia.com/1150122/jsp/jharkhand/story_9537.jsp.
55. Kumar, R. (2018). *E-governance and Disaster Management*. New Delhi: GenNext Publication.

56. Kumar, S. (2014). Ethnographic Research: Holistic understanding of human behaviour through text and context. *Jharkhand Journal of Development and Management Studies. XISS, Ranchi*. Vol. 12, No.1, March 2014, pp. 5709-5730
57. Kunreuther., & Howard. (1978). Disaster Insurance Protection Public Policy Lesson. New York: Wiley.
58. Lidstone, J. (1999). *Disaster education in the School Curriculum*, Natural Disaster Management.
59. Lima, H. M., Borba, A. A., Pinheiro, A., Lima, A. M., & Almeida, J. A. (2013). *Impacts of natural disasters on environmental and socio-economic systems: what makes the difference?.* Ambiente & Sociedade, *16(3).*
60. Mamogale, H. M. (2011). *Assessing Disaster Preparedness of Learners and Educators in Soshanguve North Schools (Master's thesis).* University of the Free State.
61. Marsh, G., Buckle, P., & Smale, S. (2001). *The Concept of community in Community Capability and Disaster Management.* 2nd international Conference, Post Disaster reconstruction: Planning for Reconstruction, Coventry.
62. Martz, E. (2010). *Trauma Rehabilitation after War and Conflict: Community and Individual Perspectives.* New York: Springer.
63. Maskrey, A. (1989). *Disaster Mitigation: A Community based Approach.* London: Oxford press.
64. Mcbean. G. (2015). *Disaster resilient cities- a goal for the future.* Retrieved at http://opinoncanada.com.
65. McConnan, I. (2000). *The Sphere Project- Humanitarian Charter and Minimum Standards in Disaster Response.* New Delhi: Maya Publisherss.
66. Medury, U. (2001). *Coping with Disasters: A Community Based Approach.* New Delhi: Prentice of Hall India.
67. Miller, H. E., Engemann, K. J., & Yager, R. R. (2006). Disaster Planning and Management. *Communications of IIMA, 6(2),* 25-36.

68. Mills, J., Durham, J., & Packirisamy, V. (2017). *Rehabilitation services in disaster response. Bulletin of the World Health Organization, 95*, 162-164.
69. Ministry of Home Affairs, Government of India. (2004). *Disaster Management in India.* New Delhi.
70. Ministry of Home Affairs, Government of India. (2011). *State level programmes for Strengthening Disaster Management in India.* New Delhi.
71. Ministry of Home Affairs, Union Government (Civil). (2013). *Performance Audit of Disaster Preparedness in India: Report of the Comptroller and Auditor General of India.* New Delhi.
72. Mishra., Girish, K., & Mathur, G. C. (1995). *Natural Disaster Reduction*. New Delhi: Reliance Publishing House.
73. Mitchell, J. K. (1999). *Crucibles of hazard: Disasters and Mega Cities in Transition:* Tokyo and New York, Tokyo: United Nations University Press.
74. Moga, J. (2002). Disaster Mitigation Planning: The Growth of Local Partnership for Disaster Reduction. *Regional Workshop on Best Practices in Disaster Mitigation*, 169-177.
75. Moore., & Linda, K. (2003). *Emergency Communications: The Emergency Alert System (EAS) and All Hazard Warnings. Congressional Research Service Report for Congress,* Library of Congress, Washington, D.C.
76. Mukherjee, B. (2011). Agony alive 16 yrs after Dabwali fire. *The Times of India*. Retrieved from https://timesofindia.indiatimes.com/india/ampnbspAgony-alive-16-yrs-after-Dabwali-fireampnbsp/articleshow/11225977.cms.
77. Mwale, H. M. (2006). *Safe Schools for Teaching and Learning: Developing a School wide, self study process (Master's thesis).* Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

78. Narsimhan, S., & Kim, T. Y. (2008). *India and Korea, bridging the gaps*. Manak Publications, 90.
79. National Disaster Management Division, Ministry of Home Affairs, Government of India. (2004). *Disaster Management in India.* New Delhi.
80. National Institute of Disaster Management, Ministry of Home Affairs. (2012). *India Disaster Report.* New Delhi.
81. National Institute of Disaster management. (2014). *Jharkhand- National Disaster Risk Reduction Portal*. New Delhi.
82. Newman, C. J. (1976). Children of Disaster: Clinical observations at Buffalo Creek. *American Journal of Psychiatry*, *133(3).*
83. Nick, C. W. (1991). *Disaster Mitigation in Asia and the pacific.* Manila: Asian Development Bank.
84. Oakley, D. (1993). *A National Disaster Preparedness Service*. P.A. Meriman and C.W.A. Browitt (Ed.).
85. OECD. (1995). *Global warming: Economic Dimensions and policy responses.* Paris.
86. Oliver, J. E. (2005). *Encyclopedia of World Climatology*, Netherland: Springer.
87. Orissa State Disaster Management Authority. (2002). *Community based Disaster Preparedness Programme*. Project Completion Report, OSDMA, UNDP, Bhubaneshwar.
88. Pal, I., & Ghosh, T. (2018). *Natural Hazards Management in Asia*, (1st Ed.). New Delhi: Sage Publications India Pvt Ltd.
89. Pandey, P. (2016). Class 7 student found dead in Ranchi school, 3 teachers detained. *The Indian express*. Retrieved from http://indianexpress.com/article/india/india-news-india/class-7-student-found-dead-in-ranchi-school-3-teachers-detained/.
90. Pandey, R. K. (2016). Legal Framework of Disaster Management in India. *Indian Law Institute Review.* 178-190.

91. Parasuraman, S., & Unnikrishnan P. V. (2000). *India Disaster Reports.* New Delhi: Oxford University Press.
92. Patwardhan, A., & Ajit, M. (2007). *Disaster Prevention, Preparedness and Management and Linkages with Climate Change Adaptation. Technology Information, Forecasting and Assessment Council*, New Delhi. 1-31.
93. Perrow, C. (2011). *Normal Accidents: Living with High Risk Technologies.* New York: Princeton University Press.
94. Phillips, S. C. (2012). *Rethinking Disasters: Finding Efficiencies through Collaboration* (Master's thesis). Naval Postgraduate School, Monterey, California.
95. Quarante, E. L. (2003). *Urban Vulnerability to Disasters in Developing Societies.* London: Rouletdge.
96. Rea, D. (2007). *Preparing for the future: Incorporating Disaster Management Education in Sri Lankan Schools* (Master's thesis). Coventry University.
97. Reddy, D. V. (2010). *Applied Geology*. Vikas Publishing House Pvt Ltd, 217.
98. Reed., & Shiela, B. (1997). *Introduction to Hazards. Disaster management Training Programme,* United Nations Development Programme, Geneva.
99. Rim, K. T., & Lim, C. H. (2014). Biologically Hazardous Agents at Work and Efforts to Protect Workers' Health: A Review of Recent Reports. *Safe Health Work, 5(2),* 43–52.
100. Rocha, J. (2011). *A Study on Uncertain Dynamic Disaster Management Tasks, Knowledge Sharing, and Task Performance* (Master's thesis). Florida International University.
101. Sahni, P., Dhameja, A., & Medury, U. (2001). *Disaster Mitigation: Experiences and Reflections*. New Delhi: Prentice-Hall of India.

102. Schneiderbauer, S., & Ehrlich, D. (2004). *Risk, Hazard and People's Vulnerability to Natural Hazards: a Review of Definitions, Concepts and Data.* Joint Research Center, European Commission.

103. Scrader, K. (1991). Ethical Dilemmas and radioactive Waste: A Survey of Issues. *Environmental Ethics, 13,* 327-343.

104. Sharma, S. M. (2016). Road Traffic Accidents in India. *International journal of advanced & integrated medical sciences, 1(2),* 57-64.

105. Sharma., & Vinod, K. (1999). *Disaster Management. Indian Institute of Public Administration,* New Delhi.

106. Singh, A., Patwardhan, A., Abhyankar, A., & Sarda, N. L. (2012). Extreme Weather Events in India- A Preliminary Analysis of Impacts. *Disaster & Development, Journal of the National Institute of Disaster Management, New Delhi. 6(1&2),* 49-56.

107. Singh, K., & Mishra, S.A. (2001). Road Accident Analysis: A case study of Patna City. *Urban Transport Journal, 2(2),* 1-11.

108. Singh, T. (2006). *Disaster Management Approaches and Strategies*. New Delhi: Akanksha Publishing House.

109. Sinha, A. (1999). *Relief administration and capacity building for coping mechanism towards disaster reduction.* Towards a safer world in the 21st century with hope, Porbandar.

110. Sinha, D. K. (2006). *Towards basics of Natural Disaster reduction*. New Delhi: Research Co. Book Centre.

111. Sinha, P.C. (1998). Encyclopedia of Disaster Management, *Vol. 1, Introduction to Disaster Management*. New Delhi: Anmol Publication Pvt. Ltd.

112. Smith, K. (2001). *Environmental Hazards, Assessing Risk and Reducing Disaster*, London: Routledge.

113. Somers, K. (1995). *Perspectives on Risk Management*. Risk Analysis, 15, 677-84.

114. Sorensen., & John, H. (2001). Hazard Warning System: Review of Twenty Years of Progress. *Tsulfo Alert, 3(1).*
115. Srivastava, R. K. (2014). Kumbakonam fire tragedy: Life term for principal, 10 years' jail for school owner. *The dnaindia*. Retrieved from http://www.dnaindia.com/india/report-kumbakonam-fire-tragedy-life-term-for-principal-10-years-jail-for-school-owner-2006606.
116. Stalberg., & Christian, E. (1994*). The Intelligent City and Emergency Management in the 21st Century.* The International Emergency Management and Engineering Conference, 18-21.
117. Sub-committee on Disaster Reduction. (2003). Interim Report on Reducing Disaster Vulnerability through Science and Technology, USA.
118. Tigges, J. M. (2008). *Emergency preparedness: An analysis of Iowa high school emergency preparedness plans* (Master's thesis). Iowa State University, Ames, Iowa.
119. Tom, P., & Todd, M. (2003). *Facing up to the storm: How Local Communities can cope with Disaster*. U.K: Christian Aid.
120. Turner, B. A., & Pidgeon, N. F. (1997). *Man- Made Disasters*. Oxford: Butterworth Heinemann.
121. Tuswadi. (2014). *Disaster Management and Prevention Education for Volcanic Eruptions: a Case of Merapi Area Primary Schools in Java Island, Indonesia* (Master's thesis). Graduate School for International Development and Cooperation, Hiroshima University.
122. UNDP. (1999). *Emergency Relief Items, Compendium of Basic Specifications*. UNDP, New York.
123. UNDP. (2001). *From Relief to Recovery: The Gujarat Experience*, New Delhi.
124. UNDP. (2002). A Climate Risk Management: Approach to Disaster reduction and Adaptation to Climate change. UNDP Expert Group Meeting, *Integrating Disaster Reduction with Adaptation to Climate Change.* Havana, 11-21.

125. UNDP. (2004). Reducing Disaster Risk: A Challenge for Development. United Nations Development Programme, Bureau for crisis Prevention and Recovery, Retrieved at http://www.undp.org/bcpr/disred/english/regions/asia/iran.htm.
126. UNICEF Regional South Office for South Asia. (2009). *Education in Emergencies in South Asia, Reducing the Risks Facing the Vulnerable Children.* University of Birmingham, UK.
127. UNICEF. (1998). *Supplement to Assisting in Emergencies: A handbook for UNICEF Field Staff.*
128. UNISDR. (2004). *Living with Risk: A Global Review of Disaster Reduction Initiatives.* International Strategy for Disaster reduction, United Nations Inter Agency Secretariat, Geneva.
129. United Nations Educational, Scientific and Cultural Organisation. (2010). *Managing Disaster Risks for World Heritage.*
130. United Nations Office for the Coordination of Humanitarian Affairs. (2002). *UNDAC Field Handbook*, Geneva.
131. United Nations. (1984). *Disaster Prevention and Mitigation: A Compendium of Current Knowledge*. Office of the United Nations Disaster Relief Coordinator (UNDRO), Geneva.
132. USAID. (1998). *Field Operations Guide for Disaster Assessment and Response.* Bureau for Humanitarian Response, Office of Foreign Disaster Assistance, Washington D.C.
133. Venkatesan, V., & Swami, P. (2001). India's most powerful earthquake in fifty years devastates vast areas of Gujarat, with Bhuj town and nearby areas being the worst affected. *The Killer Earthquake, 18(3),* 3-16.
134. Winchester., & Peter. (1992). *Power, Choice and vulnerability: A Case Study in Disaster Management in South India,* James & James Science Publishers.
135. Wisner., & Ben. (2001). *Disaster and Development, Development Studies Institute,* London School of Economics and Political Science, El Salvador.

136. World Conference on Disaster Reduction Yokohama. (1994). Yokohama Strategy and Plan of Action for a Safer World. Retrieved from http://www.isdr@un.org.
137. World Disaster Report. (1999-2005). *International Federation of the Red Cross and Red Crescent Society*, Geneva.
138. World Disasters report. (2004). *Building Community Resilience.* International Red Cross and Red Crescent Societies.
139. World Health Organization. (1989). *Coping with Natural Disaster: The Role of Local Health Personnel and the Community*, Geneva.
140. Yadav, S. K. (2013). Social Support in Disaster Coping and Mitigation in the Case of Recurrent Disaster: A Qualitative Investigation. *Disaster & Development, Journal of the National Institute of Disaster Management, New Delhi.* 7(1&2), 164-180.

APPENDICES

9.1 Questionnaire

1.	Name, address and type of the school whether Government or public school.	Name: _____ _____ Type: (Govt/Public)_____ Capacity _____ Address: _____ _____ _____
2.	Man-made disasters that occurred in school in past five years.	a. School fire _____ _____ b. Road accident _____ _____ c. Transport safety _____ _____ d. Mid day meal Disaster _____ _____ e. Any other (Theft/Attack/Building) _____ _____ _____
3.	Identification of various man-made disasters by school management. (Disaster that can happen in future/ Disaster prone area)	a. School fire _____ _____ _____ b. Road accident _____ _____

		c. Transport Disaster _____ _____ d. Mid day meal Disaster _____ _____ e. Any other (Theft/Attack/Building) _____ _____
4.	Community based disaster management teams identified by school management. (Name, Collaboration, distance and contact details of the local authorities available in schools)	a. Police _____ _____ b. Paramilitary Forces _____ _____ c. Fire brigade _____ _____ d. Medical team(Dispensary) _____ _____ e. NGO _____ _____ f. School Disaster Management Team _____ _____ g. Local people/Panchayat _____ _____

		h. Any other(Theft/Attack/Building) _____ _____
5.	Traditional Strategies adopted by the school management for man-made disasters.	a. Disaster Management Plan _____ _____ b. Institutional Mechanism _____ _____ c. Incident Response System _____ _____ d. Capacity building(Building) _____ _____ e. Capacity Building (Training/Awareness) _____ _____ f. Standard operating procedures _____ _____ g. Check List _____ _____ h. Mock Exercises _____ _____ i. Budget/ Finance _____ _____

		j. Review Update _____ _____
6.	Modern Strategies adopted by the school management for man-made disasters.	a. Fire drills(search/rescue/evacuation) _____ _____ b. Fire evacuation map _____ _____ c. Awareness generation(Act/Plays) _____ _____ d. First Aid(Training) _____ _____ e. Warning (Forecasting by IMD) _____ _____ f. Side Grills in Buses _____ _____ g. First Aid kit in Buses _____ _____ h. Fire extinguisher in buses _____ _____ i. GPS in buses _____ _____ j. Quality checks of mid day meal _____

		_____ k. Road safety exercises(Drills) _____ _____ l. Routine Test for Drivers(Alcohol) _____ _____ m. Documentation _____ _____
7.	Facilities and resources available with the school for man-made disaster management.	a. School fire _____ _____ b. Road accident _____ _____ c. Transport safety _____ _____ d. Mid day meal issue _____ _____ e. Any other (Theft/Attack/Building) _____ _____
8.	Whether Syllabus of the schools should be modified for disaster management in terms of parameters like:	a. Information(Content) _____ _____ b. Education(Practical) _____ _____

		c. Communication (IT) _____ _____ d. Training (IMD forecasting) _____ _____ e. Any other(Theft/Attack/Building) _____ _____
9.	Preparedness for man-made disasters by the school management.(Specify the procedures)	a. School fire _____ _____ b. Road accident _____ _____ c. Transport safety _____ _____ d. Mid day meal issue _____ _____ e. Any other(Theft/Attack/Building) _____ _____
10.	Disaster response strategies at the time of disasters (Presence of doctors/ counselors or collaborations for the same.)	a. Trauma & Stress _____ _____ b. Rumour & Panic _____ _____

<table>
<tr><td></td><td></td><td>c. Psychological response
_____
_____

d. Any other(Theft/Attack/Building)
_____
_____</td></tr>
<tr><td>11.</td><td>Perceptions of the school management head about the management of man-made disasters in schools (How to manage disasters effectively).</td><td>a. School fire
_____
_____
b. Road accident
_____
_____

c. Transport safety
_____
_____

d. Mid day meal issue
_____
_____

e. Any other(Theft/Attack/Building)
_____
_____</td></tr>
<tr><td>12.</td><td>Perceptions of the school students about the management of man-made disasters in schools (How to manage disasters effectively?).</td><td>a. School fire
1. Fire is detected
<table><tr><td>Self Help</td><td>Call Help</td><td>Inform School</td><td>Any Other</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
2. Surrounded in Fire
<table><tr><td>Self Help</td><td>Call Help</td><td>Inform School</td><td>Any Other</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
3. Sibling is surrounded</td></tr>
</table>

Self Help	Call Help	Inform School	Any Other

b. Road accident

Self Help	Call Help	Inform School	Any Other

c. Transport safety

Self Help	Call Help	Inform School	Any Other

d. Mid day meal issue

Self Help	Call Help	Inform School	Any Other

e. Any other(Theft/Attack/Building)

1. Theft in School

Self Help	Call Help	Inform School	Any Other

2. Attack in School

Self Help	Call Help	Inform School	Any Other

3. Building Condition

Self Help	Call Help	Inform School	Any Other

9.2 Publications by the Scholar in the Research area

1. Gupta, S. K. Kumar, S. & Sinha, C. (2015). Community Based Disaster Preparedness Planning. *The IUJ Journal of Management*, 3(2), 45-47.

2. Gupta, S. K. Kumar, S. & Sinha, C. (2016). Water Quality Criteria: Quality Standards for Water Supplies. Water and Sustainable Development, New Delhi: New Delhi Publishers, 101-108.

3. Gupta, S. K. & Kumar, S. (2016). Role of Supply Chain Management in Mitigating Natural Disasters: The Case of Floods in Sahibganj District of Jharkhand in 2016. *The IUJ Journal of Management*, 4(2), 5-7.

4. Gupta, S. K., Kumar, S. & Rao, O. (2018). Strategy Framework for Risk Management of Manmade Disasters. MTC Global.

9.3 Proposed time Frames for Completion of Major Milestones

SL.NO.	Topic to be covered	Time duration
1	Proposal of Research topic	Nov 2014
2	Literature survey	Dec 2014 – Mar 2015
3	Presentation of synopsis	Apr 2015
4	Registration of the topic for PhD thesis	May 2015
5	Questionnaire and Pilot Study	Jun 2015- Nov 2015
6	Presentation of Research Progress	Dec 2015
7	Extensive data survey	Jan 2015- Nov 2016
8	Presentation of Data Surveyed	Dec 2016
9	Data compilation and analysis	Jan 2017- Nov 2017
10	Overall Presentation	Jan 2018
11	Pre-submission	June 2018
12	Thesis Submission	Aug 2018