



A Needs and a Capacity Assessment of Fire Preparedness in the Municipalities of Nepal

FINAL REPORT

**Ministry of Local Development/GoN
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LIST OF ABBREVIATIONS

DDC	District Development Committee
FNCCI	Federation of Nepalese Chamber of Commerce and Industries
MoHA	Ministry of Home Affairs
MoLD	Ministry of Local Development
NRCS	Nepal Red Cross Society
VDC	Village Development Committee

Executive summary

Nepal is vulnerable to a variety of natural hazards, including earthquakes, floods, landslides, fires, thunderstorms, avalanches, and glacier lake outburst floods. The Tarai region suffers from numerous fire outbreaks in the dry and stormy season. The fire brigade in Nepal is the administrative unit with the primary responsibility for responding to fire responses. However, this institution is weak and fire engines are decrepit though the first fire station, Barun Yantra Karyalaya, was established by Rana Prime Minister Juddha Samsher Rana in 1937. Each municipality is directly responsible for its own fire brigade and all function under the aegis of the Ministry of Local Development (MoLD). The operational management of fire brigades, however, is extremely poor. To operationalise fire preparedness and mitigation in Nepal, some good initiatives in terms of fire preparedness and mitigation have been adopted by municipalities though few are well documented or implemented. MoLD approved the *Fire Brigade Operation and Management Guideline of 2010*.¹ Various community-based fire risk preparedness programmes which focus on strengthening the capacity of municipalities and communities to prepare for and mitigate fire risks are in place. Although Nepal's urban populations have soared and municipal infrastructures have expanded greatly to meet their needs, the country has not adopted a comprehensive policy for fire risk management.

The objective of this study was to assess existing capacities, identify gaps and propose a way forward. The study methods included a review of secondary information, including existing laws, policies, guidelines, and strategies and collection of primary information through consultation with duty bearers, rights holders and stakeholders in fire risk management. A detailed checklist designed to assess current technical, financial, managerial and institutional capacities, identify issues and concerns and to map a way forward was designed and materialized. A total of 500 respondents, 50 respondents from each of the municipality were consulted for quantitative analysis. All the information collected from various sources was then tabulated, analysed and synthesised to prepare a draft report.

The physical condition of fire engines is poor because they have not been operated or maintained well. Essential equipment like hoses and portable generators is not available. Engines from companies other than Indian ones have turned out to be very expensive because spare parts are unavailable and locals are not skilled in their maintenance. All of a municipality's fire engines are kept in the same place despite the inefficiency of this system and there are too few engines to begin with and few have the extension ladders and elevators needed to fight fires in high rise buildings. Even municipalities which wish to buy more engines are put off by the 10% service fee. There are not enough search and rescue tools and they are not well-stored. For effective response, search and rescue tools are neither adequate nor tools are managed systematically. Provisions for emergency water and fuel storage are inadequate and there are too few fire alarms and extinguishers. Fire response is ad-hoc and engines are seen as a headache.

The management capacities of municipalities in terms of fire prevention and fire extinguishment are inadequate. Fire-fighters have limited skills and knowledge and other municipals have never had the opportunity to participate in trainings and orientations on fire-fighting. The roles of

communities as 'first responders,' of municipal police in coordinating efforts, and of NGOs in coordinating training are not yet recognised, nor is the role that armed police force can play in improving managerial capacity. Compared to other hazards, fires are overlooked in educational curriculum. Over-staffing and poor management has burdened municipalities unnecessarily. In district with no municipality, there is no fire service at all. Few houses are insured and only one hospital has a burnt unit. None of the municipalities have made fire response, contingency, fire safety or emergency plans.

Fire brigades operate using allocations from the block budget from the central government and the municipal budget. Though the *Fire Brigade Operation and Management Guideline of 2010* stipulate that funds come from the multiple sources, only some District Development Committees (DDCs) and Village Development Committees (VDCs) contribute. NGOs have not taken the initiative in mobilising the public and private sectors to pay a service charge and private organisations do not perceive that they have a duty to contribute. Inter-office coordination of resource sharing is limited. Though most municipalities have a disaster management fund, it is limited and provisions for providing relief to fire victims are not regulated.

There is an institutional vacuum within municipalities and the MoLD because there is neither a disaster management unit nor a disaster focal person solely responsible for overseeing disaster plans and programmes. As a result, there are no vertical or horizontal linkages with policy-level forums. Multi-stakeholders consultation meetings are rarely organised for idea-sharing and synergy. Despite the provisions for fire-fighting sub-committees at the ward level, there are none. Though the Users Rights Forum has raised the issue of the poor quality of LPG cylinders, the rate of explosions in urban areas is high. The government of Nepal has promulgated codes, acts and polices related to fire, but most people are ignorant about them because of poor dissemination.

Recommendations: Recommendations are categorised into three parts depending upon the time frame. Actions that can be carried out within two years' time are termed short-term, while medium-term actions are those that can be done between 2-5 years and long-term actions require 5-10 years' time.

Technical capacities

Short term

- *Manage spare parts and maintenance:* Resources should be allocated for the immediate maintenance of engines even if it means reducing allocations for operations and periodic servicing carried out. Spare parts and hoses pipes should be purchased with a view to the model of engine in question. A water-lifting system using portable generators should also be arranged for.
- *Arrange search and rescue materials for quick response:* Search and rescue materials should be stocked in sufficient quantity and stored properly. A large trunk should be used to prevent rusting, mildew and damage by rats. Sufficient hydrogen gas, liquid fuel, and platinum chemical foams should be supplied and first aid kits replenished and updated.
- *Manage battery-led fire alarms:* Fire alarms should have batteries so they work even when there is load shedding.
- *Aware on importance of fire detectors and fire extinguishers:* Basic information about the importance of fire detectors and fire extinguishers should be disseminated through FM radio and television and a cost-benefit analysis provided to be convincing. Fire-fighters should be oriented to the proper use of fire extinguishers.

- *Explore alternative sources of water:* Municipalities should map the ponds and wells within their vicinity and manage them well so they can be used in emergencies. They should harvest rainwater and provide storage tanks. Emergency supplies of fuel should also be provided.
- *Design training as per training need assessment and run during slack season:* Training, drills, and simulations in areas such as emergency fire management, risk assessment, search and rescue, first aid, fire-fighting, evacuation, and crowd control should be imparted during the slack season of the summer monsoon season for municipal staff, municipal police, and disaster focal persons. There should be refresher trainings as well. While designing the training curricula, more emphasis should be given to metropolitan officials, more focus on search-and-rescue capacity-building than fire control, and more time and energy for fire preparedness than fire response.
- *Identify and train first responder:* Since communities are 'first responders,' basic tips on fire response should be provided to community leaders, teachers, youths, and elderly using street drama, drills and simulation exercises.
- *Increase the performance of 101 telephone number:* Considering that proper communication is crucial for securing a timely response, there should be an emergency 101 telephone number in all municipalities within the same district. The fire fighters should provide VHF telephone sets for the effective communication throughout the fire response.

Medium term

- *Procure portable fire engines:* Because streets in inner city areas are narrow, portable fire engines should be purchased. A model should be procured to ensure that spare parts are available and to keep maintenance cheap.
- *Increase fire engines with extension ladders and elevators:* According to international standards, there should be one fire-fighter in every 2,000 people and one engine for a population of 28,000. The number of fire engines with extension ladders and elevators should be increased considering the population and severity of the fire risks. While municipalities are keen to purchase engines, they feel the 10% service charge is too high. They should get a subsidy or tax exemption to encourage them.

Long term

- *Decentralize the fire brigades and fire engines:* Since the pace of urbanisation is great, fire brigades should be established at the outer periphery of municipalities so they can avoid heavy traffic and respond quickly. They should not all be kept in the same place. If there is more than one fire engine in a municipality, they can be kept at different ward offices in coordination with the local police station.

Managerial capacities and awareness raising

Short term

- *Design and enforce a plan to regulate the fire engines:* The MoLD should devise a mechanism to provide fire-fighting services in districts which have no municipality. Each participating DDC should make an annual plan in coordination with other agencies, including FNCCI, and get it endorsed by the DDC council. The DDC should allocate some of its budget to fire fighting and leverage resources from FNCCI and VDCs. Fire engines should be operated by the Armed Police Force.

Medium term

- *More focus on awareness raising activities:* NGOs should be mobilised to design and implement awareness-raising programmes for fire preparedness. Activities could include training, orientation, and folk songs. These fire related awareness programme along with need for and benefits of house insurance should be broadcasted through FM radio and television.
- *Disseminate fire safety messages:* NGOs should disseminate messages about fire safety measures like the proper handling of gas cylinders, the inspection and rehabilitation of electrical wiring system, and provisions for water, sand, buckets, and fire extinguishers. They should organise orientations on fire prevention and extinguishment at the household and community level.
- *Assign some of armed police force to run fire brigade:* Some trained armed police force should provide input to fire brigades by working with them for certain periods of time. Municipality police should also receive training in and orientation on fire-fighting.
- *Redefine the role of fire brigade staff:* The roles of existing fire brigade staff should be redefined so they can contribute in other essential services. Municipalities should provide a “golden handshake” incentive to get some staff to quit. Then, to reduce their long-term financial obligations, new staff should be hired under contract and their facilities clearly defined.
- *Manage special burn units:* Municipalities should coordinate with district hospitals to manage special burn units.

Long term

- *Mainstream fire preparedness and mitigation in curricula:* Material on fire preparedness and mitigation should be included in school and college curricula as well as in the Civil Service Commission examination. The MoLD should coordinate with the MoHA to include fire preparedness and mitigation skills in the training curriculum of newly recruited members of the police, armed police force and army.
- *Prepare and enforce plans:* A fire response contingency plan should be prepared for each vulnerable area. Response, fire safety and emergency plans should be formed.
- *Allocate more roles to civil societies:* Municipalities should mobilise NGOs in coordination with the NGO Federation district chapter to run public awareness campaigns to make people and VDCs recognise the rationale and benefits of service fees. Unless civil society and the private sector assume responsibility it will be hard to manage resources for the operation of fire brigades.

Financial capacities

Short term

- *Enforce Fire Brigade Operation and Management Guideline:* Municipalities should strictly follow the *Fire Brigade Operation and Management Guideline of 2010* in order to get DDCs, VDCs, FNCCI, I/NGOs, and donor agencies to generate resources and should levy a service charge.
- *Carry out functional coordination for resource sharing:* Municipalities should coordinate with district forest offices, which allocates resources for bush fire management, as well as with other relevant offices to help generate funds. It should also coordinate with FNCCI to get resources as per the *Fire Brigade Operation and Management Guideline of 2010* and the principle of social corporate responsibility.

Medium term

- *Design and run quality plans for resource mobilization:* In order to secure a larger block budget from the central government, municipalities should design and implement quality

programmes so that they meet the government's minimal conditions and performance measurement standard and are entitled to additional resources.

- *Strengthen disaster management fund:* Municipalities should strengthen the disaster management fund to regulate ensure that relief items reach fire victims immediately and work with the NRCS in doing so.

Institutional capacities

Short term

- *Organize periodic review and reflection:* Municipalities should organise periodic interaction meeting among fire brigade teams, members of the armed police force and army, Scouts and NRCS, and FNCCI and the NGO Federation to share ongoing efforts in fire preparedness and mitigation, emerging challenges, and the anticipated contribution of each stakeholder in whatever initiatives are adopted. Such meetings lessen the gaps in fire-fighting coverage by sharing resources for synergy.
- *Form and activate ward-level fire-fighting sub-committee:* Municipalities should form ward-level fire-fighting sub-committee as per the *Fire Brigade Operation and Management Guideline of 2010* to undertake basic preparations like mapping highly vulnerable areas, managing local materials to douse fires, and coordinating among like-minded agencies for fire preparedness and mitigation.
- *Ensure fire control mechanisms:* Municipalities should not approve the construction of high-rise buildings without assessing their fire control mechanisms.
- *Incorporate a fire risk management component in Municipality's periodic plans:* Municipalities should incorporate a fire risk management component in their periodic plans.

Medium term

- *Form disaster management units with clear ToR:* In order to regulate the fire preparedness and mitigation programme, disaster management units should be established in municipalities and at the MoLD and clear terms of references laid out. The MoLD and each municipality should have a disaster focal person who will attend district and central natural disaster relief committees meetings to share fire-related issues and concerns and help manage collaborative programmes.
- *Activate through Consumer Protection Forum:* Considering that the explosion of LPG cylinders is the main cause of fires in urban areas, awareness activities about how to handle cylinders should be conducted on radio and television and municipalities should monitor gas dealers through Consumer Protection Forum.

Long term

- *Implement codes and policies with media mobilization:* Relevant codes, like the building and fire safety codes should be implemented properly and enforced. The media should disseminate information about those provisions to the general public. Fire safety should be made mandatory in National Building Code and enforce immediately.

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A Needs and a Capacity Assessment of Fire Preparedness in the Municipalities of Nepal

I. Background

Like other South Asian countries, Nepal is vulnerable to a variety of natural hazards,¹ including earthquakes, floods, landslides, fires, thunderstorms, avalanches, and glacier lake outburst floods. Of them, floods, landslides and fires² cause the severest property damage and fires claim the fourth largest number of lives after, epidemic, landslides, and floods (MoHA, 2010). As Nepal becomes more urbanised, fires have become increasingly devastating hazards. Literally in minutes, a fire can take dozens of lives and destroy hundreds of livelihoods. A large conflagration causes great social, economic and environmental. Historically, Nepal's largest fires occurred at Singha Darbar in 1971, the Bhirkuti paper factory in Nawalparasi District in 1984, and the Bhutanese camps of Jhapa in 2011. In 2008 and 2010 respectively the districts of Tehrathum and Ilam were devastated by fire and in 2009, a forest fire rage in Ramechhap District.

Nepal pays a heavy price in lives and properties due to fire. On average, fires are responsible for property losses worth 350 million rupees and the deaths of 43 people annually. The average years sees more than 1500 outbreaks (MoHA, 2009). If a household loses its house, often its main asset, and the valuable property within, it often falls into poverty.

In ancient times, fire was to warm the human body, sharpen tools, cook meals, and light the environs. Later it was used to run trains and ships, produce electricity, extract minerals, and support technological development.

The Tarai, Nepal's southern plains region, suffers from numerous fire outbreaks in the dry, stormy season between April and June when temperatures exceed 35°C. Because most houses in the region are wooden and have thatched roofs, they are extremely vulnerable to incendiary lighting strikes. In the winter, the major cause of fires is the short circuiting of electrical appliances, particularly heaters. In Nepal's inner city areas, houses are old, made with wooden joists, and placed in close proximity; these too are vulnerable, as fires easily leap from one house to the next. Urban fires cause great loss of life and property and can have a devastating impact on local economies.

Box 1: Chronology of fire initiatives

- **1937:** Established Juddha Barun Yantra Fire Station at New Road in Kathmandu
- **1944:** Set up fire brigades in Lalitpur and Bhaktapur with Dodge fire engines with tailor pumps
- **1966:** Established a fire brigade at Tribhuvan International Airport
- **1975:** Received seven fire engines from Germany
- **1987:** Received three Isuzu Morita fire trucks with ladders and a Mini Mitsubishi after SAARC Summit
- **1994:** Prepared a national fire safety code
- **1995:** Enacted Local Self-Governance Act
- **1996:** Enacted Local Self-Governance Regulations
- **1997:** Enacted Fire Prevention and Protection Act
- **2008:** Proposed transferring ownership of fire brigades from the Ministry of Home Affairs (MoHA) to that of Local Development
- **2009:** Accomplished the transfer
- **2010:** Enacted Fire Brigade Operation and Management Guidelines

¹ The Natural Disaster Relief Act of 1982 defines "natural hazards" as earthquakes, fires, storms, floods, landslides, heavy rain, drought, famine and epidemics. It also includes industrial accidents and accident caused by explosions or poisoning.

² In 1777, Antoine Lavoisier, a French chemist, proved that burning is the result of the rapid union of oxygen with other substances and that as a substance burns, heat and light are produced. Fires, defined as instances of something burning, can be quite destructive, taking a heavy toll in life and property.

1.1 The history of fire fighting

The first fire station, Barun Yantra Karyalaya, was established by Rana Prime Minister Juddha Samsher Rana in 1937, three years after a major earthquake. It had a single vehicle; a Morish made in the U.K.³ An iron tower was established to ring the alarm when a fire broke out. In 1944 Lalitpur and Bhaktapur each got a Dodge fire engine with a tailor pumps. The fire service at Tribhuvan International Airport was established twenty-two years later, in 1966. In 1975 the German government donated seven fire engines. Today, there are fire services in 46 of Nepal's 58 municipalities. Until 2009, when the Ministry of Local Development (MoLD) took charge by virtue of a Cabinet decision, the MoHA was responsible for fire services. Despite a 74-year history, fire fighting services are inadequate and vehicles are in poor physical condition.

1.2 Causes of fires

Fires occur in Nepal for many reasons, including poor settlement planning, lack of preventive measures, inadequate fire resistant construction, mishandling of inflammable substances, poor awareness of fire hazards, and criminal activities. Other key reasons are that the nation lacks institutional arrangements to implement fire protection policies and safety codes for the use of electricity, gas, fuel and does not assess the fire safety of buildings. The dense concentrations of buildings, narrow roads, the use of flammable building materials, and aging water supply and electrical systems have increased the risk of fire, as have the general processes of population growth, unplanned urbanisation, and industrialisation.

Smoking is also a major cause of fire. The unsafe storage of flammables and of readily incinerated materials like polyethylene and other types of plastic sheeting and bamboo and other soft woods also results in fire, as do illegal and loose electric connections, sub-standard wiring, and overloading of electrical systems. In villages, the practice of setting fire to agriculture residue standing in the fields in order to fertilise the soil is another chief reason for wild fires.⁴ The three major reasons for fire can be categorised as technical, human and agricultural (see Box 2).

Box 2: Major causes of fires

(i) Technological: Gas leaks; explosions of gas cylinders and kerosene stoves; short-circuiting of electric heaters, irons, TVs, and other electrical appliances; faulty wiring; collision of electric wires resulting high of winds; use multi-point adaptors; fluctuations in voltage; and low electric poles.

(ii) Human: Children's easy access to matches, smoking, burning mosquito coils, using candles and oil lamps during load shedding, theft of electricity, and family disputes.

(iii) Agricultural: Improper management of straw; use of mechanical threshers; burning straw for heat; feeding cooking stoves with rich husks; preparing animal feed on outdoor stove throughout the day.

1.3 Types of fires

Fires can result from meteorological phenomena like heat waves, and lightning as well as from human actions⁵ like armed conflict, pollution, infrastructure failure or collapse, civil unrest and terrorism. Fires can be categorised into the following three types.

- **Forest and bush fires:** These fires are as a result of practices like slash and burn cultivation and charcoal production by Nepal's blacksmithing caste as well as by natural phenomena like lightning strikes and windstorms. They destroy both community-managed and government-owned forests, including those in national parks and protected areas, and, in many cases, standing crops in fields adjacent to those forests.

³ In 1937, Kathmandu Valley was not linked to India by motorable road. The Morish fire engine was dismantled in the Nepali town of Birgunj near the border with India and its parts transported to Kathmandu by porters.

⁴ It is believed that agricultural residue reduces the productivity of crops if it is not burnt. Sometimes people set their fields alight, believing, falsely, they will witness better harvests.

⁵ It is estimated that about 99% of all fires are caused by human activities.

- **Industrial and chemical fires:** These fires occur when hazardous materials such as petrochemicals spill or leak and subsequently explode, technology fails, vehicles collide, and factories catch on fire. Within minutes, an entire industrial area can be aflame and billion of rupees of property swallowed up. They also take lives and destroy the environment.
- **Structural fires:** A structural fire is a fire which burns the structural components of various residential buildings. They differ from fires that destroy the contents of a room as well as from chimney fires, vehicle fires, and wildfires and other outdoor fires. These fires are as a result of structural failure and are the by-products of other types of fire. They destroy structures like hospitals, hotels, stadiums, government offices, historical sites, schools, airports, and shopping malls. They also destroy lives and property and cause environmental and economic losses.

1.4 Fire hazards and incident profile in Nepal

In Nepal, fire hazards are analysed by season, month, and time of day. Fire profiling also includes a consideration of the incidence and severity of fires.

a. Analysis by season: Climatic conditions have a large influence on the severity of fires. In Nepal, it is summertime conditions, with their hot temperatures and high winds, that are more prone to fire than winter, when cold temperatures strong but moist winds reduce the severity of any fire that does start.

a. Analysis by month: The severity of fire risk differs throughout the year, with certain months being more prone to fires than others. The months of March, April, May, and June, which fall at the height of the dry season, is the period most at risk and, indeed, has the highest incidence of fires. Winter months are less prone to fire hazards because the ground and housing materials are likely to be damp, thus reducing the ability of any fire that does break out to spread.

c. Analysis by time of day: A micro-analysis of number of fire incidents in terms of time revealed that fires are more frequent at night. This connection can be explained by a number of factors. First, open flames are more likely to be used at night--for lighting, cooking and heating. Second, drunkenness is associated with fires and more abuse of alcohol occurs at night.

d. Incidence: Fire incidents occur at any time of year, but more often at night. The causes, in order of decreasing frequency, are candles toppling over, cigarettes not being properly extinguished, cooking oil igniting, electrical failure, gas cylinders or stoves exploding.

e. Severity: The severity of fires is correlated both with season and time. Fires in the dry summer are more severe than those in the winter, and those which occur at night, when people are asleep and some are in a drunken stupor, are more severe than those that occur during the day.

2. The Context

Fire is one of the most devastating hazards in Nepal. Every year it causes the loss of large numbers of lives and properties. Nepal's Tarai plains are particularly susceptible to fire hazards due to the heat, the style of house construction,⁶ and frequent lightning strikes and windstorms. Most incidences of fires occur in the dry summer season, festivities, crop harvesting, and load-shedding. Poor handling of fire for cooking and other purposes, electrical short circuits, poor wiring, poor handling of gas cylinders and stoves, human negligence and lack of adequate fire safety measures are the major factors contributing to the outbreak of fires.

⁶ Most houses are made of flammable materials--dry straw and a wooden structure.

In Nepal, the fire brigade is the administrative unit of the municipality with the primary responsibility for responding to fire responses. However, this institution is weak and fire engines are decrepit. Each municipality is directly responsible for its own fire brigade and all function under the responsibility of the MoLD. The operational management of fire brigades, however, is extremely poor and there is much work to be done in terms of reducing risks by implementing fire preparedness⁷ and mitigation measures.

Despite the shortcomings of Nepal's fire-fighting capacity, there are reasons for optimism. First, in 2010, the MoLD approved the *Fire Brigade Operation and Management Guideline of 2010*⁸ to operationalise fire preparedness and mitigation in Nepal. Actually doing so, however, requires strong technical, financial, managerial and institutional capacities at the municipality level and, while capacity varies considerably across Nepal's 58 municipalities, in most cases, these capacities are very weak and have not yet been properly analysed.

Second, some good initiatives in terms of fire preparedness and mitigation have been adopted by municipalities though few are well documented or implemented. In addition, the Nepal Red Cross Society and other non-governmental organisations have recently conducted various community-based fire risk preparedness programmes which focus on strengthening the capacity of municipalities and communities to prepare for and mitigate fire risks.

Although Nepal's urban populations have soared and municipal infrastructures have expanded greatly to meet their needs, the country has not adopted a comprehensive policy for fire risk management. The objective of this study was to assess its existing capacities, identify gaps and propose a way forward. It makes a substantial contribution to the fourth flagship programme.

2.1 Objective

The objectives of this study were three-fold:

- To support the collection, compilation and analysis of information and reports on fire risk reduction by municipalities, the MoLD and other stakeholders.
- To carry out a needs and a capacity assessment of the municipalities with regard to fire preparedness and mitigation.
- To organise a multi-stakeholder consultation workshop at the national level to assess municipal needs and capacities

2.2 Study methods

The study methods adopted included a review of secondary information, including existing laws, policies, guidelines, and strategies. Primary information was collected by consulting duty bearers, rights holders and stakeholders in fire risk management. A detailed checklist designed to assess current technical, financial, managerial and institutional capacities, identify issues and concerns and to map a way forward was developed and approved and sent to all 58 of Nepal's municipalities. Ten municipalities were visited to directly capture the feelings, perceptions, ideas and views of stakeholders through key informant interviews. Consultations in the form of focus group discussions were held with the fire brigade teams of those ten municipalities. Interviews conducted with key fire fighters and fire engine drivers were beneficial in revealing the histories

⁷ Fire preparedness activities activities put in place before any fire breaks out and are aimed at mitigating or preventing the negative impacts of fires.

⁸ The main objectives of the guidelines are to establish a reliable system for the operation and management of fire brigades, to provide the services of fire engines to adjoining VDCs and to the municipalities of adjoining districts, to solicit resources from village and district development committees, to provide fire engines to recently established municipalities which do not yet have their own engines, to manage a system for generating resources, to provide for operation and maintenance, to increase the speed of services, and to increase the participation of local communities and the private sector in fire risk management.

of various fire brigades as well as their response mechanisms and the constraints they face. Meetings with executive officers, finance officers and store keepers helped to round out the current picture of fire brigade management.

To ascertain what municipal residents think about the performance of fire brigades, a quantitative analysis was conducted using a survey. The sample size was determined using a formula devised by Arkin and Colten (1963), whose confidence and error levels are 95% and p% respectively

$$n = \frac{NZ^2P(1-P)}{Nd^2 + Z^2P(1-P)}$$

Where,

n = sample size

N = total number of households in the 58 municipalities

Z = level of confidence (95%)

P = estimated proportion of beneficiary population

d = level of error (5%)

Using the above formula, the sample size was calculated as just 500, or 50 randomly selected respondents in each of the 10 municipalities examined in detail. Each answered a structured questionnaires prepared through discussion and modified after field testing. Table I and Figure 4 show the occupations of the respondents.

Table I: Reasons for poor performance of fire brigade by municipality

SN	Municipality	Occupation of respondent					Total
		Agriculture	Daily wage labour	Students	Service	Others	
1	Bhadrapur	12	9	9	12	8	50
2	Mechi	16	5	8	14	7	50
3	Kathmandu	5	6	12	21	6	50
4	Pokhara	15	5	10	15	5	50
5	Dhangadhi	10	8	12	15	5	50
6	Lalitpur	7	9	13	10	11	50
7	Kirtipur	11	4	14	13	8	50
8	Madhyapur Thimi	21	9	12	5	3	50
9	Lekhanath	8	6	15	12	9	50
10	Bhaktapur	8	21	5	10	6	50
Total		113	82	110	127	68	100%

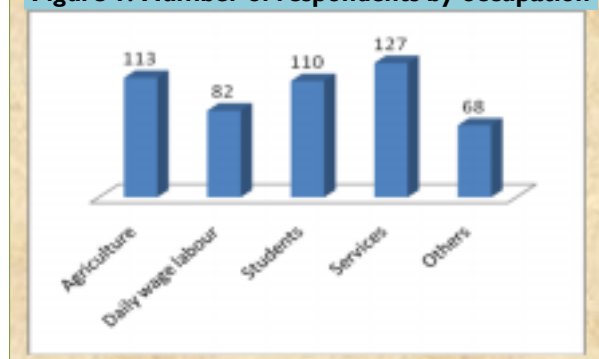
Source: Field survey, 2011

One-quarter of respondents work in the service sector, 23% in agriculture, 22% are students and 16% are daily wage labourers. The remaining 14% do a variety of jobs, including running grocery stores, teaching, raising cattle, and driving.

The researcher met key district-level officials to assess the level of coordination among them and held short meetings with representatives of the MoHA, MoLD, Association of Municipalities, and the

UNDP disaster risk management team members to collect data and to validate information from the field. All the information collected from various sources was then tabulated, analysed,

Figure I: Number of respondents by occupation



and synthesised to prepare a draft report, which was shared with stakeholders for their feedback and suggestions before a final report was produced.

2.3 Limitations

This study is based on primary information collected from 10 of Nepal's 58 municipalities; time and resource constraints made visits to the other 48 impossible. The municipalities selected are, however, representative of the fire-related issues that characterise the Tarai and the hills and the east, central and western regions of Nepal. All 58 municipalities did receive a checklist and more than 25 municipalities sent their responses were reviewed and included in this report.

2.4 Structure of the report

This report has four sections. The first section provides background on fire hazards in Nepal, the history of its fire-fighting services, an analysis of the causes of fire, and a categorisation of the types of fire. The context, objective, study methods and limitations are briefly summarised in the second section. The third section is the main part of the report. It describes the technical, financial, managerial and institutional capacities in terms of fire preparedness and mitigation of Nepal's municipalities. The last part of the report summarises the key conclusion and recommendations.

3. Analysis of the findings

This section describes the technical, financial, managerial and institutional capacities of fire brigades in the municipalities of Nepal.

3.1 Technical capacities

The indicators of technical capacity of Nepal's fire brigades include their status, the physical condition of fire engines, the availability of spare parts, the servicing of fire engines and fuel management. They also include the availability of search and rescue tools, water storage facilities, the physical location of fire brigade, and the efficiency of fire response work.

a. Status of fire brigade: Even 74 years after the introduction of fire brigades in Nepal, 12 municipalities⁹ do not have fire engines. Most major cities in the hills, including the capital, and major Tarai cities have fire engines because the threat of fire is severe and many newly declared municipalities also have fire engines though that is dependent on the resource available and the leadership of municipal officials. Altogether 46 municipalities have 69 fire engines each with a capacity of 4000 litres¹⁰ in majority (MoLD, 2009). In addition, the district development committees of Parbat, Udaypur, Panchthar and Lamjung have one fire engine each. However, there are no adequate fire engines in the large cities like Kathmandu and Lalitpur. Mr. Dilaraj Gachha of Juddha Barun Yantra had this to say regarding the need for more and larger fire engines (see Box 3).

Box 3: More and larger fire engines are needed

There are not enough fire engines and their capacity is too limited. We need five 5000-litre fire engines and five 2000-litre fire engines, five portable fire engines, and two fully equipped fire engines. We also need spare parts and fire-fighting aids, including fire extinguishers. We also need chemical fire extinguishers as well as fire oxygen and platinum chemical foam extinguishers so that we can respond to all types of fire. Unless we get additional high-capacity fire engines, we will not be able to deliver satisfactorily services.

⁹ Municipalities without fire engines are Ratnanagar, Tansen, Putalibazar, Lekhnath, Baglung, Birendranagar, Narayan, Dipayal Silgadhi, Bimeshwar, Kirtipur, Madhyapur, and Panauti.

¹⁰ In Kathmandu, one fire engine a capacity of 9500 litres; the other four are smaller.

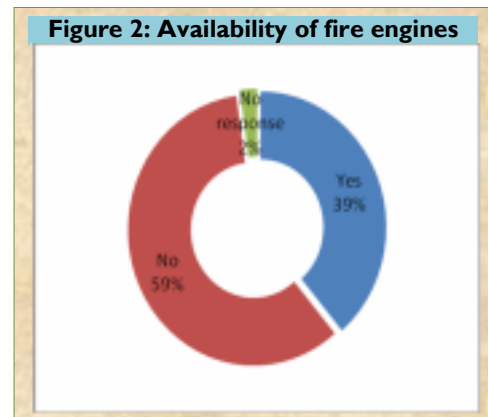
Respondents' perceptions of the availability of fire engine services are laid out in Table 2 and Figure 2 below.

Table 2: Availability fire engines services by municipality

SN	Municipality	Yes		No		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	30	60	16	32	4	8
2	Mechi	27	54	21	42	2	4
3	Kathmandu	12	24	38	76	0	0
4	Pokhara	26	52	23	46	1	2
5	Dhangadhi	32	64	18	36	0	0
6	Lalitpur	11	22	38	76	1	2
7	Kirtipur	8	16	40	80	2	4
8	Madhyapur Thimi	4	8	45	90	1	2
9	Lekhanath	7	14	43	86	0	0
10	Bhaktapur	37	74	13	26	0	0
Total		194	39	295	59	11	2

Source: Field survey, 2011

The availability of the fire engines services is different across the municipalities. Interestingly, fire brigade services are worse in metropolitan and sub-metropolitan cities than in smaller municipalities. Some municipalities, including Bhadrapur, Dhangadhi and Bhaktapur, satisfy residents their not having many fire engines. Their success demonstrates that the number of fire engines has no direct correlation with the quality of services provided. Overall, just 39% of respondents think that sufficient services are available. Residents of Dhangadhi are most satisfied, with 64% responding positively, while those in Madhyapur Thimi are least satisfied with 90% declaring that services are inadequate. The fact that there are no fire engines in Madhyapur Thimi Municipality may account for the dissatisfaction.



b. Physical condition of fire engines: Fire brigades are responsible for containing and extinguishing any outbreak of fire by utilising appropriate methods, including fire attack and suppression, alert rescue operations, damage control and operational coordination of action with other agencies. To do so reliably, they need well-maintained vehicles. In actual fact, however, the fire engines are in a poor state. Most are more than 15 years old and, according to respondents, they overheat and cease to function after two to three hours of fighting fires. Not even Indian fire engines, with spare parts right next door, are well-maintained. The water pumps of the majority of the fire engines do not function well so it is difficult to spray water at sufficient heights. Portable fire pump for use in narrow alleys or on roads blocked by collapsed buildings are not fully operational. Fire-fighters have to rely on simple engines even in the case industrial fires,¹¹ which demand much more sophisticated technology to succeed. Generators are too heavy for use in emergency situation or they simply do not work at all.

Except in Kathmandu, where one engine can fight fires up to 10 or 11 storeys, all the other engines lack ladders systems to fight fires above two or three storeys. With the government sanctioned to construct buildings up to 20 storeys high, clearly capacity is inadequate. Fire-

¹¹ Pokhara municipality, however, has been discussing the possibility of buying an engine suitable for fighting industrial fires with FNCCI.

fighters are forced to climb staircases within buildings in order to put out fires; this places them at great risk. Search and rescue materials are also inadequate and there are neither enough ropes nor enough capacity to use the extant ropes to ensure adequate safety.

c. Availability of spare parts: There is no provision for procuring spare parts for the emergency use. Only a few nuts, bolts, crowns and excels are available. Because of the poor storage system, the spare parts which are available are rusty. Finding spare parts for fire engines made in China, Japan, Germany and the U.K. are not readily available; they have to be imported from Singapore, a costly proposition. For India-made engines, in contrast, spare parts are available locally and Sipardi Company has helped maintain engines. However, since there is no local mechanic who can handle serious problems and an expert has to be called in from India in such cases. The problems in operation and maintenance are compounded by the fact that Nepal owns many different models of fire engines.

d. Servicing of fire engines: As the use of fire engines is seasonal and unpredictable, there is no provision for their periodic servicing. There is, however, a simple system of ensuring functionality after each fire response: the brakes and the battery are tested. Engines are also started every other day to ensure the battery is not dead. Servicing systems are not uniform. Mechi municipality, for example, services its engine every six months while Dhangadhi does it every 9000 km. In general, servicing is done no more often than every six months unless a serious mechanical problem is encountered. Because municipalities do not provide a mechanic, emergency repairs are often conducted by drivers using a 'hit and miss' method.

To be properly prepared for fire hazards, each fire brigade should keep engines at international standards operations by establishing repair and maintenance workshops within the municipalities themselves. As of now, however, no municipality has such a shop. Mr. Rohit Bahadur Shrestha of Lalitpur, Sub Metro-Politian City municipality had this to say about maintenance (see Box 4):

Box 4: Timely maintenance of fire engine is mandatory

Fire engines are more than 24 years old. Due to the scarcity of spare parts, the need for special technicians and the expense, it is hard to carry out periodic maintenance and repair. The engines should be overhauled as soon as possible. Right now they are only showpieces. If immediate action for improving the physical condition of fire engines is not taken, it will be very difficult to serve the people. We will face the wrath of the public if the engines are not made workable.

e. Fuel management: Though all fires stations should safely store fuel to run engines for use in emergencies, only the Juddha Barun Yantra in Kathmandu has a stock of just 200 litres. After every fire response, engines should be refuelled fully (160 litres for most engines), but this is not always the case. A full of fuel tank of fire engine enable just four to five hours of continuous operation and has to be resupplied through service providers if a fire response takes more than five hours. The municipality authorities do not place enough trust in the fire brigade team to store the fuel at office for emergency period. Each municipality assigns each of its fire engines a particular petrol pump to refuel but these pumps are not always the closest to the fire station.

f. Availability of search and rescue tools: No fire station has enough search and rescue tools and those they do have are not properly managed. A set of search and rescue tools ideally includes optimal numbers of chain saws, concrete cutters, crow bars, wire and abaca ropes, shouldering sticks, clippers, jacks, hammer pincers, and handsaws and abaca rope but no station meets the ideal. Some of the tools that are available are inappropriate because they do not match the model of fire engines. In Dhangadhi, search and rescue tools were misplaced after a

group of Maoist rebels hijacked¹² one of its fire engines. Most fire stations got their search and rescue tools with their fire engines and since then municipalities have added only the most essential tools either because of resource constraints or lack of commitment. No municipality has a trunk or other proper system of storage and many tools are rusty.

First aid equipment is similarly limited. There are few stretchers and spin boards for the injured and few first aid kits. Kits were provided with the fire engines, but most are now empty or filled with expired medication. Even though minor injury is common during fire-fighting, neither fire brigades nor municipalities seem concerned by the possibility. Health and ambulance services specially designated for fire-fighting are lacking. Only the BP Koirala Institute of Health Sciences (BPKIHS) in Dharan has a special burn unit for victims of fires and except for Kathmandu, which has two fire ambulances suitably equipped with instruments and monitors, only ordinary ambulances are available.

Many fire brigades do not even have the most basic of uniforms so essential to their safety. Only in Kathmandu, Siddharthanagar and Inaruwa have fire-fighting jackets and dress while boots are found only in Bharatpur, Tikapur, Damak, Kathmandu and Kapilvastu in adequate number. There are large numbers of helmets but life jackets are found only in Kathmandu and Kapilvastu municipalities. Poor storage has resulted in much damage to the available clothing by rats and mildew.

Box 5: Uniforms for fire-fighters are required

Responding to a fire requires highly technical skills. Sometimes locals force us to do what they say because we do not have a uniform; they only follow our instructions if we wear army uniforms. During a fire, every person wants to save his assets. However, fire-fighting is based on a special science: fire-fighters have to assess how the wind is flowing, the extent of the damage and safeguard others' assets from damage.

There are far too few fireproof outfits and they are designed for individuals taller than 5 feet 7 inches, too large for many Nepali men and almost all Nepali women. It is very heavy and bulky and difficult to move in. As a result, physical injury is common during the fire response. It is also rumoured that the black colour of the outfits causes cancer and people say that wearers look like ugly ghosts. Mr. Punya Prasad Subedi, a fire-fighter of Pokhara Municipality, spoke about the need for fire-fighting uniforms to ensure that fire victims stay safe during a fire (see Box 5).

Box 6: Fire-fighting equipments are very costly

There are no fireproof uniforms for fire-fighters and while helmets and boot are available, there are not enough and the helmets too are not fireproof. The number of life jackets is inadequate though there are a token few. Each complete fireproof outfit would cost us NRs.125,000. We cannot afford to supply our fire-fighters with adequate tools.

In most municipalities, the storekeeper prepares an inventory twice a year, but no steps are taken to fill the gaps largely due to resource constraints. Mr. Madan Ghimire, Executive Officer of Bhadrapur municipality, spoke of the high cost of fire-fighting equipment (see Box 6):

There is not enough foam (hydrogen gas or liquid fuel) to protect important documents from fire. Hydrogen gas is highly effective for putting out electrical fires but it is not used much. Wood, cloth and paper fires are all put out by water though this is not an effective.

¹² The fire engine was looted when fire brigade team was on the way to Dhangadhi from fighting a fire in Hasuliya VDC of Kailali District. It was found one year later in a remote village of same district.

In most municipalities, fire extinguishers are not installed properly or functional. While in Kathmandu, the majority of private banks, hospitals, cinema halls and some public and government buildings have installed fire extinguishers; people do not know how to use them and rarely instructions for their use are posted nearby. Ironically, Dharan’s fire-fighters know how to use extinguishers but they don’t have any, whereas in Inarawa municipality they have extinguishers but only limited technical knowledge about their use. The general public know even less about fire extinguishers.

g. Water storage facilities: Water plays a crucial role in fire response, but only a few fire stations have water storage facilities on their premises. Harvesting rainwater and pumping underground water are the two main sources. The capacity of those which do have facilities varies widely: Mechi and Dharan municipalities each have about 40,000 litres but Dhangadhi and Biratnagar have half that capacity with just 18,000 and 16,000 litres respectively.

Despite opportunities to harvest rainwater and use pond water,¹³ most municipalities have no emergency supply. Fire engines in Kathmandu Valley get water from Mahankal, which is 12 to 25 km away depending on the municipality concerned. Unfortunately, getting water from dirty rivers and ponds decreases the lifespan of the pumps of engine.

Water hydrants have been installed in newly established municipalities. For example, Bharatpur municipality has constructed 50 water hydrants with the support of the Urban Environment Improvement Project funded by the Asian Development Bank. About the importance of a source of water, Mr Dilaraj Gachha of Juddha Barun Yantra said as in Box 7.

Box 7: Water storage facilities should be managed

To be frank, water management facilities are very poor. Juddha Barun Yantra has no large water storage capacity. When a fire broke out in Jhose hardly one kilometre from the fire stations, engines had to travel 12-13 km to Mahankal to get water. They reached the scene very late and their response was, as a result, ineffective. Locals were very angry. In our analysis, water can be pumped from Tundikhel, Kamalpokhari, Teku and Balaju and stored for fire-fighting purposes. Fighting fire without water is like fighting a war without guns or bullets.

h. Physical location of fire brigade: Except in Pokhara and Siddarthanagar fire brigades are located in strategically appropriate areas, most in the heart of the city. However, fire brigades believe that branches must be set up in other strategic locations to address the skyrocketing rate of urbanisation. In cities like Kathmandu and Lalitpur, the heavy traffic makes it difficult to respond to fire rapidly enough. In Kathmandu, officials believe supplemental stations should be set up in Maharajgunj (Ward 3), Dallu (Ward 15), Sinamangal (Ward 35), Baneshwor (Ward 10), and at the trolley bus station premises (Ward 34) in order to decentralise service.

The results of the survey with regard to people's satisfaction with the existing location of their city’s fire brigade are summarised in Table 3.

Table 3: Satisfaction with the existing locations of fire brigade by municipality

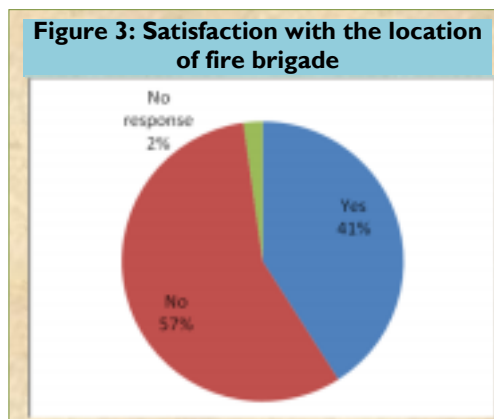
SN	Municipality	Yes		No		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	38	76	10	20	2	4
2	Mechi	45	90	5	10	0	0
3	Kathmandu	12	24	37	74	1	2
4	Pokhara	6	12	44	88	0	0
5	Dhangadhi	42	84	8	16	0	0

¹³ There are several ponds in each of the 13 wards of Jaleshwor municipality. The municipal fire engine fills its tank from them.

6	Lalitpur	11	22	38	76	1	2
7	Kirtipur	5	10	43	86	2	4
8	Madhyapur Thimi	5	10	41	82	4	8
9	Lekhanath	7	14	42	84	1	2
10	Bhaktapur	34	68	16	32	0	0
Total		205	57	284	41	11	2

Source: Field survey, 2011

Respondents have different opinions about the existing locations of fire brigades. Respondents' satisfaction is higher in small municipalities than in metropolitan and sub-metropolitan cities. In metropolitan and sub-metropolitan cities, fire brigades are located in inner-city areas and it is even difficult to mobilise them during emergencies because of heavy traffic and narrow road. Decentralising fire brigades would improve response time. The majority of respondents (57%) said that existing locations are strategically sound, but 41% respondents believe they are not. The greatest satisfaction is found in Mechi, with 90% satisfied; the least in Pokhara, where 88% are dissatisfied. The results suggest that a re-evaluation of existing locations is needed in some municipalities.



i. Efficiency of fire response: Although fire-fighters express a desire to respond more quickly and efficiently, they are hampered by a numbers of factors, including late communication, slow fire engines¹⁴, speed breakers in unnecessarily locations, other drivers' not giving way after hearing the horn or siren of a fire engines and heavy traffic. Other reasons include poor water pumping facilities, bridges and culverts, and low-lying electricity wires.

The absence of fire oxygen and platinum chemical foam and fire extinguisher cylinders for special types of fire also hinder the efficiency of fire responses, as does the lack of adequate search and rescue materials and fireproof uniforms, helmets, boots and eye protection. Considering how dilapidated the engines are, however, the efficiency of fire responses must be considered good and the dedication of fire-fighters, despite many obstacles, is highly admirable. The survey respondents' perceptions about the efficiency of fire response are given in Table 4 and Figure 4.

Table 4: Efficiency of fire response by municipality

SN	Municipalities	Excellent		Good		Poor		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	12	24	14	28	22	44	2	4
2	Mechi	18	36	9	18	19	38	4	8
3	Kathmandu	9	18	14	28	25	50	2	4
4	Pokhara	8	16	12	24	26	52	4	8
5	Dhangadhi	13	26	14	28	23	46	0	0
6	Lalitpur	14	28	12	24	22	44	2	4
7	Kirtipur	10	20	18	36	21	42	1	2
8	M. Thimi	8	16	16	32	23	46	3	6
9	Lekhanath	9	18	18	36	21	42	2	4
10	Bhaktapur	4	8	12	24	34	68	0	0
Total		105	21	139	28	236	47	20	4

Source: Field survey, 2011

¹⁴ The maximum speed of DCM fire engines is 90 km/hr whereas TATA fire engines go 60-65 km/hr. since most engines are very old; they travel slower than the optimal speed.

While almost half think that fire response is either excellent or good, 47% think it is poor. The most positive response was in Mechi, where 36% think the response is excellent. Residents of Bhaktapur were most negative: 68% think the response is poor.



3.2 Financial capacities

The financial capacity of each municipality was judged by assessing the available financial resources as well as local resource management and mobilisation.

a. Financial resources: Resource constraints are the main reason fire engines are in poor condition.

The fiscal budget allocated by the central government is insufficient: it covers just 30 percent of the total need, though the actual proportion varies from municipality to municipality. Each gets between NRs. 400,000 and NRS. 1,100,000, depending on the numbers of staffs and engines. The annual budget received from government for the Kathmandu fire brigade is more than NRs. 3,000,000. Once a municipality's annual block budget is provided by the MoLD¹⁵, no separate grants are sent for fire brigades. In an example of the principles of autonomy and decentralisation, it is the responsibility of individual municipalities to allocate annual budget to fire brigades. The *Fire Brigade Operation and Management Guideline of 2010* stipulates that budget not spent at the end of the fiscal year should be carry forward to next fiscal year .

- Box 8: Provisions made in 2010
Guideline for resource mobilisation**
- MoLD's surplus fund
 - District development committee
 - Village development committee
 - Municipality
 - Federation of Nepal Chamber of Commerce and Industries (FNCCI)
 - I/NGOs
 - Donor agencies
 - Service charge
 - Others

Except in a very few cases, there are no coordination committees¹⁶ to assume responsibility for the operation and management of fire brigades and for resource mobilisation. Even those municipalities which do have committees, they do not organise the three annual meetings mandated in the guideline, coordination committees should organise at least three meetings annually, but this recommendation is rarely adhered to. This means that municipalities formulate annual programmes and determine annual budgets for the operation and management of fire brigades without consulting a coordination committee. Kathmandu Metropolitan City, is an exception: it has formed a fire brigade improvement task force to regulate fire response activities in an effective manner. The responsibilities of a coordination committee are as follows:

- Support municipality in formulating an annual programme and determining annual budget
- Assist the municipality in mobilising resources in the coordination with adjoining Village Development Committees (VDCs), District Development Committees (DDCs) and municipalities

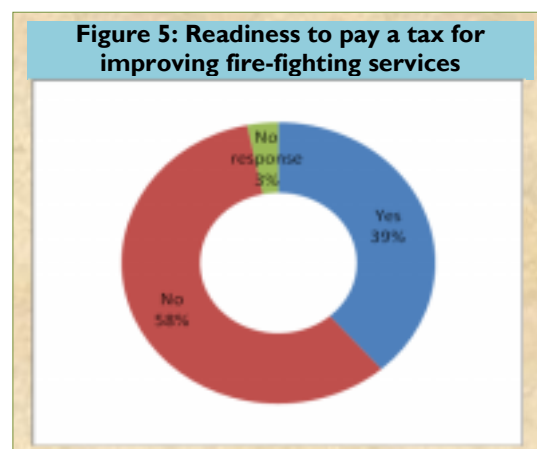
¹⁵ The amount is received as a local development grant, not as a separate budget for fire brigade management.

¹⁶ Each committee is supposed to be coordinated by the chief of municipality and include district administrators from the district development committee and District Police Office, representatives from other municipalities in the same district, two chairpersons from VDCs which could operate fire brigades, and representatives from FNCCI, NGO Federation, NRCS, and Nepal Journalist Federation. The executive officer of the municipality is the member secretary of the committee.

- Monitor fire engine and other equipment frequently to ensure they function
- Ensure that fire engines are only used to fight fires
- Arrange proper security of fire engines
- Set and enforce service fees to make fire brigade operation and management sustainable

b. Local resource management and mobilisation: Though the existing policy¹⁷ clearly spells out that a local development fund should be established for the operation and management of fire brigades, such funds have not been put into practice. The *Fire Brigade Operation and Management Guideline of 2010* also stipulates that funds be mobilised at the local level (see Box 3) and clearly defines roles and responsibilities. The DDC is supposed to ensure that it makes grant supports and those other VDCs and municipalities contribute as required. District administration offices are to provide security and VDCs to pay service fees set by the coordination committee. FNCCI, the private sector and civil society, in a demonstration of corporate social responsibility, should also provide resources as recommended.

Though roles are clearly defined, only DDCs and VDCs are fulfilling their responsibilities. For example, Kapilvastu, the DDC provided NRs. 100,000 and VDCs, NRs. 20,000 each as a service charge to fire brigade. The Rupandehi DDC allocated NRs. 400,000 in 2001-- as there are more fires in rural than urban areas. Mechi municipality collects Rs. 3000 from each adjoining VDC as an annual service charge and NRs. 15 from each house as an annual asset tax. The same provision is also enforced in Inaruwa municipality. Damak charges NRs. 5 as an integrated assets tax explicitly for fire-fighting services.



There are several problems regarding raising funds at the local level. The fact that fire engines provide service beyond the boundaries of any given municipality is the main reason people are unwilling to pay. In this regard Mr. Gyan Bahadur Chhetri, Subedar, Pokhara Sub Metro-Politian City said which is given in Box 9.

People's willingness to pay tax to improve fire-fighting services is inversely correlated with the services available: respondents are more willing to pay a tax where the quality of services is poor, as it is in metropolitan and sub-metropolitan cities. This is indeed a positive sign. Contrary to this, in Mechi, people are willing to pay additional taxes although good fire-fighting services are already available. Only 39% respondents were in the favour of paying a tax to improve fire-fighting services; 58% were not (see Table 5 and Figure 5).

Box 9: Water storage facilities should be improved

It is very difficult to raise service charge from municipal residents because fire engines provide service outside the municipal area. In many cases, fire engines are a white elephant for the municipality. In 1990, we fought a fire at the Bhirkuti paper industry for 11 days. How logical it is if we force residents of Pokhara to pay a tax?

¹⁷ The Local Self-Government Act and Regulations of 1995 and 1996 respectively clearly state that municipalities are solely responsible for managing additional resources for their fire brigades.

Table 5: Readiness to pay a tax for improving fire-fighting services by municipality

SN	Municipality	Yes		No		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	12	24	37	74	1	2
2	Mechi	19	38	28	56	3	6
3	Kathmandu	32	64	18	36	0	0
4	Pokhara	22	44	28	56	0	0
5	Dhangadhi	13	26	35	70	2	4
6	Lalitpur	28	56	20	40	2	4
7	Kirtipur	21	42	28	56	1	2
8	Madhyapur Thimi	18	36	29	58	3	6
9	Lekhanath	12	24	34	68	4	8
10	Bhaktapur	16	32	34	68	0	0
Total		193	39	291	58	16	

Source: Field survey, 2011

People in Kathmandu and Lalitpur are most willing to pay a tax, with 64% and 56% responding positively, while those in Bhadrapur are least willing, with nearly three-quarters saying they are not willing.

3.3 Managerial capacities

The management capacity of each municipality was assessed in terms of available human resources and their capacity, staff facilities, distance between the quarters of fire-fighters and fire engines, and the distribution and coverage of fire engines. It also assessed the system of damage and needs assessment; the preparation of response plans; fire safety, emergency and contingency plans; communication systems; interagency coordination; and awareness-raising campaigns. The security and the use of fire engines were also considered.

a. Available human resources: Except in Kapilvastu¹⁸, there are more staff members available than needed, considering that each engine can be run by a team of six¹⁹ | one shift and that there are two shifts a day. However, many fire brigades visited expressed a need for more engines and more staff. Although the majority of staff members are permanent employees under the Municipality Act, some fear that if there is no fire engine or if the existing engine is not functional, they will lose their job and be transferred into another, less enjoyable department. Because staff members hold this opinion, they have a vested interest in keeping engines in the best physical condition possible. Positions which were vacated in 1991 have not been filled. Only about two-thirds of positions allocated are actually filled.

Box 10: Relevant trainings would improve the staff's skills

Juddha fire brigade is operating with human resources with limited skills and no proper training. There are 40 staff members, including 11 policemen from the Armed Police Force, 10 city policemen from Kathmandu Metropolitan City Enforcement Division and 18 staff from MoHA, to respond to approximately 350 fires annually as well as search and rescue efforts when people drown in wells, or buildings collapse. As urbanisation has complicated fire-fighting, training is needed to improve the skills of staff.

As fire-fighters work only as and when needed, they are free much of the time. Despite the leisure they have, they are very negative about municipal authorities and feel that they are ignored, isolated, and treated as second class staff. Except in Dharan, fire-fighters have not engaged in regular physical training since 1991. The views of municipal authorities about fire-fighting staff are similarly negative. They believe their performance is not satisfactory in

¹⁸ In Kapilvastu, two fire engines are being operated with a team of six, two drivers and four fire-fighters.

¹⁹ A team of six is needed to run one fire engine: four fire-fighters, one driver and one helper.

comparison with the investment made in them. No staff member is well trained. Mr. Dilaraj Gachha of Juddha Barun Yantra had this to say about the need for skilled staff which is given in Box 10.

b. Capacity building: Each municipality is responsible for providing training, orientations, and study visits to the staff of its fire brigades as part of capacity-building initiatives. Fire brigade teams should be skilled in fire risk management and search and rescue and first aid skills but trainings in these areas are almost never organised. A few fire-fighters participated in a simple orientation conducted by security personnel when fire engines were provisioned and GTZ/UDLE and National Fire Control and Security Consultancy Services Pvt. Ltd also organised a basic training. Some simulations were organised to teach fire-fighters to make a stretcher out of two bamboo poles and a blanket and to make ropes to hang outside a burning building. However, no refresher training was provided and skills have not been updated. In many cases, senior fire-fighters lead through example, passing on knowledge taking a 'learning by seeing' approach. Interactions between fire brigade teams and municipality officials about current issues are very limited.

Except in a few cases, there is no provision for sending fire-fighters on exposure tours to other municipalities though fire-fighters suggest that study visits do help them acquire new skills. Sometimes inappropriate staff members are selected for tours or training because of favouritism. For example, senior municipals officials were selected for training abroad designed for fire-fighters. Such unfair practices in have discouraged staff and their dissatisfaction is often reflected in their work.

In rural areas, locals respond first to fires before fire engines come but they rely solely on traditional ideas and have no technical skills. Local police should take an active role in coordinating such efforts, but in the recent years, particularly in urban and peri-urban areas, the tendency to wait for fire engines is increasing due to growing individualism and eroding social harmony.

c. Staff facilities: Staff facilities differ from municipality to municipality. Apart from a monthly salary, fire brigade team members get food, clothing, and other allowances which keep in mind that they are on duty for 12-hour shifts. For example, Biratnagar Sub-Metropolitan city provides annual allowances for mosquito nets and blankets and in Inuruwa municipality, a goat is provided after every successful effort²⁰ as an incentive. Even the demand of staff for insurance is great, not all municipalities have insurance policies though Tikapur municipality, to cite one example, has an insurance fund of NRs. 100,000. The *Fire Brigade Operation and Management Guideline of 2010* states that provisions for insurance should be up to maximum NRs. 500,000. The Dhangadhi fire brigade has demanded a risk allowance equivalent to 33% of their total salary. Travel allowances are applicable only if fire-fighters are called up to cross district boundaries.

Fire brigades are under the aegis the MoLD, but staff titles are similar to those in the army²¹. A *subedar* is in charge of each fire station (except at Juddha Barun Yantra, where a Sub-inspector is in charge); this post is equivalent to a *nayab subba*, or level 5 assistant. Because of this system, there is still some confusion over how to appraise the performances of staff members.

²⁰ This provision was in place until 1957, when it was retracted as it added to municipal costs.

²¹ The positions are *subedar*, *jamdar*/fire-fighter (level 4 assistant), *hawaladar* (level 3 assistant), *Sipahi* (level 2 assistant) and *chhalak*.

d. Accommodations: Except in Itahari municipality, fire brigade teams are quartered either very close to or in the same premises as fire stations. This enables teams to depart 3-5 minutes after receiving the message/alarm. However, physical facilities are very poor except in Mechi municipality.

e. Distribution of fire engines: Considering the severity of fire incident, the distribution of fire engines (see Table 6) is, in general, good. Nepal's Terai regions and fast-growing cities are particularly more fire-prone. Except for four districts, districts which have not yet been officially declared as having a municipality have no fire engines. However, some municipalities are not appropriately provisioned: Bhadrapur municipality is too small to have two engines and Pokhara needs more than one.

Table 6: Number of fire engines by municipality

SN	Municipality	Number of engines
1	Biratnager, Kathmandu	5
2	Siddarthanagar	4
3	Lalitpur, Dharan	3
4	Bhadrapur, Kapilvastu, Itahari	2
5	Others	1

Source: MoLD (2010), Survey (2011)

Nepal's existing policies say nothing about the authority given to VDCs for the operation and management of fire engines. In recent years, in cases where municipalities have been reluctant to operate a fire brigade because of the high cost, VDCs like Dhapakhel VDC of Lalitpur District have taken the initiative. Regardless of who operates an engine, it is a costly proposition, especially if the engine runs on petrol.

f. Coverage and operational modality: The service fire engines provide in terms of geographical coverage is excellent. Their dedication and timely services are praised by stakeholders and the general public. All fire brigades provide at least 30% of their services beyond municipal and even district boundaries. The Dhangadhi fire engine even helped the Indian town of Sedabeda extinguish a fire which broke out after a vehicle carrying highly inflammable gases exploded.

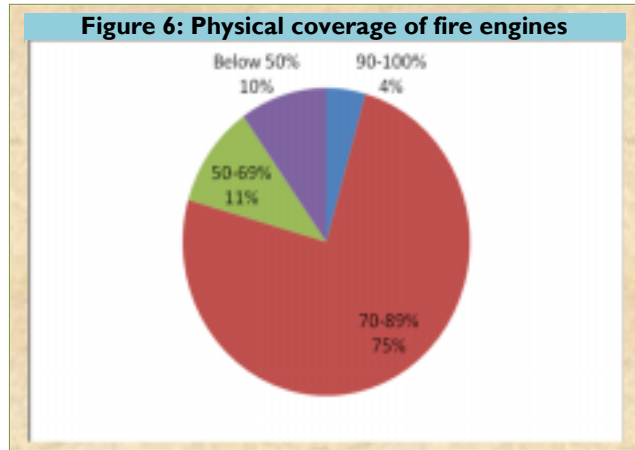
The allocation of roles are defined informally in the case of a single municipality having more than one fire engine or two municipalities within the same district both having fire engines. These distinctions are limited to the case of minor fires. For example in Kailali District, the fire engine in Tikapur Municipality covers fires up to Sukhad VDC in the west and the Dhangadhi municipality fire engine services the rest of the district. In Bhadrapur, the small fire engine is served the urban area while the large one is mobilised to fight fires in the peri-urban and rural areas. In both districts, however, both engines are mobilised if the need arises.

Table 7: Physical coverage of fire engines by municipality

SN	Municipality	90-100%		70-89%		50-69%		Below 50%	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	3	6	41	82	5	10	1	2
2	Mechi	5	10	38	76	4	8	3	6
3	Kathmandu	2	4	35	70	5	10	8	16
4	Pokhara	0	0	45	90	5	10	0	0
5	Dhangadhi	2	4	42	84	0	0	6	12
6	Lalitpur	3	6	33	66	6	12	8	16
7	Kirtipur	0	0	35	70	11	22	4	8
8	Madhyapur Thimi	2	4	32	64	10	20	6	12
9	Lekhanath	3	6	43	86	0	0	4	8
10	Bhaktapur	2	4	31	62	8	16	9	18
		22	4	375	75	54		49	

Source: Field survey, 2011

Interestingly, despite the many grievances of fire brigade staff, fire-fighting is highly regarded as a humanitarian service. People admire the efforts of fire-fighters, who fight fires valiantly even without proper safety measures in place. Physical coverage is worse in metropolitan and sub-metropolitan cities than it is in municipalities outside of Kathmandu. The reason is that narrow roads within the inner city are not accessible to large fire engines. Most respondents think that fire engines serve 70-80% of the total area of a municipality (see Figure 6); only 4% place coverage above 90% mostly because engines cannot travel on narrow streets.



The situation at each of the municipality is presented in table 7.

g. Damage and need assessment: After every fire response, fire brigades prepare a simple report incorporating general information, the extent of damage to the building(s) involved, the number of people and livestock dead or injured, the loss of stored and standing crops, and a monetary estimate of total property losses, (see Box 11). The loss is only a crude estimate designed to counter the false claims of victims who hope to get more compensation. The template used for damage and need assessment is given in annex-1.

Box 11: A typical situation report

- Date and exact location of fire
- Nature of fire
- Name, telephone and address of first communicator
- Condition of road
- Departure time
- Arrival time
- Total time spent
- Number of water tanks used
- Number of people and livestock injured and dead

In Nepalgunj municipality, the fire brigade is responsible for assessing fire damage and preparing a report for the municipality and the MoLD for further action but most municipalities do not visit the site to thoroughly assess damage and needs. The municipality is responsible for carrying out damage and need assessment, supporting relief management and distribution, and recommend that other agencies like the Nepal Red Cross Society (NRCS) also provide relief. Relief is distributed through a municipality's disaster management fund.

h. Response plan: Fire-fighting is always the first priority in any fire management plan. Fire response activities (see Box 12) are aimed at rapid intervention to prevent loss of life, protect health, and prevent loss of livelihood. Fire management planning, preparedness and monitoring are the three key pillars of any fire response plan. A fire response plan has four operational phases: (i) warning and call procedures and notification, (ii) alert at the National Emergency Operation Centre and incident site, (iii) plan activation and debriefing, and (iv) analysis and deactivation. Most municipalities have no fire response plan so their fire response activities are limited to carrying out small-scale search and rescue operations, assessing the causes of fire, carrying out damage and need assessments, and producing situation reports using a simple template. Bharatpur, Kalaiya and Ilam municipalities have for example a disaster risk management plan but no separate response plan for fire mitigation.

Fire risk and threat mapping, analysis and dissemination of wind flow information, and installation of fire detectors are part of a fire early warning system, but no municipality has one. Some municipal authorities have never even heard of fire early warning systems.

Because there are no pre-established evacuation routes from fire-prone areas, confusion prevails during emergencies. A community-based approach to fire risk assessment and mapping fosters solidarity, coordination and cooperation among relevant stakeholders, but there is no such system.

Box 12: Fire response activities

- Fight fires
- Carry out search and rescue operations
- Manage emergency health care and support
- Determine the cause of fire
- Carry out damage and need assessment
- Identify the likely resources for response
- Provide information on hazardous materials
- De-energise electrical lines
- Prepare situation reports
- Manage media reporting on fires

i. Fire safety, emergency, and contingency plans: No municipality has drafted a fire safety, emergency or contingency plan as part of its fire preparedness activities. Mechanisms to guarantee fire safety, securing building approval²², implement fire safety regulations, retrofit valuable buildings, and employ land-use zoning to manage risk are non-existent at the municipality level.

Though inner city areas are very vulnerable to fire hazards, fire-fighting services in these areas are extremely poor. Residential buildings are not protected from fire and even though major public buildings like hospitals, schools, community buildings, and cinema halls are equipped with alarms and fire extinguisher, they often do not function. Roads are too narrow for fire engines to pass. There is no fire engine at either Bhadrapur or Dhangadhi airport.

j. Communication systems: Communication systems are good except in exceptional cases. In most stations, when a phone call reporting a fire is received, the receiver sets off an alarm²³ in the quarters of the fire-fighters and response is quick. However, some municipalities rely on a hand-rung bell which often cannot be heard well above daytime noise and fire-fighters have to be informed in person. At the same time he raises the alarm, the receiver verifies the validity of the notice. A telephone set with a caller-identification feature is helpful in this endeavour. Within minutes, the receiver figures out the location and nature of the fire, identifies the shortest route to it, and takes down the mobile phone numbers of some of the key people. There is no need for securing approval to fight a fire within a municipality, but municipal officials have to sanction an effort outside the district.

Calls about fires can be transmitted by dialling 101 or any other number assigned to the fire brigade. Because many crank calls were received²⁴ in the past, a system of dialling 101 from a landline phone only was established. This has caused confusion as mobile phone users need to dial a separate number which few people know. Because of the absence of VHF sets, it is extremely difficult to communicate during the fire response.

In fact, only half of respondents (49%) said that they knew 101 was the emergency fire number (see Figure 7 and Table 8). This ignorance demonstrates a challenge to seeing fire response

²² Safety measures provisioned in the building code include adequately wide doors, windows, and corridors, an emergency fire escape, and use of fire-resistant construction materials, but people are either unaware of these provisions or they are not enforced.

²³ Alarms do not function during load shedding and none have back-up battery systems.

²⁴ The penalties for a false alarm, as provided for in Section 165(5) of the Local Self-Governance Act of 1995 is up to NRs. 1000 for the first offence and double that for the second.

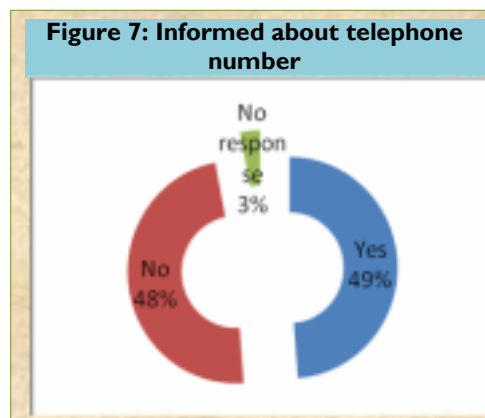
work begin promptly. Because they do not have adequate information, people use a circuitous channel of communication that delays response time. The respondents of metropolitan and sub-metropolitan cities have more information about the fire brigade telephone number than do people in municipalities outside of Kathmandu. The fact that the 101 telephone number does not work often create the confusion over the residents. Residents of Pokhara are most aware, with 78% aware of the 101 number, while residents of Madhyapur Thimi and Bhaktapur are least informed. In both those municipalities only 36% are informed.

Table 8: Do you know the fire brigade telephone number?

SN	Municipality	Yes		No		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	22	44	27	54	1	2
2	Mechi	26	52	24	48	0	0
3	Kathmandu	32	64	16	32	2	4
4	Pokhara	34	78	16	32	0	0
5	Dhangadhi	21	42	26	52	3	6
6	Lalitpur	30	60	18	36	2	4
7	Kirtipur	21	42	29	58	0	0
8	Madhyapur Thimi	18	36	30	60	2	4
9	Lekhanath	22	44	25	50	3	6
10	Bhaktapur	18	36	30	60	2	4
Total		244	49	241	48	15	3

Source: Field survey, 2011

The 101 telephone number is assigned to the fire brigade at the district headquarters. If there is another fire brigade within the same district, it does not use the same number. For example, in Kailali, 101 is the telephone number assigned to Dhangadhi municipality and Tikapur has another number. The delay in getting the message to the Tikapur fire brigade after an uninformed caller has dialled Dhangadhi can be crucial. Every minute lost to ignorance about how to raise a fire alarm rescues the effectiveness of the fire response. Clearly more awareness-raising about contact numbers is essential.



k. Inter-agency coordination: There is good coordination among the fire brigade, drinking water office, police, army and the Nepal Electricity Authority. In Kathmandu Valley, water can be available for free round-the-clock at Mahankal. The police and army help relay the alarm and provide safety and security²⁵. The Nepal Electricity Authority immediately disconnects power upon request. Municipalities also work well with the NRCS though the presence of Scouts in fire response is very minimal. Though Juddha Barun Yantra does cooperate with airport authorities, it is difficult to mobilise fire engines in general. However, Juddha Barun Yantra has received some support from Pashupati Bikas Kosh (which has one fire engine) in the past when the need for fire response work was great.

Because coordination is good, it is easy to provide relief materials to fire victims. Surkhet municipality, for example, gets immediate relief materials from the DDC and the NRCS and

²⁵ If it needs help, a fire brigade will contact a local police station for security and other services.

timber from the district forest office. Syangja municipality gives CGI sheets and nominal cash support to its fire victims. These are only few examples.

I. Fire preparedness activities: Mass and print media mobilisation is very important for fire preparedness activities, which include spreading messages through television, radio, street drama, video, folk songs, drills, posters, pamphlets, and hoarding boards. See Box 13 for a list of other fire preparedness activities. Not all of these means of communication are well mobilised. FM radios like Nagarik FM in Bhadrapur; Pathivara and Kanchanjunga FMs in Mechi; Kathmandu Metro and Radio Surkhet are widely used, while Siddarthenagar municipality reportedly printed and distributed posters and Dharan municipality included fire preparedness messages in its newsletter. Sometimes local daily newspapers print a list of important telephone numbers including those of the local fire station, police, and hospitals. Miking is used in Bhadrapur and Biratnagar municipalities.

The MoHA organises annual fire drills and simulation exercises in Kathmandu to inform stakeholders about how to prevent fires and how to reduce their impact. No civic education is provided to make people aware of what to do during and after a fire. These steps are listed below:

During a fire

- Summon people to extinguish the fire as soon as possible
- Free any livestock tied near the conflagration
- Dismantle flammable structures like hay stacks in adjacent areas
- Pour water or sand on the fire or beat it with green leaves or branches
- Evacuate the area or house immediately
- Rescue the elderly, women and children first
- Give first aid to all the injured and send them to the nearest hospital
- Do not open rooms whose doorknobs are hot
- Roll and slide across the floor of a room filled with smoke
- Roll on the ground if your clothes catch on fire
- Do not re-enter a building unless fire-fighters have said it is safe to do so

After a fire

- Analyse the causes of the fire
- Prepare a damage and a needs assessment report
- Arrange to provide relief materials to fire victims in coordination with the NRCS and district disaster relief committee
- Encourage people to take out insurance against fire
- Plan and implement fire preparedness activities

Box 13: Range of fire preparedness activities

- Raise awareness through civic education programmes
- Build capacity through training and study visits
- Formulate and implement fire response, fire safety, and contingency plans
- Carry out environmental monitoring and hazard analysis
- Prepare evacuation routes
- Strengthen emergency communications
- Manage and mobilise resources
- Develop early warning systems
- Design and implement fire prevention activities

The probability of the fire incidents is higher in metropolitan and sub-metropolitan cities due to the use of modern electrical appliances and gas cylinders and stoves. The awareness levels of big city residents about fire preparedness and response activities is lower than it is in smaller

municipalities. The majority (84%) of the respondents opined that municipalities do not attempt to raise awareness about fire preparedness and mitigation through the media (see Figure 8 and Table 9). Even in Mechi where reported media mobilisation is greatest only 14% claim it is an awareness-raising strategy. Media involvement is least in Madhyapur Thimi, where not a single respondent said the media spreads messages. There is a need for generating awareness among people through intensive media mobilisation. More demonstrations, drills and simulations are needed to increase the awareness levels of residents.

Table 9: Increase awareness through media mobilization by municipality

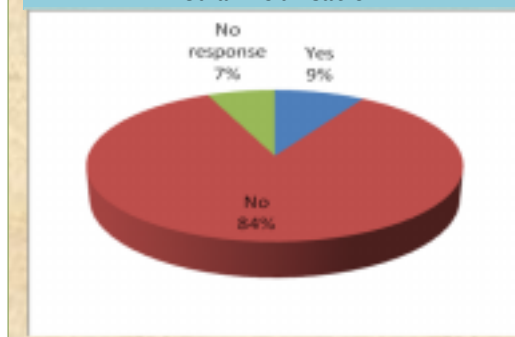
SN	Municipality	Yes		No		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	6	12	44	88	0	0
2	Mechi	7	14	38	76	5	10
3	Kathmandu	5	10	39	78	6	12
4	Pokhara	4	8	42	84	4	8
5	Dhangadhi	5	10	43	86	2	4
6	Lalitpur	4	8	42	84	4	8
7	Kirtipur	1	2	47	94	2	4
8	Madhyapur Thimi	0	0	44	88	6	12
9	Lekhanath	6	12	44	88	0	0
10	Bhaktapur	6	12	40	80	4	8
		44		423	84	33	

Source: Field survey, 2011

m. Security of fire engines: All the fire engines except those in Bhadrapur are kept in garages in either good or moderate conditions. Security in Mechi municipality is outstanding. During Nepal's conflict, the fire engine of Dhangadhi municipality was hijacked and found abandoned in a remote village one year later. In 1990, when the Pokhara fire engine was misused to break up agitators, protestors broke all its glass.

n. Uses of fire engines: By and large, fire engines are used solely to fight fires, but due to political pressure they have also been put to use distributing drinking water during special functions, including cleaning roads, settling dust during a VIP's tour, levelling stadium grounds before regional and national level sporting events, distributing water during religious functions, and washing sewerage drains. In Kathmandu, ladders have been used to extract people from deep wells²⁶. During Janandolan II, a popular uprising, fire engines were used to disperse agitators by directing blasts of water at them. In Kathmandu, one fire engine is kept on stand-by during the festivals of Maha Sivaratri, Ghode Jatra and others.

Figure 8: Awareness-raising through media mobilisation



3.4 Institutional capacities

Institutional capacities were judged with respect to existing policy provisions, institutional set-up, and the role of municipalities in preparedness and mitigation initiatives.

a. Existing policy provisions: Though the Natural Disaster Relief Act was passed in 1982, there has been little progress in fire risk management in the last three decades. The Building Act of 1987, the Building Conservation Act of 1993, and the *Fire Brigade Operation and*

²⁶ People climb into wells to clean them and, in some cases, are asphyxiated by the methane gas present.

Management Guideline of 2010 include provisions about fire preparedness and mitigation and the Local Self-Governance act and regulations of 1995 and 1996 respectively discuss fire brigade management. Because people are unaware of such provision, there has been little progress on the ground.

Over 80% of respondents said they knew nothing about policy provisions for fire preparedness and mitigation and only 11% said that they had some knowledge (see Figure 9). Knowledge was greatest in Kathmandu, where almost one-quarter are informed, and least in Madhyapur Thimi, where over 90% are not. There is a need for disseminating information about these policies if fire preparedness and mitigation is to be translated into action.

Table 10: Awareness about existing policy provisions by municipality

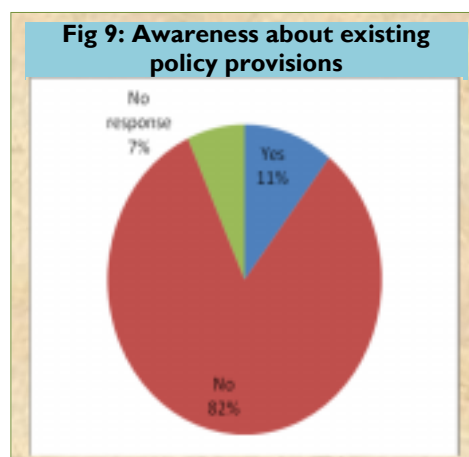
SN	Municipality	Yes		No		No response	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
1	Bhadrapur	2	4	42	84	6	12
2	Mechi	4	8	42	84	4	8
3	Kathmandu	12	24	37	74	1	2
4	Pokhara	8	16	42	84	0	0
5	Dhangadhi	6	12	43	86	1	2
6	Lalitpur	4	8	40	80	6	12
7	Kirtipur	5	10	43	86	2	4
8	Madhyapur Thimi	2	4	46	92	2	4
9	Lekhanath	5	10	40	80	5	10
10	Bhaktapur	5	10	38	76	7	14
		53	11	413	82	34	7

Source: Field survey, 2011

The Fire Safety Code of Nepal National Building Code (NNBC 107:1994) is limited to the provision of fire alarm and other appurtenances. It does not include requirements for design considerations or the selection of building materials based on a fire grading of the building category. It makes only limited recommendations on fire safety and covers only ordinary buildings.

Fire safety code is not enforced and building permits are issued even to buildings which do not comply with its terms. In particular, buildings do not install fire alarm and extinguishers. In addition, the code itself is deficient: it makes no stipulations about design or building material in its grading categories. Its recommendations are limited and concern only ordinary buildings. What it does specify is minimum requirements regarding fireplaces, fire extinguishers, water storage for fire extinguishment, the demarcation of fire zones, and generalities like proper access, wide doors, fire escape ways, exit doors, fire stairs, open space, and lightning arresters and conductors. The code has not been integrated into municipal building bylaws and there is no municipal institution responsible for the functions related to the fire code.

Chapter 4, Article 96 (1) of the Local Self-Governance Act states that a fire brigade is a mandatory service and lays out the functions, duties and powers of municipalities with respect to the operation and management of fire brigades.



b. Institutional set-up: In most municipalities, the fire brigade falls under the social development or planning and environment section.

Even though existing policies clearly state that fire brigades should function under the municipality authorities, not all are. In Rajbiraj municipality, the fire brigade is jointly managed by the municipality and the DDC; in Kapilvastu, the district police office that is in charge; and the fire brigade in Bhaktapur falls under the jurisdiction of Juddha Barun Yantra in Kathmandu, not the Bhaktapur municipality.

Opinions about the institutional set-up of fire brigades varied. Because fire brigades need considerable resources and serve large areas, some opined that it is better they be managed by the DDC, which could direct each VDC to contribute resources on an annual basis. Other people thought that since security is an issue, fire brigades should be managed by the armed police force. Some even argued NGOs should assume responsibility. However, most do agree that municipalities should be in charge because they are a social service and more fires occur in urban centres than in peri-urban and rural areas.

Box 14: Preparedness activities

At home

- Do not dump flammable materials near the house
- Do not store petrol, diesel, kerosene or paints in the house
- Check electrical wiring periodically
- Do not place electric wiring under a carpet
- Do not overload a socket
- Store nylon and other fabric far from the kitchen
- Do not obstruct corridors, stairways, or exits

In the community

- Train community volunteers in fire preparedness
- Run small-scale awareness-raising activities
- Disseminate messages through posters and pamphlets
- Carry out frequent community clean-ups
- Organise activities like essay and art competitions and debates at schools with fire prevention as their theme

Though the fire brigade and fire risk management activities are incorporated in the municipality's annual and periodic plans, they are not prioritised for implementation partly because of a lack of resources and partly because of unaccountable officials. Very few organisations and institutions are working in the area of fire preparedness and mitigation so there is little support from NGOs and donors for institutional development. District disaster relief committees do not consider fire as significant as floods, landslides and epidemics.

c. Role of municipalities in preparedness and mitigation²⁷ initiatives: Even small initiatives have great value in preparing a community for fire hazards. Steps as simple as calling for community volunteers to use whistles to mobilise first responders can be introduced. Volunteers should participate in emergency management trainings but none have been held. Local materials like mud, sand, water, and green branches can be used to extinguish fires but there is no practice of storing them.

The municipal social development or planning and environment department is responsible for disseminating simple messages about fire preparedness and mitigation (see Box 14) at the household and community levels, but rarely do so. Other tasks municipalities could carry out but do not include mapping fire risks; zoning and planning; identifying evacuation routes; monitoring temperature, rainfall and wind; improving fire resistance and warning systems; improving fire-fighting; planting fire-resistant trees and shrubs; and formulating fire contingency plans.

²⁷ Fire mitigation activities aim to reduce loss, lessen the impact of fires, make vulnerable elements more fire resistant, and introduce prevention measures.

Fire mitigation initiatives include the development and improvement of infrastructure to reduce likely losses and impacts. Some crucial initiatives are using retrofitting measures to protect buildings of national importance for protection, replacing thatched roof with less flammable materials, and widening roads to at least 12 feet so fire engines can pass. There is less effort in fire mitigation than fire preparedness activities.

4. Conclusions and recommendations

The following conclusions and recommendations are based on the interpretation and analysis of the primary data obtained through the survey administered and the qualitative information derived from interviews.

4.1 Technical capacities

Conclusions: The physical condition of fire engines is poor because they have not been operated or maintained well. Essential equipment like hoses and portable generators is not available. Engines from companies other than Indian ones have turned out to be white elephants because spare parts are unavailable and locals are not skilled in their maintenance. All of a municipality's fire engines are kept in the same place despite the inefficiency of this system and there are too few engines to begin with and few have the extension ladders and elevators needed to fight fires in high rise buildings. Even municipalities which wish to buy more engines are put off by the 10% service fee. There are not enough search and rescue tools and they are not well-stored. For effective response, search and rescue tools are neither adequate nor managed systematically. Provisions for emergency water and fuel storage are inadequate and there are too few fire alarms and extinguishers.

Recommendations

Recommendations are categorised into three parts depending upon the time frame. Actions that can be carried out within two years' time are termed short-term, while medium-term actions are those that can be done between 2-5 years and long-term actions require 5-10 years' time.

Short term

- *Manage spare parts and maintenance:* Resources should be allocated for the immediate maintenance of engines even if it means reducing allocations for operations and periodic servicing carried out. Spare parts and hoses pipes should be purchased with a view to the model of engine in question. A water-lifting system using portable generators should also be arranged for.
- *Arrange search and rescue materials for quick response:* Search and rescue materials should be stocked in sufficient quantity and stored properly. A large trunk should be used to prevent rusting, mildew and damage by rats. Sufficient hydrogen gas, liquid fuel, and platinum chemical foams should be supplied and first aid kits replenished and updated.
- *Manage battery-led fire alarms:* Fire alarms should have batteries so they work even when there is load shedding.
- *Aware on importance of fire detectors and fire extinguishers:* Basic information about the importance of fire detectors and fire extinguishers should be disseminated through FM radio and television and a cost-benefit analysis provided to be convincing. Fire-fighters should be oriented to the proper use of fire extinguishers.
- *Explore alternative sources of water:* Municipalities should map the ponds and wells within their vicinity and manage them well so they can be used in emergencies. They should

harvest rainwater and provide storage tanks. Emergency supplies of fuel should also be provided.

Medium term

- *Procure portable fire engines:* Because streets in inner city areas are narrow, portable fire engines should be purchased. The Indian Euro UTC1613 model should be procured to ensure that spare parts are available and to keep maintenance cheap.
- *Increase fire engines with extension ladders and elevators:* According to international standards, there should be one fire-fighter in every 2,000 people and one engine for a population of 28,000. The number of fire engines with extension ladders and elevators should be increased considering the population and severity of the fire risks. While municipalities are keen to purchase engines, they feel the 10% service charge is too high. They should get a subsidy or tax exemption to encourage them.

Long term

- *Decentralize the fire brigades and fire engines:* Since the pace of urbanisation is great, fire brigades should be established at the outer periphery of municipalities so they can avoid heavy traffic and respond quickly. They should not all be kept in the same place. If there is more than one fire engine in a municipality, they can be kept at different ward offices in coordination with the local police station.

4.2 Managerial capacities

Conclusions: The management capacities of municipalities in terms of fire prevention, fire extinguishment and fire impact restoration are inadequate. Fire-fighters have limited skills and knowledge and other municipals have never had the opportunity to participate in trainings and orientations on fire-fighting. The roles of communities as 'first responders,' of municipal police in coordinating efforts, and of NGOs in coordinating training are not yet recognised, nor is the role that armed police force can play in improving managerial capacity. Compared to other hazards, fires are overlooked in educational curriculum. Over-staffing and poor management has burdened municipalities unnecessarily. In district with no municipality, there is no fire service at all. Few houses are insured and only one hospital has a burnt unit. None of the municipalities have made fire response, contingency, fire safety or emergency plans.

Recommendations

Short term

- *Design training as per training need assessment and run during slack season:* Training, drills, and simulations in areas such as emergency fire management, risk assessment, search and rescue, first aid, fire-fighting, evacuation, and crowd control should be imparted during the slack season of the summer monsoon season for municipal staff, municipal police, and disaster focal persons. There should be refresher trainings as well. While designing the training curricula, more emphasis should be given to metropolitan officials, more focus on search-and-rescue capacity-building than fire control, and more time and energy for fire preparedness than fire response.
- *Identify and train first responder:* Since communities are 'first responders,' basic tips on fire response should be provided to community leaders, teachers, youths, and elderly using street drama, drills and simulation exercises.
- *Increase the performance of 101 telephone number:* Considering that proper communication is crucial for securing a timely response, there should be an emergency 101 telephone number in all municipalities within the same district. The fire fighters should provide VHF telephone sets for the effective communication throughout the fire response.

- *Design and enforce a plan to regulate the fire engines:* The MoLD should devise a mechanism to provide fire-fighting services in districts which have no municipality. Each participating DDC should make an annual plan in coordination with other agencies, including FNCCI, and get it endorsed by the DDC council. The DDC should allocate some of its budget to fire fighting and leverage resources from FNCCI and VDCs. Fire engines should be operated by the Armed Police Force.

Medium term

- *More focus on awareness raising activities:* NGOs should be mobilised to design and implement awareness-raising programmes for fire preparedness. Activities could include training, orientation, and folk songs. These fire related awareness programme along with need for and benefits of house insurance should be broadcasted through FM radio and television.
- *Disseminate fire safety messages:* NGOs should disseminate messages about fire safety measures like the proper handling of gas cylinders, the inspection and rehabilitation of electrical wiring system, and provisions for water, sand, buckets, and fire extinguishers. They should organise orientations on fire prevention and extinguishment at the household and community level.
- *Assign some of armed police force to run fire brigade:* Some trained armed police force should provide input to fire brigades by working with them for certain periods of time. Municipality police should also receive training in and orientation on fire-fighting.
- *Redefine the role of fire brigade staff:* The roles of existing fire brigade staff should be redefined so they can contribute in other essential services. Municipalities should provide a “golden handshake” incentive to get some staff to quit. Then, to reduce their long-term financial obligations, new staff should be hired under contract and their facilities clearly defined.
- *Manage special burn units:* Municipalities should coordinate with district hospitals to manage special burn units.

Long term

- *Mainstream fire preparedness and mitigation in curricula:* Material on fire preparedness and mitigation should be included in school and college curricula as well as in the Civil Service Commission examination. The MoLD should coordinate with the MoHA to include fire preparedness and mitigation skills in the training curriculum of newly recruited members of the police, armed police force and army.
- *Prepare and enforce plans:* A fire response contingency plan should be prepared for each vulnerable area. Response, fire safety and emergency plans should be formed.

4.3 Financial capacities

Conclusions: Fire brigades operate using allocations from the block budget from the central government and the municipal budget. Though the *Fire Brigade Operation and Management Guideline of 2010* stipulate that funds come from the multiple sources, only some DDCs and VDCs contribute. NGOs have not taken the initiative in mobilising the public and private sectors to pay a service charge and private organisations do not perceive that they have a duty to contribute. Inter-office coordination of resource sharing is limited. Though most municipalities have a disaster management fund, it is limited and provisions for providing relief to fire victims are not regulated.

Recommendations

Short term

- *Enforce Fire Brigade Operation and Management Guideline:* Municipalities should strictly follow the *Fire Brigade Operation and Management Guideline of 2010* in order to get DDCs, VDCs, FNCCI, I/NGOs, and donor agencies to generate resources and should levy a service charge.
- *Carry out functional coordination for resource sharing:* Municipalities should coordinate with district forest offices, which allocates resources for bush fire management, as well as with other relevant offices to help generate funds. It should also coordinate with FNCCI to get resources as per the *Fire Brigade Operation and Management Guideline of 2010* and the principle of social corporate responsibility.

Medium term

- *Design and run good plans for resource mobilization:* In order to secure a larger block budget from the central government, municipalities should design and implement good programmes so that they meet the government's minimal conditions and performance measurement standard and are entitled to additional resources.
- *Strengthen disaster management fund:* Municipalities should strengthen the disaster management fund to regulate ensure that relief items reach fire victims immediately and work with the NRCS in doing so.

Long term

- *Allocate more roles to civil societies:* Municipalities should mobilise NGOs in coordination with the NGO Federation district chapter to run public awareness campaigns to make people and VDCs recognise the rationale and benefits of service fees. Unless civil society and the private sector assume responsibility it will be hard to manage resources for the operation of fire brigades.

4.4 Institutional capacities

Conclusions: There is an institutional vacuum within municipalities and the MoLD because there is neither a disaster management unit nor a disaster focal person solely responsible for overseeing disaster plans and programmes. As a result, there are no vertical or horizontal linkages with policy-level forums. Multi-stakeholders consultation meetings are rarely organised for idea-sharing and synergy. Despite the provisions for fire-fighting sub-committees at the ward level, there are none. Though the Consumer Protection Forum has raised the issue of the poor quality of LPG cylinders, the rate of explosions in urban areas is high. The government of Nepal has promulgated codes, acts and polices related to fire, but most people are ignorant about them because of poor dissemination.

Recommendations

Short term

- *Organize periodic review and reflection:* Municipalities should organise periodic interaction meeting among fire brigade teams, members of the armed police force and army, Scouts and NRCS, and FNCCI and the NGO Federation to share ongoing efforts in fire preparedness and mitigation, emerging challenges, and the anticipated contribution of each stakeholder in whatever initiatives are adopted. Such meetings lessen the gaps in fire-fighting coverage by sharing resources for synergy.
- *Form and activate ward-level fire-fighting sub-committee:* Municipalities should form ward-level fire-fighting sub-committee as per the *Fire Brigade Operation and Management Guideline of 2010* to undertake basic preparations like mapping highly vulnerable areas, managing local materials to douse fires, and coordinating among like-minded agencies for fire preparedness and mitigation.

- *Ensure fire control mechanisms:* Municipalities should not approve the construction of high-rise buildings without assessing their fire control mechanisms.
- *Incorporate a fire risk management component in Municipality's periodic plans:* Municipalities should incorporate a fire risk management component in their periodic plans.

Medium term

- *Form disaster management units with clear ToR:* In order to regulate the fire preparedness and mitigation programme, disaster management units should be established in municipalities and at the MoLD and clear terms of references laid out. The MoLD and each municipality should have a disaster focal person who will attend district and central natural disaster relief committees meetings to share fire-related issues and concerns and help manage collaborative programmes.
- *Activate through Consumer Protection Forum:* Considering that the explosion of LPG cylinders is the main cause of fires in urban areas, awareness activities about how to handle cylinders should be conducted on radio and television and municipalities should monitor gas dealers through Consumer Protection Forum.

Long term

- *Implement codes and policies with media mobilization:* Relevant codes, like the building and fire safety codes should be implemented properly and enforced. The media should disseminate information about those provisions to the general public. Fire safety should be made mandatory in National Building Code and enforce immediately.

