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Delhi Slums Under 3-D Fire

By Col Retd Pk Chaturvedi

Abstract- A disaster is any occurrence that causes damage, ecological disruption, loss of human life, or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area. The Slum and informal settlement households are living in poor dwelling conditions. In these settlements, one side congested area forces them to have fire related activities in unsafe conditions. Other side, without Government notification on their legality of living in Slum areas, they are not provided with common living conditions available with other members of society. On top of all 'the Sword of Eviction' is seen even during day dreaming by these poor habitants. Their identity linked with residence keeps them and their growing kids in state of inferiority and depression. To mitigate damages by fire-disaster, recovery, rehabilitation, and development efforts require enormous funds that, amidst insufficient contingency funds, are taken out from other development programmes of city that are planned or underway, thereby impeding development efforts. Therefore, it is important that disaster mitigation programmes are made an integral part of developmental programmes of Delhi. At the same time, efforts to enhance the capacities of communities and coping systems at various levels and sectors towards self-reliance and selfsufficiency in managing disasters effectively and must be sustainable. It is immediate requirement to recognise ownership of slum habitants and proper housing is provided to them with government plans.

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"Slums are litmus tests for innate cultural strengths and weaknesses. Those people whose cultures can harbor extensive slum life without decomposing will be, relatively speaking, the future's winners. Those whose cultures cannot will be the future's victims." (Kaplan, 1994)

1. INTRODUCTION

Human beings live in an environment to which they are physically and constitutionally attuned and depend on it for their survival. In the course of living in this environment, the physical environment may influence or be influenced by the social behaviour of the human beings (Dunlap and Catton in Buttel, 1987). While living in this environment human beings have been successfully able to adjust/ adapt to the pressures exerted on them by nature and their way of living. They did so by modifying their behaviour and surroundings to adjust to daily hazards. However, they have not been as

successful in adjusting to less frequent events (Coppola, 2007).

What are these crisis events that affect or disrupt normal social life of the people who otherwise adjust well with the surrounding environment? These crisis events are disasters. The term disaster is derived from the Italian roots dis- and astro, meaning "away from the stars" or in other words an event to be blamed on an unfortunate astrological configuration (*ib.id*).

India faces disasters of different types and people have been struggling to overcome the disasters that strike with periodic regularity. Fire has also been a major cause. Disaster Management geared to make a paradigm change from response and calamity relief to disaster prevention, preparation and mitigation. Another significant change is to move from largely government instituted disaster management to public private partnership and community based disaster management. In this regard, significant changes have been made. India probably has the world's oldest disaster relief code which started in 1880. This relief code provides details of the relief to be given by the government to the affected people.

Past experience of relief operations, it was strongly felt that the resources from external agencies arrive at least 06 to 12 hours later than the occurrence of disasters. Further, the priority is given by local commanders to those casualties that appear to have more chances of survival. While most of the casualties can be saved by local assistance during initial reaction time, lot of efforts are needed to look into the issue and administer local activities in initial stage of the disaster or even preparedness in disaster prone localities. There is a paradigm shift from reactive approach of mitigation and relief to proactive approach of planned rehabilitation and development. Relief and rehabilitation may be temporary measures necessary for returning to pre-existing levels of development cooperation. Once disaster hostilities cease, moving into recovery and early development type assistance may be hampered by a lack or incapacity of local authorities and the prevailing need for socio-psychological coping with the past.

The Census (2001) of India has defined Slum as "a compact area of at least 300 populations or about 60-70 households of poorly built congested tenements, in unhygienic environment, usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities". The slum population in India was counted as 42.58 million during 2001 census spread over 640 cities/ towns, which was 15 per cent of the

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urban population and 23.1 per cent of the cities/ towns' population reporting slum. The life in slums is human disaster, yet the slum population is growing with alarming rate all over the world but more so in developing countries. In a report titled "The Challenge of Slums", the United Nations Human Settlements Program (*UN-HABITAT 2003*) reported that one billion people, approximately one third of the world's urban dwellers and a sixth of all humanity live in slums. India alone constitute about one third of the global slum population. The report has warned that the population of the world's slums will double to two billion people within 30 years. These studies have helped in understanding "The Challenge of Slums" and rapid unplanned urban expansion.

II. SLUMS IN DELHI

Slums are the result of the gap between the demand and the legal and formal supply in the housing market. Slums are considered to be the result of multiple deprivations such as illegal land tenure, deficient environment and inadequate shelter (Chauhan Akhtar, 2009). According to Census of India 2011, 66% of towns in India have slums, with 17.4% of urban households. However, this estimate omits the households not covered under definition of slum even if living in poor dwelling conditions than those living in defined slums. These informal settlements also have quality of life and infrastructure similar to those of slums (PRIA, 2014).

People in these areas of low socio economic status are generally at higher risk of heat-related morbidity. The area distribution of households (HH) with and without separate space for cooking is main drawback of living condition. The average covered area of the slum house per HH is just about 108 sq ft. To stay with a family of average size of 4.5 with all HH belongings in such a tiny space depicts the miserable life the slum dwellers lead. As regards housing condition about half of them live in pucca houses and remaining in semi pucca/ kuchcha house (*Report, Delhi Urban Shelter Improvement board, 2014*).

In the next two decades more people will seek residence in slums, which are already vulnerable and continues to lose life, property and livelihood due to fire disasters in slums. Migrant's first stay as shelter less starts with a stay at the workplace like restaurant, shop, factory, workshop, construction site and ends on the pavement or in a night shelter or with their relatives. However, the economic and housing conditions of the relatives already settled in Delhi may put limits to the type and duration of the help extended as far as accommodation is concerned. After an initial stay upon his arrival in a slum hut or one-room tenement with his parents or relatives, they are compelled to leave due to lack of space and to stay in a night shelter or a pavement dwelling area. The persons working in the

occupation also play an appreciable role in introducing him to a new work, including sometimes showing him cheap (or free) and convenient places to sleep, cooking food on the pavement in small groups for their dinner Dupont & Tingal D, 1997).

Besides, the slum dwellers that move to such shanties from essentially different disaster-prone areas of the country mostly fall victim to unrelenting exploitation and poverty. They live in such shanties due to no other affordable/ available shelter in the city and usually lack any awareness about fire safety (*Ministry of Homes Affairs-Director General Civil Defence, 2011*).

Slums are also work place causing fire hazards. To know the cause of accidental fire in kitchen, it is important to know what kind of stove/cooking oven are used in slums like kitchen-gas, electric heater, kerosene stove or firewood burner. The stove is the number one cause of fire hazards, which may destroy entire house especially in slums areas where there are thatched roof or other inflammable materials like straw kept near the kitchen. A burner remains hot and until it cools off, it can be very dangerous. The oven using wood can be dangerous because burning embers remain for longer time. When lighting the fire on a wooden fuel oven, sparks may fly to the thatched roof. Even after the cooking is over, the remaining fire may not be extinguished off by sprinkling water. Inflammable article like kerosene are mostly placed very near to the kitchen fire. It was noticed that JJ Cluster habitants are most vulnerable to fire and fire incidences are very frequent there. Lack of water supply added more criticality to disaster response to fire in Delhi Slums. In the past, such occurrences were more in JJ clusters and habitants in fire prone conditions. These slums are in neighborhood of areas having costly and modern developed installations which are receiving huge damages due to such fire. Thus it is imperative to have a capability of quick roll out of a infrastructure with features to make it suited for disaster management tasks. Important ones are assessing damage and needs, coordination of resources, establishing command and control, implementing incident reporting/response systems, efficient distribution of aid and crisis communications.

III. PAST FIRES IN DELHI SLUMS

The Delhi has so far witnessed a number of slum fires, many of which ended up claiming dozens of lives. In the past, on Apr 12, 2013, a fire broke out in a slum cluster in outer Delhi gutting approximately 400 hutments, fire brigade officials said. The blaze was reported at the slum in Bawana area. Fire fighters reached the spot after an intense struggle to get there through narrow passages that link the slum to the main road. Moreover, by the time they brought the fire under control, it devoured all the belongings of more than

2,000 poor people who lived there. Reportedly, the area lacked adequate source of water, a scenario, regrettably, common to every city slum, resulting in disruption to fire-fighting operations. Fortunately, as most of the dwellers were outside for work and others somehow managed to get out, no casualties were reported.

Nearly 1,000 slums were gutted after a high voltage electricity line that fell on a slum cluster triggered a massive fire in East Delhi's Ghazipur on Thursday afternoon. Police officials said the fire broke out around 2.50 pm. Nearly 25 fire tenders were rushed to the spot and took two hours to bring the blaze under control, Fire department officials said. One person was charred to death while another seriously injured when a fire broke out in a slum cluster in east Delhi after an electric wire fell on it in the wee hours of Sunday. The incident took place in the slum cluster located behind Ankur apartment in Patparganj at around 2:50 am, a senior fire brigade official said. Seven fire tenders were rushed to the spot which doused the blaze within an hour. One person died while another was seriously injured in the incident. "The blaze broke out after an electric wire caught fire and fell on it," the official said. Earlier on April 8, around 600 hutments were gutted when a major power transmission line fell down on a slum in Ghazipur. (Press Trust of India, Tuesday November 12, 2013).

A massive fire engulfed Jai Hind slum in Vasant Kunj area of South Delhi on Friday, 25th April, 2014. This camp exists at a distance of approximately 500m from main road and is on DDA land. DDA has also constructed boundary wall to restrict/contain further expansion/encroachment of this land. It is also informed by locals that encroachers on this land were removed by DDA in year 2010. This is newly found group of approximately 1500 shanties of tin shed and have uniform type of construction that is tin sheet walls and roof and is located at Vasant Kunj behind main road Masoodpur. The dwellers of this camp are mostly rag pickers, kabaries and stacking the waste papers, gattas, plastic sheets, plastic bags etc. nearby their tin sheds as well as inside. Majority of them are migrants and settled here in last few years. The fire was reported at 8.30 in the morning.

On Jan 11, 2016, three children, including a six-month-old boy, were charred to death while another suffered serious burns after a fire broke out in east Delhi's Usmanpur area gutting about 25 huts. Ten fire tenders were rushed to the spot but the blaze had claimed the children's lives by the time the police or firemen reached the spot. Officials said the fire seemed to have broken out from an angeethi (wooden stove) being used in one of the houses.

On April 16, 2016, a fire broke out in a scrap dump in a Dwarka sector 3 slum cluster in Delhi, a fire

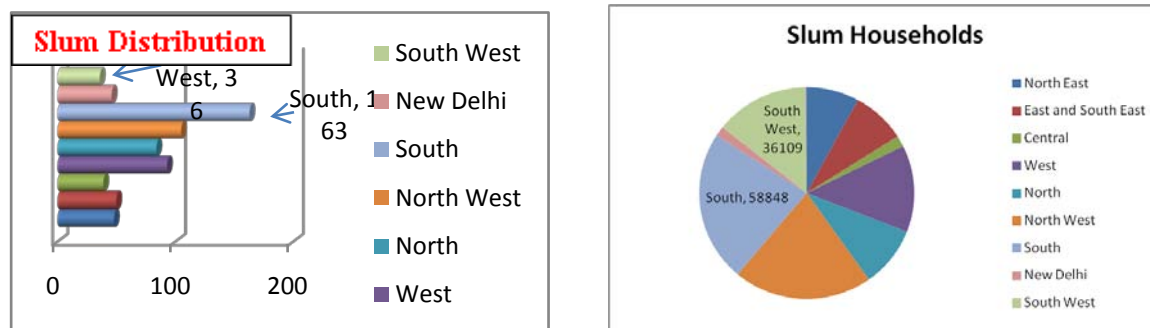
official said. No casualty has been reported. The fire occurred around 10.08 am, the official said. "At least 20 fire tenders were rushed to the site and it took about one-and-a-half hour to douse the flames," the official said.

On November 8, 2016, over 800 people were rendered homeless after a massive fire gutted more than 300 *jhuggis* at a slum in north Delhi's Sadar Bazar on Monday evening. While the trigger for the blaze remains to be probed, the police said the presence of a large amount of plastic and scrap in the *jhuggis* helped the flames to spread rapidly. The *jhuggis* are located near the railway tracks close to the Sadar Bazar market. While small shops operate out of many of these *jhuggis*, these are some distance away from the main market. As soon as the fire began, almost all the residents rushed out of their huts. Some tried to douse the flames using water from pumps in nearby buildings, but it had little impact. Two persons—a boy and a man—suffered burns. They, however, did not require hospitalisation. Around 6.45 p.m., the fire department was alerted. "A few fire tenders who were stationed close to the slum reached there in quick time," said Atul Garg, Chief Fire Officer, Delhi Fire Services. However, other fire tenders dispatched to the site either found themselves stuck in traffic jams near the New Delhi railway station or faced difficulties in negotiating congested lanes in Lahori Gate area. Fire fighters and the police also faced difficulties in managing the crowd as a number of locals as well as visitors to the Sadar Bazar market gathered at the site to witness the operations.

In fact, the manner in which shanties in a slum generally huddle together preventing adequate air and light from entering the area is well enough to constantly expose a slum to fire, slum dwellers those move to such shanties from essentially different disaster-prone areas of the country, falling victim to unrelenting exploitation and poverty. When they lend in such shanties due to no other affordable/ available shelter in the city, usually lack any awareness about fire safety (MHA-DGCD, 2011).

IV. METHODOLOGY

Research methodology for the present study is based on the examination of secondary and empirical data. The twin sources have been collected and duly tabulated, collated, and analysed for deriving major conclusions. This study aims at understanding the problems of slum fire disaster management in Delhi. To pursue the research study, the districts of South and South-West Delhi have been undertaken. This study is based on 20 slum clusters in South-West and South district of Delhi covering about 4.9 per cent of total households living in the slums of Delhi and 16.7 percent in different location of these two districts of Delhi.



Source: Compiles by Researcher

Fig. 1: Slum Distribution and Slum Household in Delhi

The study has used both quantitative and qualitative methods of data collection. A structured schedule was developed to seek information from field collected data, write-ups in books, seminar and conference papers, census reports including the basic statistics available with government organizations like Delhi Urban Shelter Improvement Board (DUSIB), Municipal Corporation Delhi (MCD), Delhi Fire Service (DFS), Delhi Development Authority (DDA), Government of NCT of Delhi (GNCTD), Union Ministry of Urban Development (GOI), Planning Commission (GOI), and UNDP/UNESCO. The data and information procured

from these sources were scanned and analyzed for correlations with primary survey data.

Meetings were also held with the elected Counsellors, MLAs, and local Slum Welfare Associations to understand their strengths and difficulties, as well as to elicit their views on various aspects of the issue. Open discussions and interviews with the State, district, mohallah officials, NGOs, Slum welfare association/leaders, etc., were also held. This helped in identifying bottlenecks in the existing system to deal with avoiding or minimising fire disasters in Slums and provided insights for policy suggestions.

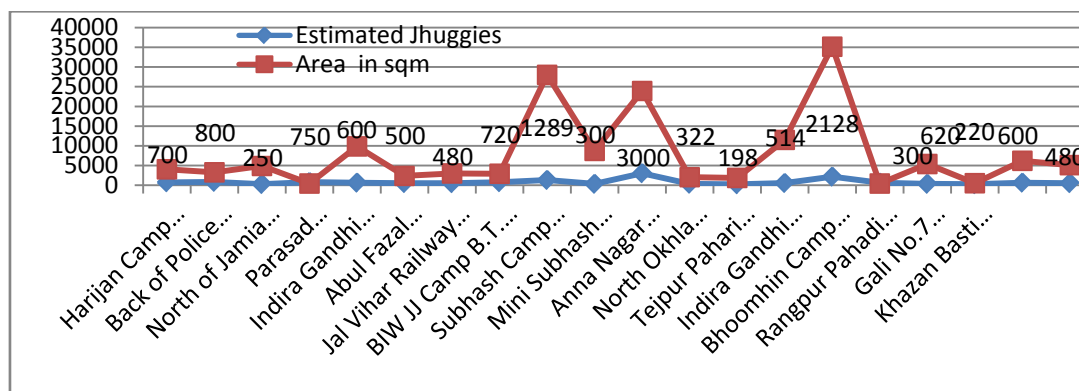
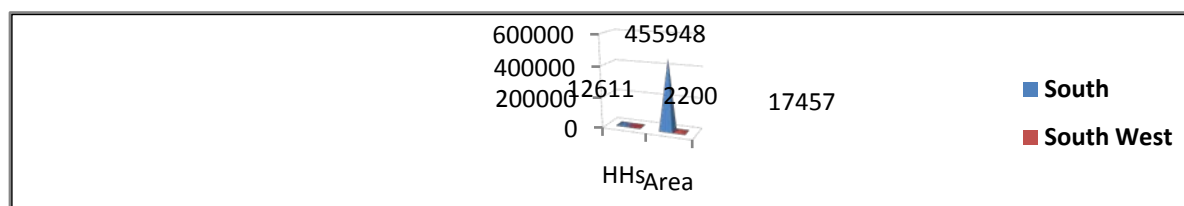


Fig. 2: HH in Numbers Distributions in Slums

There are few slums densely populated. Reference serial number 16 and 18 of above table, 620 HHs on 390 sq mtr area and 220 HHs on 477 sq mtr

area respectively, these slums are in worst condition and vulnerable for hazard.



Compiled by: Researcher

Fig. 3: HH in Numbers and Area in Sq mtr

The survey data and information is collected from the selected respondents. The qualitative data (six focus group discussions of 20 each and 6 individual interviews, and purposively sampled participants from 101 individual household (61 in South District and 20 in

South West District gathered. For analysis, the questioner response is collated to form a compiled data sheet for further analysis of collected information and presented in a table. The sequence of factors to be analysed are listed for both the districts and

representation is computed to percentage response to the issue. The data collected from slum habitants is presented below in Table.

Table 1: Compilation of Data Sheet – Slum Survey

Issues	Details	Survey South	% South	Survey S-W	% S-W	Total Average %
		81		20		101
House	Kuchcha	6	7.44	2	10	8
	Semi Permanent	34	42.16	9	45	43
	Bricks and RCC	30	37.2	7	35	37
Roof	Grass-Thatched	3	3.72	1	5	4
	Tent-Tarpaulin	4	4.96	1	5	5
	Wooden	4	4.96	1	5	5
	Asbestos/Tin Sheet	27	33.48	7	35	34
	Tiled	1	1.24	0	0	1
	RCC Slab	38	47.12	9	45	47
Kitchen Fuel	Do you have Kitchen	27	33.48	8	80	35
	Cow Dung	2	2.48	1	5	3
	Fire Wood	19	23.56	5	25	24
	Coal	2	2.48	1	5	3
	Electricity	4	4.96	1	5	5
	LPG	53	65.72	12	60	65
Water	Tubewell	9	11.16	2	10	11
	Municipal/DJB	6	7.44	2	10	8
	Own arrangement	2	2.48	0	0	2
	Public hydrant	47	58.28	12	60	59
	Tanker	4	4.96	2	10	6
Electricity	Public Meter	39	48.36	10	50	49
	Individual Metered	10	12.4	3	15	13
	Un authorized	25	31	6	30	31
	No supply	2	2.48	1	5	3
Approach Road	RMC	24	29.76	7	35	31
	Metalled	20	24.8	5	25	25
	Path	15	18.6	4	20	19
	Lane	11	13.64	2	10	13
	None	9	11.16	2	10	11
Medical/ Health	In Location near Slum	25	31	5	25	30
service	In Municipal Ward	50	62	10	50	60
	Mobile Van	5	6.2	5	25	10
	Landline /wireless	20	24.8	5	25	25
Telephone	Mobile	45	55.8	12	60	57
	No	9	11.16	3	15	12

Fire Brigade	Response in ten Minutes	20	24.8	4	20	24
	After ten Minutes	55	68.2	9	45	64
	Not arrived/ or arrived after fire extinguished	6	7.44	7	35	13
Duration of Stay	Less than 1 Years	2	2.4	1	5	3
	One Yr to less than 2 years	8	9.92	2	10	10
	2 Years or More	70	86.8	17	85	87
Previous Incidence seen	Same Slum	8	9.92	5	25	13
	Other Place	56	69.44	12	60	68
Reason for Fire incidence	Casualness	11	13.64	3	15	14
	Intentional by outsider	8	9.92	2	10	10
	Accidental	58	71.92	14	70	72
	Do not Know	3	3.72	1	5	4
Govt/ NGO Program	yes	4	4.96	1	5	5
	No	58	71.92	14	70	72
	You were asked	0	0	0	0	0
	Are you willing to participate	69	85.56	18	90	87

Compiled by: Researcher

V. HOUSING STATUS AND TYPE OF STRUCTURE

Land is an important economic resource and the ownership of such economic resource is important for every family and household. Urban poor gets 60% of his source of income from the formal sector which he directly and indirectly contributes to city level GDP. As an economic contributor he has the aspiration to land ownership. However, migrants in initial stage hardly have survival means and their savings towards land/House can only be thought of after a foot-hold is established In Delhi. Therefore maximum tries to have egress by unauthorized route or rental gate. Presently, only 1% of the slum households have Patta, which is an important document, given by Tehsildar for land ownerships. 1% Households with Patta usually live in Pucca houses. 4% of the households have Possession Certificate document. 28% and 35% live in Public and Private Encroached Land do not have any proper

ownership. These houses may be Kachcha and Semi Pucca homes, around 33% would be Kachcha and 66% is Semi Pucca. 19% of the households live in rented slum homes which can be of any form. These rented and other forms of homes can be in any form like pucca, semi-pucca or Kuchcha. This general pattern of Delhi is not seen in South and S-W Districts. Average 37 percent are in Pucca houses. The main problems are with unauthorized and rental habitants, who are not in a position to upgrade their living conditions due to uncertainty of their stay in these houses. The HHs with pucca construction is not on any laid down bye-laws for their safety or having access for support needed in hazard. House layout, inside also, is not having proper ventilation or light. Such slums need to be relocated even if they have to be upgraded in-situ for proper layout within laid down norms and bye laws.

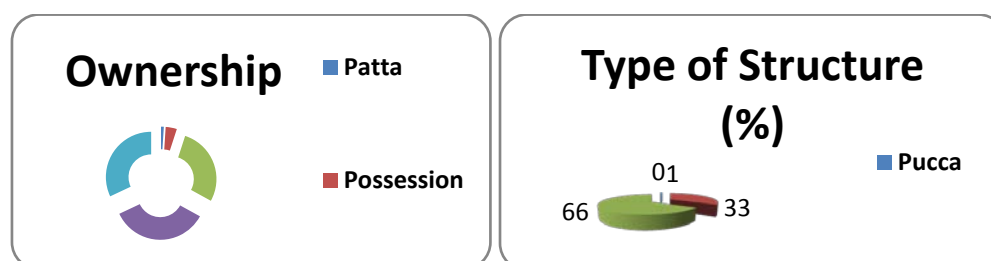
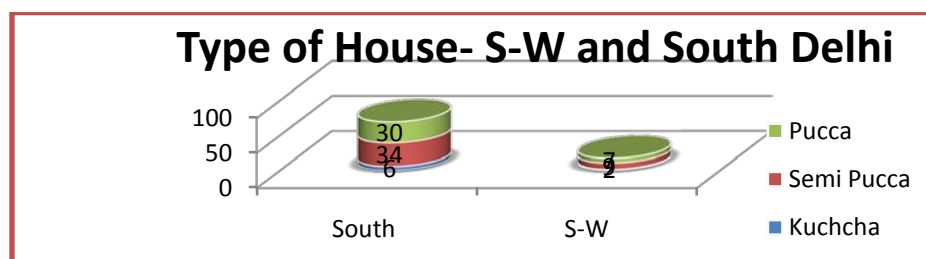


Fig. 4-A: Ownership and Type of Structure



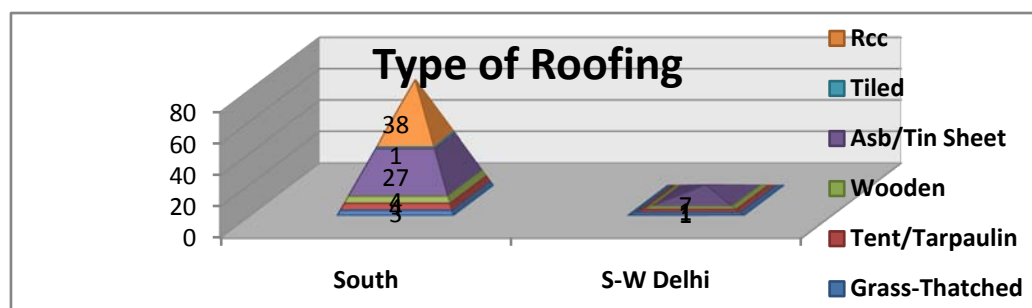
Compiled by: Researcher

Fig. 4-B: Type of Structures- S & S-W

a) Roofing Material

The slum-dwellers use minimum building materials to create their living space. They use easily available local building materials. Often they use old and used tin sheets, timber rafters, joists and posts, country tiles, plastic sheets and other recycled materials. However, their limited technical expertise is put to the best creative use to meet their shelter needs. Not only the type of structure is main concern but also roofing material is main cause for fire. Other than stone or RCC/Brick reinforced roof, Grass/ thatched or wood material are itself inflammable. Due to financial deficiencies in supporting expenditure in one go, slum dwellers construct their houses in stages and therefore

Roofing is left for next phase of construction. If during first stage, it is hoped to start second phase early, the roof is kept with low cost material and vulnerability is created even if it being a pucca house. As far as South and S-W districts are concern, only 48 percent are having safe roofing material out of 37 percent pucca and 43 percent semi pucca houses. 13 percent having Grass/ thatched or tarpaulin/ tent or wooden roofing are in critical condition from fire hazard point of view. It is further seen that even though houses are reported in pucca or with RCC roofing but extensions at top floor are provided with temporary materials and extended to HHs on nominal rents and it is difficult to account them in their relevant category.



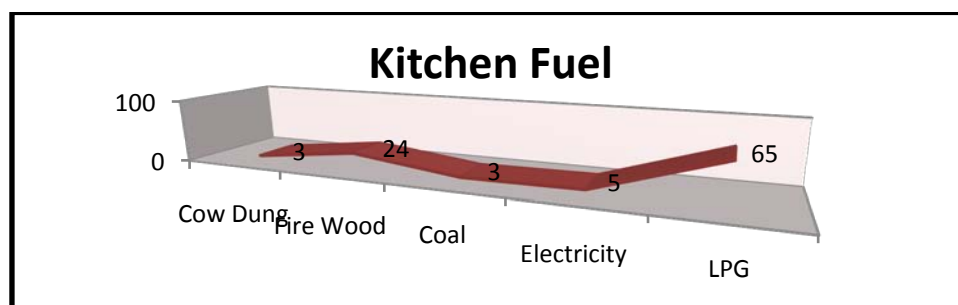
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Fig. 5: Roofing Materials

b) Fuel for Kitchen

The average covered area of the slum house per HH is just about 108 sq ft. To stay with a family of average size of 5 with all households belongings in such a tiny space depicts the miserable life the slum dwellers lead. Condition of slum houses due to limited area forces to manage the living without kitchen and toilets. As a result, make shift arrangements are made for cooking. Generally open Chula is made outside the covered area if fire-wood or cow dung is used. Coal and Firewood is still used as fuel by 1.1 per cent and 1.3 per cent of the households respectively. Cow dung is used by 0.5 per cent of the households. In rainy season, such arrangements are restricted inside congested available space only. Remnants and semi burnt fuel is sensitive cause for fire hazard. For cooking, 5 percent

dependent on electricity and 65 percent use LPG. Non availability of K-Oil, delay in refill of gas cylinders and interrupted supply of electricity also forces to easily available source as wood and cow dung. The cooling period needed for burner after use is also overlooked by most of the users particularly if space and time is constraint for these slum habitants. The distribution of kitchen fuel used by slums is shown below.



Compiled by: Researcher

Fig 6: Fuel for Kitchen

c) Source of Water

As per survey discussed earlier, In Delhi, 455 Slums have one or the other source of drinking water and remaining reported not having any such facility. Such persons fetch water from the adjacent localities. Only 211 reported regular water supply by Delhi Jal board. In 55.77 per cent not receiving regular supply, the frequency of water supply is reported by 76.69 per cent, twice daily in 24 hour and thrice daily reported by

14.29 per cent. In South and S-W districts, the status is similar. 59 percent are dependent on public hydrants and 6 percent on tanker water supplied by DJB having no schedule. Out of remaining 35 percent, only 8 percent have regular supply by DJB. Even though 11 percent have tube well supply but generally it has been declared illegal by notifications of Ground Water Board due to depleting water table. For fire fighting, one cannot depend on local source at all.

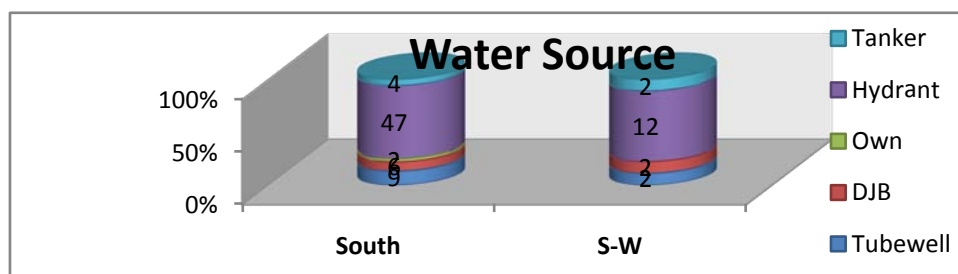
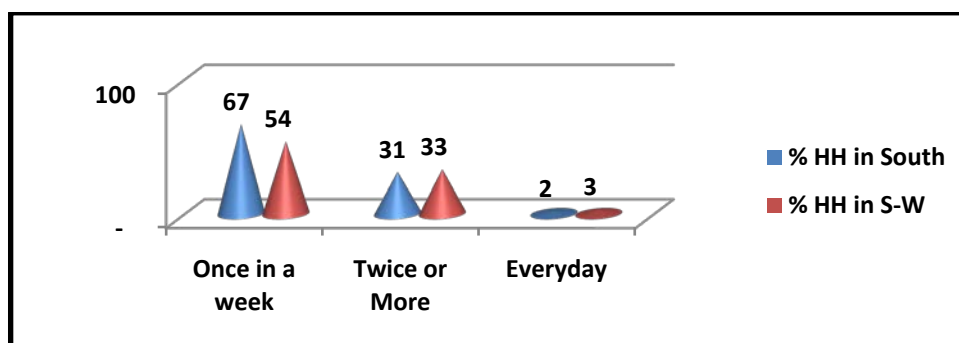


Fig 7: Water sources in Slums of South and S-W Districts



Compiled by: Researcher

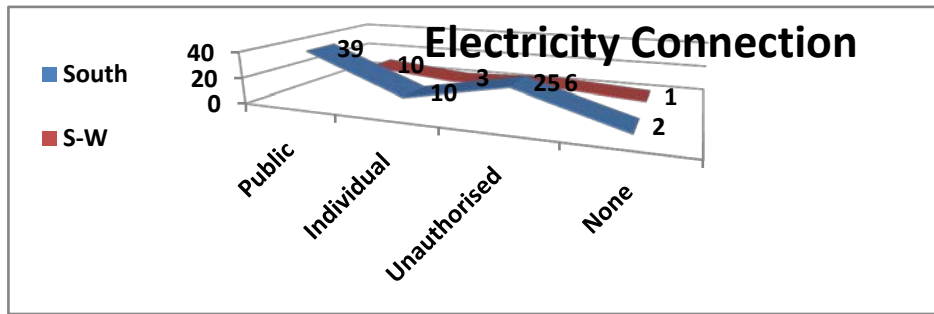
Fig 8: Duration of Water supply in South and S-W Districts

d) Electricity Connection

Only 44 per cent of the total slums have street lighting inside the slums causing inconvenience for the slum dwellers that do not have such facility. The average number of hours of load shedding during summer is reported at 2.43 during summer and 0.90 in winter. Firstly this problem is making life unsafe in Slums in general and to girls, female and old persons in particular. It forces habitants to use unsafe means for

lighting as well as for cooking. Approximately 31 percent are having un authorized connections and 3 percent have no source of electricity. 49 percent have public metered supply and 13 percent have individual connections shown by Fig 9. In general, slums earmarked for dislocation or eviction, no one want to spend the money for up gradation. HH are not interested for spending money in getting electric connection nor does state government provide

organised electric poles or distribution scheme in these slums.



Compiled by: Researcher

Fig. 9: Electric sources in Slums of South and S-W Districts

e) Approach Road

The quality of roads inside the slums in Delhi is not that bad. 51.5 per cent slums have roads of mixed type which includes cement concrete road, bitumen road and kutchha roads. 31.24 per cent slums have cemented concrete roads. Only 3.14 per cent slums

have kuchcha roads. In S and S-W, 43 percent have Kuchcha roads as shown in Fig 4.11. Due to more lanes, the move of fire tender in slums is difficult in south west district. Further density of slums vs area also, restricts the availability of approach roads for fire tender in case of requirement

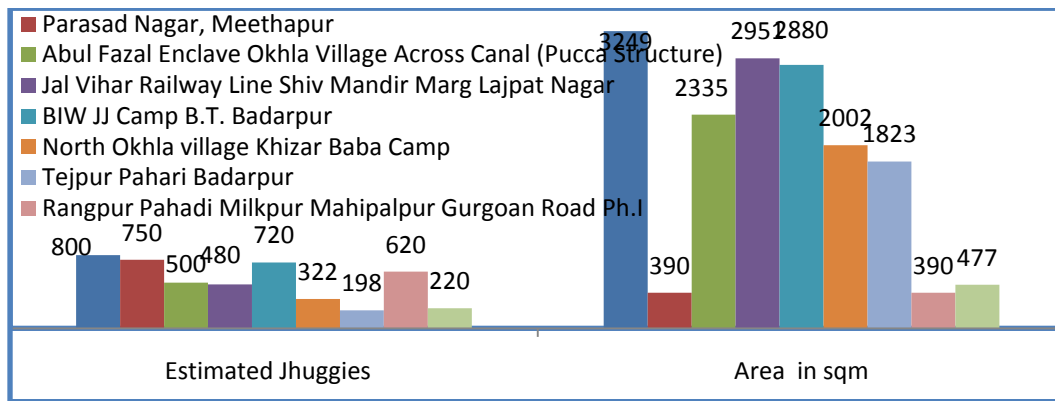
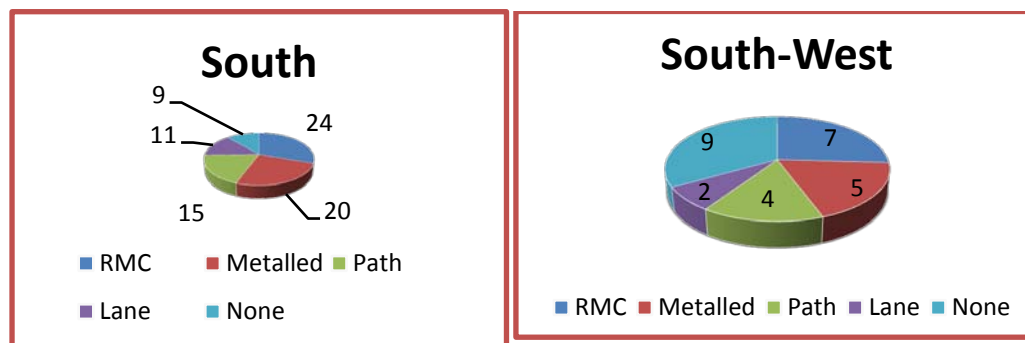


Fig. 10: Slum occupied Area Vs Slum HHs of South and S-W Delhi



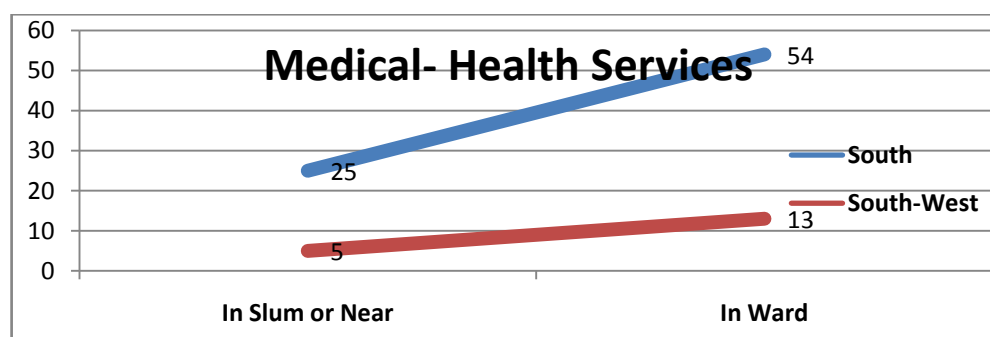
Compiled by: Researcher

Fig. 11: Road availability in Slums of South and S-W Delhi

f) Medical/Health Facilities

The facilities of Medical and health is generally negligible. Either they have to go up to 5 kms in ward having some arrangements or weekly mobile facilities are made available with a doctor for few hours only. In

emergency, there is no organized known services available and it is main cause of common concern. Various modes of services utilised by these house old is shown in Fig 12 below.



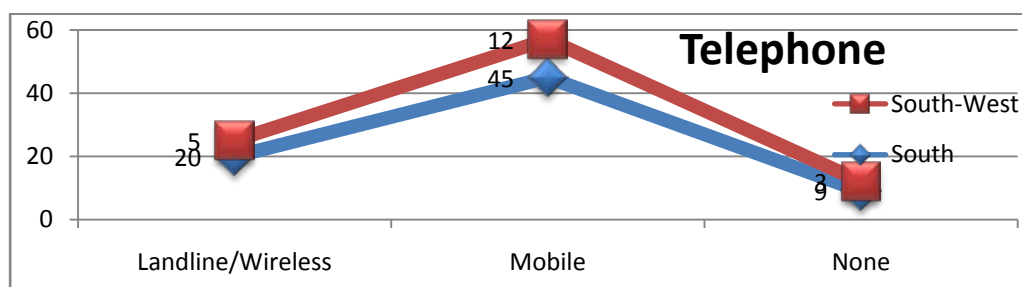
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Fig. 12: Health Facilities in Slums of S and S-W Districts

g) Telephone

In any disaster particularly fire, what matters most is the time gap between the fire and the response that follows. Most of the damage to lives and properties occur during this period. Therefore, besides government agencies, response should start where the fire strikes. For prompt communication in emergency, telephone is utilized by common people. Even though mobile is now

available with majority. However landline or wireless is available with 25 percent in both of these slums. 57 percent uses mobile in both these districts while 12 percent HH have no means of communication. As far as fire related issues are concern, this is not a point for serious consideration. If that response comes from an organized local group, then the loss of lives and assets can be minimized.



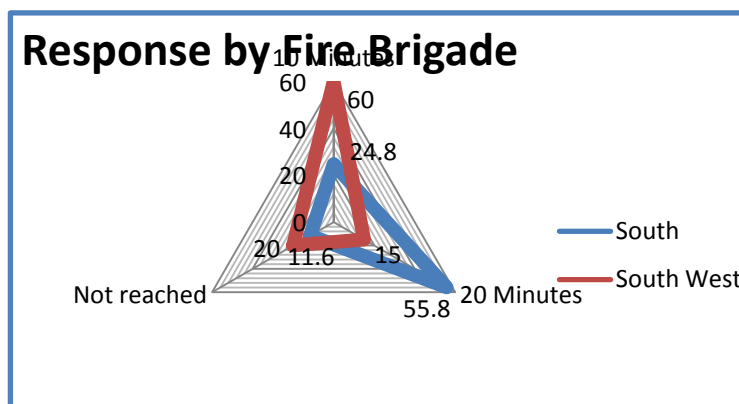
Compiled by: Researcher

Fig. 13: Telephone availability in S and S-W Slums

h) Fire Brigade

Even though Delhi Fire Service is responsible for entire Delhi. But due to various reasons prevention issues are not enforceable in slum areas. Further due to narrow lanes their response time is very high. Over and above the basic source of fire hydrants are generally not

available in prescribed distance of incidence locations. Survey confirms this problem. Only 64 percent reported that fire brigade could reach after 10 minutes of reporting. 13 percent reported that it never reached their location when fire broke in front of them.



Compiled by: Researcher

Fig. 14: Fire Brigade Availability

VI. DURATION OF STAY

This aspect is related to belongingness of habitants to their houses as well as to their slum area. Government policies also defines the right of getting a place for shelter based on the time dweller has spent in that house. During survey it is revealed that only 3 percent are the ones who have less than 1 year stay in the location and 10 percent having stay between one to two years. However these 13 percent are categories

under non authorised HHs, who cannot get benefit of slum upgradation house. Therefore these people are obstructing government plans. To make plan implementable, all habitants have to be addressed. As per judicial order, without an alternative arrangement, HH cannot be removed or evicted, HH having their presence after 2014 cannot be provided any assistance. 87 percent have to live without basic amenities.

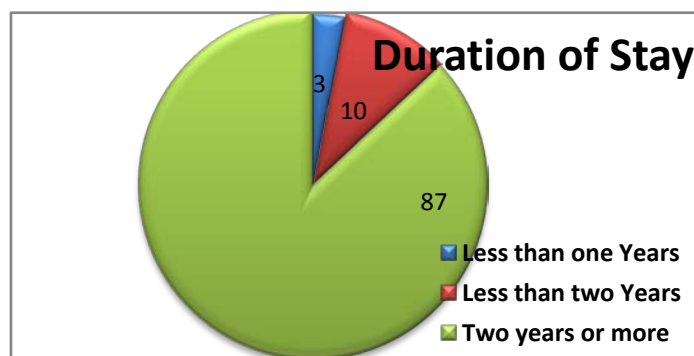
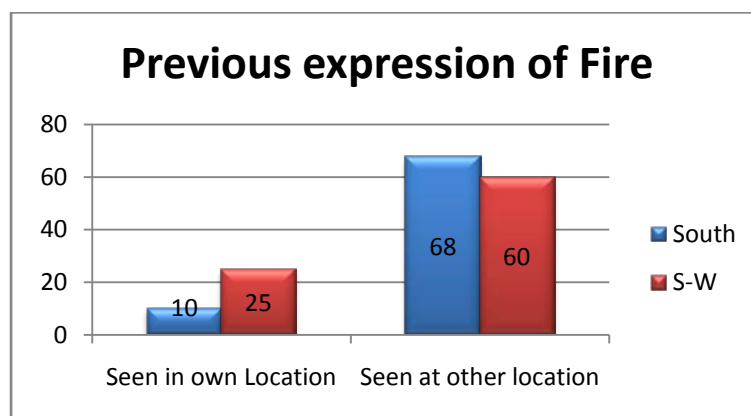


Fig.15: Longevity of HH in Slum Area

Previous Fire Incidences

It is important to note that the fire disasters are local events and the better solutions can be developed from the local environment and habitants of the slum. The lessons from the past events have major contribution for future plan. To develop an awareness in order to cope up with disasters and reconstruct the affected community as a disaster resilience community,

the past experience is re-capitulated. To find the details of habitants having firsthand experience of previous fire disaster, the survey revealed that 78 percent habitants of south district slums and 85 percent of S-W district slums have seen after math of fire disaster. In S-W slums even 25 percent have experience of fire damages in their own slum. These people can contribute to reduce vulnerability in their locations.



Compiled by: Researcher

Fig. 16: Previous Impression of Fire Disaster in Slum

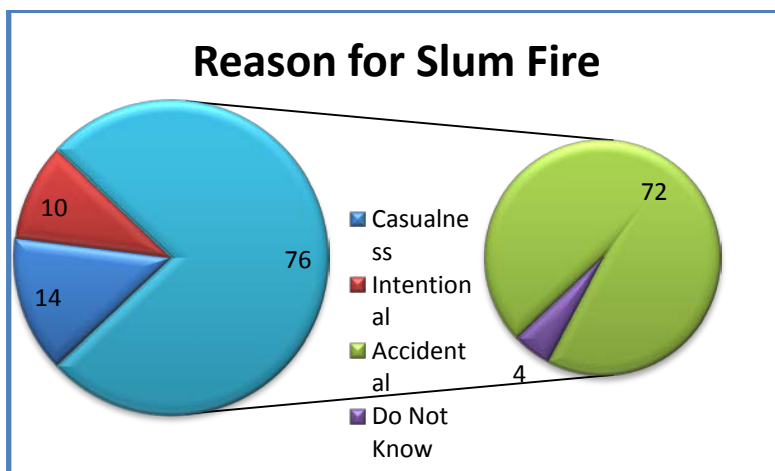
a) Reasons best felt by Habitants

Sustainability of disaster preparedness lies in addressing vulnerability conditions and changing their context, while organizing slum communities to deal with fire disasters. The extent also depends upon prevailing social and economic conditions and it's consequential effect on habitants activities within a given slum. If the

reason can be identified then, one may think to avoid the cause to safe guard against such repetition. With this as a aim, slum survey tried to collect the understanding of habitants for likely causes and expected mitigation action. It is found that 76 percent felt that fire is due to casualness of HHs and resulted as accidents reported by 72 percent. However it is further

noted that 10 percent felt that it is intentional by local politicians or muscle carriers to get the areas vacated. Intentional fire should not be accepted by any one nor to

be supported or encouraged by any 'Tabka' of society. The case study of Bangalore fire confirms intentional fire of slum by anti social elements.



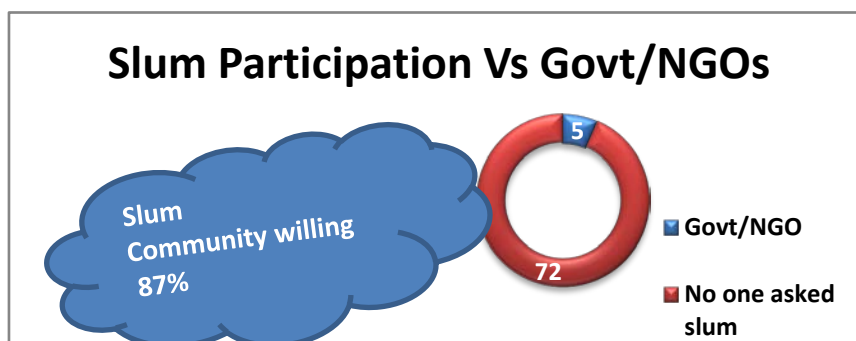
Compiled by: Researcher

Fig. 17: Reasons felt by locals

b) Govt/NGOs Response and Community Participation

Slums are not notified yet, therefore any plan requiring proper funds are less prioritized. Mitigation plans of the slum community and Mohallas demands priority under various development schemes administered by Urban Local Bodies or Government. Further it needs slum community participation. Survey

confirms that in these slums, such interaction was minimal (5 percent reported some activities in past). 72 percent reported that no one approached them in past. Such a figure is alarming and concerned officials attention is needed. While 87 percent are willing habitants to participate for development activities.



Compiled by: Researcher

Fig. 18: Slum Participation in Mitigation

c) Government and other agencies response to fire disasters

The threat of eviction without any compensation is real insecurity of tenure. The shelter remains unsecure even after decades of residing in it, the dwelling cannot

be used as collateral to obtain credit, and lack of address proof limits participation in government schemes as well as in the economic mainstream (Mathur OP, op.cit). The Survey data with Govt/ NGO officials is placed below.

Table 2: Interview with Public Representatives/ Government/NGO officials

Details	South and South West Slums
Fire Incidence in past	Most of them witnessed all incidences and actively participated. Reason is ignorance of habitants.
How do you participated in fire mitigation	Actively involved for relief operations only. No activity seen for long term plans. No govt plan/ rehabilitation scheme in force.
RRD ?	All Knows RRD and still looking for such scheme to be implemented.

Any Plan	Local committee formed and training to educate and awareness programs organized.
Any Suggestions	Local/ common building bye laws and govt in-situ slum development schemes need to be initiated immediately.
Government Action	Even though DUSIB, DJB and NDMC, MCDs and cantonment board are maintaining the slums but their is no long term plans by either of them

Source: Compiled by Researcher

The Panchayati Raj as 'Institutions of self-government' is recognised by constitution through 73rd and 74th amendments. The amendment has also laid down necessary guidelines for the structure of their composition, powers, functions, devolution of finances, regular holding of elections and reservation of seats for weaker sections including women. These local bodies can be effective instruments in tackling slum disasters through early warning system, relief distribution, providing shelter to the victims, medical assistance etc. There are various institutional stakeholders also involved in disaster management at various levels in the country. These include the police and para-military forces, civil defence and home-guards, fire services, ex-servicemen, NGOs, public and private sector enterprises, and media. In urban development plan, there is no land allotment for removal/ redevelopment/ resettlement of slum with a dedicated fund.

VII. EMPIRICAL FINDINGS

It is also found that neither proper bye laws exists for their construction and maintenance nor Fire prevention systems are adequate for slum areas. Government plans do also not exist.

But, majority has got electric connections and habitants are motivated to actively participate in all development plans. The main source of fire has not got awareness to have separate place for kitchen relative activities.

NGOs are active in all slums and in few slums, Self help Groups are created. People have been educated to understand the importance of their participation. Water and health facilities need improvement.

a) House quality

Due to type of Construction and material used for superstructure, the houses of these households are more likely to be destroyed during fire. The structures are built according to older style, without any building codes. Most of it has used lower quality construction materials and methods, and hardly maintained (Bolin and Bolton, 1986). Lower income households have fewer resources on which to construct their houses therefore construction is in stages. They also take longer to transition through these stages of housing, sometimes resides in semi-constructed/ damaged portions for extended periods of time (Girard and Peacock, 1997). In other cases, they are forced to

accept as these structure as permanent what originally was intended as temporary housing (Peacock, et al., 1987).

A study commissioned by some NGO in 2010 spoke about ignition and flammability of materials used in jhuggi construction. These clusters were found to be accident-prone and likely to go up in flames anytime. The experimental study, carried out by professor S R Kale from the mechanical engineering department of IIT-Delhi, examined how different structures reacted to fire attacks in various orientations and with different sources of ignition. Typically, a slum consists of mats, sacks, plastic and wooden columns that impart structural integrity. Fires in such settlements are quite common and result in considerable loss of property and life, the report noted. It pointed out that the materials used were flammable and even a spark could trigger a fire.

The study found that commonly used cane mats ignite easily and burn rapidly. Black plastic sheets used to cover the mat structures and also as roof, also catch fire easily and keep burning. Moreover, burning of these sheets gives off globules of burning plastic at regular intervals. The report recommended that salt and mud coatings could reduce the flammability of mats, as shown by experiments. Dunu Roy from Hazards Centre blamed shoddy urban planning for the fires. "Most huts are built in dense settlements that are contiguous and huddled together. Since there are no gaps, fire spreads rapidly. Planning and housing for the poor is the answer. When there is uncertainty over the continuity of a slum, a poor man will not invest in its safety."

Shivani Chaudhry, executive director, Housing and Land Rights Network, pointed to the government's failure to invest in adequate low-cost housing. "People need to live close to their workplaces. Scores of residents are forced to live in slums, many of which are considered 'illegal' by the state or not 'recognized'. The state's refusal to invest in these settlements and provide the minimum standard of basic services, such as water, electricity, sanitation, affects residents," said Chaudhry. HLRN cites the government's failure to protect the human rights of slum-dwellers as a violation of the Constitution and judgments of the Supreme Court that have upheld the right to housing as a human right and an extension of the right to life.

The study suggests that informal settlement dwellers play positive roles in urban economy as well as urban life apart from a few known adverse roles. Their



contribution to urban GDP, and some of the "difficult to replace" nature of jobs they are engaged in, makes them an integral productive economic agent of the urban economy. As the services provided to this section of population are often considered as favour to the community rather than their basic right, the approach and attitude of the authorities needs to be re-examined. Certainly the informal settlement dwellers deserve the basic facilities that other urban dwellers enjoy as their right. This needs to be translated into policies by the policy makers and opinion leaders of the country (PRIA, 2013).

b) Intentional fire to frighten residents

From the interviews with the residents of the few slums, the researcher has arrived at the conclusion that the few slums were intentionally set on fire by persons having interest in the land on which the slums had settled. These fires have destroyed everything that the poor slum residents had including vessels, pots, clothes, blankets, money, etc. Within a few hours, structures that have been built by the poor incrementally over years are flattened. There is little time to save anything. Whatever little documents these family have, including ration cards, voter cards, etc are also generally lost in the fire. The residents also claimed that in addition several pushcarts and vegetables and fruits for sale were also destroyed by the fire. They even said that those on the road side who had small shops selling cigarettes, sweets, etc. and even these were destroyed. Researcher has found that the lands on which these slums are located have several other interested parties who could be behind the fires. The end effect of the fire is to instill fear in the minds of the slum dwellers and force them to vacate the land. The fire is just one way of forcing the slum dwellers off the land. In various interviews the researcher came across various other tactics including threatening, physical violence using goondas, abusing the women, teasing women, etc. to force them off the land. This is an issue that needs immediate tackling.

The researcher is of the impression that the offence of intentionally setting fire to a slum which houses dalits predominantly also attracts the provisions of the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989. As was found, the slums have been set on fire by certain persons with the intention of evicting the slum dwellers. The lands on which these slums are located have been the reason for dispute between these persons and the slum dwellers. Considering these facts it is necessary to invoke these provisions of the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989 against those guilty of setting these slums of fires.

It is a matter of shame that the residents of the slums live under such circumstances especially considering that they have contributed towards metro

city development by building countless houses, schools, hospitals, colleges, etc. they cannot afford decent houses for themselves and the government does not find it necessary to fulfill their needs.

c) Judicial / Constitutional Backing

These slum dwellers have a constitutionally guaranteed Right to Shelter which the government has to fulfill. In various cases, the Supreme Court has enlarged the meaning of life under Article 21 of the Constitution to include within its ambit, the right to shelter. Upholding the importance of the right to a decent environment and a reasonable accommodation, in *Shantistar Builders v. Narayan Khimalal Totame* (1990) 1 SCC 520: AIR 1990 SC 630, the Court held that, "The right to life would take within its sweep the right to food, the right to clothing, the right to decent environment and a reasonable accommodation to live in. The difference between the need of an animal and a human being for shelter has to be kept in view. For the animal it is the bare protection of the body, for a human being it has to be a suitable accommodation which would allow him to grow in every aspect - physical, mental and intellectual. The Constitution aims at ensuring fuller development of every child. That would be possible only if the child is in a proper home. It is not necessary that every citizen must be ensured of living in a well-built comfortable house but a reasonable home particularly for people in India can even be mud-built thatched house or a mud-built fireproof accommodation". In *Chameli Singh v. State of U. P.*, a Bench of three Judges of this Court had considered and held that the right to shelter is a fundamental right available to every citizen and it was read into Article 21 of the Constitution of India as encompassing within its ambit, the right to shelter to make the right to life more meaningful. In para 8 it has been held thus: "In any organised society, right to live as a human being is not ensured by meeting only the animal needs of man. It is secured only when he is assured of all facilities to develop himself and is freed from restrictions which inhibit his growth. All human rights are designed to achieve this object. Right to live guaranteed in any civilised society implies the right to food, water, decent environment, education, medical care and shelter. The right to shelter, therefore, does not mean a mere right to a roof over one's head but right to all the infrastructure necessary to enable them to live and develop as a human being. Right to shelter when used as an essential requisite to the right to live should be deemed to have been guaranteed as a fundamental right. As is enjoined in the Directive Principles, the State should be deemed to be under an obligation to secure it for its citizens, of course subject to its economic budgeting. In a democratic society as a member of the organised civic community one should have permanent shelter so as to a physically, mentally and intellectually equip

oneself to improve his excellence as a useful citizen as enjoined in the Fundamental Duties and to be a useful citizen and equal participant in democracy. The ultimate object of making a man equipped with a right to dignity of person and equality of status is to enable him to develop himself into a cultured being. Want of decent residence, therefore, frustrates the very object of the constitutional animation of right to equality, economic justice, fundamental right to residence, dignity of person and right to live itself."

d) *Socio-Economic Community Issue*

A wide range of socioeconomic factors are associated with increased vulnerability. Areas with high crime rates, low social capital, and socially isolated individuals had increased vulnerability. People in areas of low socioeconomic status are generally at higher risk of heat-related morbidity and mortality due to higher prevalence of chronic diseases. Protective measures are often less available for those of lower socioeconomic status. Other groups, like the homeless and outdoor workers, are particularly vulnerable because of their living situation and being more acutely exposed to heat hazards. Older persons may also often be isolated and living alone, and this may increase vulnerability. The distribution of households with and without separate space for cooking is main drawback. Even fuel for fire is also main cause of concern.

e) *Missing coordination between stake holders*

With the immensity and complexity of the disaster problem, no stakeholder could effectively address the problem alone. Cooperation in disaster reduction activities among governments at national and local levels, non-governmental organizations and various sectors of the communities is essential. The broadened participation of relevant sectors, such as environment, finance, industry, transport, construction, agriculture, education, health, and media among others, in disaster reduction activities, allows for greater understanding of local vulnerabilities and risk to disasters and integration of actions of stakeholders.

The effectiveness of disaster risk management interventions could be ensured when the community and people at risk are directly involved in the disaster risk management process. It is also critical that any disaster risk management plan is dynamic and remains relevant to the community and the roles and contributions of the members are defined. Through the participative approach, the determination of risks and the intervention measures are not imposed on the community, but rather accomplished by the very people concerned. Following measures are missing-

- i. Empowerment to the poor and women, to overcome established boundaries and limitations
- ii. Funds/subsidies of state-led programs are not seen.

- iii. New relationship between grassroots groups, social organisations, and the private and public sectors is not seen.
- iv. A community led reconstruction to development strategy is based on the premise that communities can be mobilized around rebuilding efforts. Collective action around rebuilding – whether it is houses, schools or community centers, involves people in sharing of skills, resources, materials, benefits and ideas, and therefore is a shift from disaster to sustainable development.
- v. By building confidence in people's decision-making capacities, firstly people receive on time information on their entitlements, understand safety features and develop firsthand knowledge about local and new materials. Develop capacities to access cash and materials resources, and are part of community self monitoring mechanisms if and when they are established.
- vi. Empowering women's self help groups to play a key role in mobilizing communities, addressing women's issues, enhancing participation of women in rehabilitation. Specific to the reconstruction program, women's can play a key role in reaching out information, Promoting safe construction practice, monitoring relief and reconstruction, ensuring earthquake resistant standards and providing feedback to administration.

f) *Lacking support from Delhi Fire Department*

CAG commented in it's report on DFS-GNCTD that planning and preparedness for fire prevention undertaken and achieved by DFS was not commensurate with the size and complexity of a megacity like Delhi. It neither maintained a comprehensive database of areas, population under respective fire stations and geographical mapping nor was it aware of the number of high rise buildings in Delhi and the status of NOCs/FSCs issued to such buildings. DFS was suffering from shortages of resources too, particularly of operational staff and fire tenders/ bousers. Available Communication equipments are inadequate and outdated, hampering the performance of DFS. As per SFAC norms, the response time of a maximum of three minutes should be achieved in all high hazard zones and closely built up areas, and it should not exceed five minutes for other areas. DFS did not maintain manual data of actual response time, but uploaded fire reports on its website with details of response time.

g) *Lacking financial planning of governments for slum eradication*

DUSIB has submitted a voluminous slum-free city action plan (SFCAP) to Delhi government for approval. While the board has proposed various measures to rehabilitate Delhi's slum-dwellers, one of the main objectives is freeing up nearly 200 hectares of

land. The DUSIB plan will take at least six years to be implemented, subject to being approved by the Delhi government and subsequently by the Union Ministry of Urban Development. The data that the board collected in order to prepare a housing strategy for the slums, however, reveals the grim reality of depriving slum-dwellers of their dignity, also poses the perennial risk of exposing the residents to infections and diseases.

While the SFCAP deals with the all-round problems that the administration will have to tackle while making the city slum-free, it enlists a number of improvement and curative strategies to better the infrastructure and facilities available to slum dwellers. These include the existing physical infrastructure within and in the vicinity of slums and proposed relocation areas including connectivity infrastructure like road network, other transport network, water supply, sewerage, drainage, electricity and communication networks, solid waste management facilities and other physical infrastructure facilities. "Social infrastructure facilities (community toilets/baths, informal sector markets, livelihood centre, pre-schools, child care centre, schools, health centres, health, banking, community halls etc.)"

In the course of making the SFCAP, DUSIB also gathered information based on various parameters that compose the slum population of Delhi.

The board has prepared a housing strategy that will accommodate all slum dwellers in Delhi and create an extra EWS (economically weaker sections) housing stock estimated to be about 1,47,357 flats. The plan, according to DUSIB, will free up 197.23 hectares (about 500 acres) of land encroached upon by slums that is likely to fetch a price of Rs 14,526 crore. Its report states: "It is proposed to build a total of approximately 3.6 lakh dwelling units during the five years of implementation of RAY (centrally-funded Rajiv Awas Yojana) in Delhi. The total projected cost for housing is Rs 37,235 crore which is calculated without adding any price escalation. During the first year, it is proposed to build 23,755 dwelling units at an estimated cost of Rs 2,494 crore." This cover entire Delhi having 9 districts including South and S-W districts, which are scope of this thesis.

VIII. RECOMMENDATIONS

The RRD approach confirms that development can only sustain if disaster mitigation is built into the development process. Further mitigation has to be across all sectors of development. It advocates that investments in mitigation are much more cost effective than expenditure on relief and rehabilitation. Therefore following activities needs to be visited in detail:-

a) *Slum Free City Plan of Delhi*

In 1962, Delhi Govt had set up a special cell under Slum Area (Improvement and Clearance) Act

1956, for infrastructure and utility services support to slum area and to rehabilitate slum clusters as the Slum & JJ Wing. The Slum & JJ Wing of erstwhile MCD/DDA was created into a board under chairmanship of hon'ble CM of Delhi, in 2010, and renamed as Delhi Urban Shelter Improvement Board (DUSIB). DUSIB is responsible for providing/managing/co-ordinating for infrastructure and civic services in JJ clusters of Delhi. DUSIB is also nodal agency for resettlement/rehabilitation of slum clusters in Delhi. In 2009, the Government of India launched Rajiv Awas Yojna (RAY) for making India slum free. GNCTD is required to prepare a slum free strategy for the whole city. The Ministry of Housing and Urban Poverty Alleviation (HUPA), Govt. of India has appointed DUSIB as the nodal agency for Slum Free City Planning for Delhi by GNCTD. Currently, 675 JJ clusters have been identified, with about 3,06,600 jhuggis occupying about 700 hectares of land in Delhi. The JJ clusters are spread on land owned by DUSIB, MCD, NDMC, and Central Government agencies e.g. Railway, DDA (50% land), Delhi Cantonment Board, CPWD/L&DO etc. Delhi has multiplicity of authorities, multiple government bodies own lands, and control planning, approvals, allocation of land etc. These authorities are not under control of Delhi Govt. Thus, Delhi Govt. constrained unlike other state governments. It is expected that approx. 3,30,867 dwelling units will be built on tenable & semi tenable land presently occupied by JJ clusters, and about 210 hac. of land will be freed. In present proposal, considering projects under JNNURM and DUs on available vacant land, 453959 DUs will be made available against present 306602 households in various slums. Capital earned by this free land should be able to fund the development of surplus EWS housing on the tenable land parcels, presently occupied by JJ clusters. Commercial exploitation of the freed land may be able to fund the entire project of making Delhi slum free. All the Slum lands, irrespective of land owning agencies, and powers regarding preparation/approval of rehabilitation/ approval for construction plan including approval for land use change if any, should be transferred to DUSIB by making necessary Act by Centre/ State Govt. The present Act of DUSIB needs to be amended (DUSIB SFCPoD, 2015).

b) *Slum Community Participation*

The effectiveness of fire risk management interventions could be ensured when the community and people of slums who are at risk are directly involved in the fire risk management process. It is also critical that any such plan is dynamic and remains relevant to that slum community. Through this approach, the determination of risks and the intervention measures are not imposed on the slum community, but rather accomplished by the very people concerned. Moreover, greater emphasis is placed on local knowledge and the indigenous ways of knowing, rather than on expert knowledge and technologies. This shifts focus from

hazards to socio-economic vulnerability (poverty, development, etc.) of the communities at risk. Further, it allows problems defined correctly and accordingly responsive measures are designed and implemented. Slum habitants respond to disasters more efficiently and effectively with existing local resources. Community based-activities increase the community's capacity and people's potential for reducing their vulnerability to fire disasters.

- i. *Stack-holder's responsibilities*- Besides trained civil and military personnel, strengthening of existing institutional arrangements and systems is required to make the initial response to fire more effective and professional.
- c) *Funding Mechanism with development linked mitigation*

India's 10th Five Year Plan noted that the urban slum population is growing despite sharp reductions in poverty and rising incomes. The central and several state governments recognized the need for intervention by initiating, or enlarging existing urban housing and other slum subsidy programs. With this in mind, the Government of India (GOI) has requested a loan from the World Bank to implement a more effective strategy and delivery mechanism for the financing of urban slum improvement and sanitation provision in underserved areas.

In order to support the GOI to achieve the goals delineated in 10th Five-year Development Plan concerning slum improvement and poverty alleviation in urban areas, the Bank has agreed to consider a program that will focus on

d) *Act to cover techno-legal requirements*

Office of the Divisional Commissioner has requested various line departments to nominate experienced engineers to constitute a hazard safety cell within the department. NDMC, DDA and MCD have already constituted Hazard Safety Cells within their departments. Other legal provisions are as follows:-

- Amendment in Urban Development Legislations / Regulations / Bye-laws for incorporating "multi-hazard safety" provisions: A committee constituted by MHA, headed by National Seismic Advisor, Prof. A.S. Arya, has suggested in its report to incorporate Disaster Management provisions in urban development legislations, regulations/bye-laws, by making suitable amendments in Building bye-laws, master plan etc.
- DDA is looking into the existing provisions and preparing text incorporating Multi Hazard Safety provisions in the Master Plan for Delhi -2021.
- MCD has put up a draft of the new building byelaws, in which amendments as per the recommendations made by the National Expert Committee have been incorporated.

e) *Strengthen fire services*

The fire prevention wing is headed by a Deputy Chief Fire Officer and assisted by a Divisional Officer and Station Officers. But all this actions are not covering slums and their habitants. What is needed now is-

- Risk of safety and security of people can be ensured only when the affected slum communities determine their priorities and control the use of resources to reduce vulnerability to fire hazard.
- Building innovations that are evolved by the poor to cope with the crisis can be sustained if they are supported with resources and capacities. Standard safety norms and building codes are developed (in relation to local skills, materials and resources). Alternative institutional arrangements to ensure resources allocated for the widespread awareness of safe building techniques.
- In order to further strengthen the capacity for response, the fire services are proposed to be developed into multi hazard response units. It is proposed to provide rescue tenders in addition to fire tenders to each fire unit and fill up all gaps upto sub divisional level.

ACRONYMS

AUDP: Asian Urban Disaster Mitigation Program
 BMPTC: Building Material Promotion and Training Council
 CBDM: Community Based Disaster Management
 CBO: Community Based Organization
 CGDR: Centre for Global Development Research
 CPWD: Central Public Works Department
 CSE: Centre for Science and Education
 CUSEC: Central United States Earthquake Consortium
 DDA: Delhi Development Authority
 DFS: Delhi Fire Service
 DJB: Delhi Jal Board
 DM: Disaster Management
 DMA: Disaster Management Act
 DRM: Disaster Relief Management
 DRR: Disaster Risk Reduction
 FEMA: Federal Emergency Management Agency
 GOI: Government of India
 I&FC: Irrigation & Flood Control
 JJC: Jhuggi Jhopri Clusters
 MCD: Municipal Corporation of Delhi
 MHA: Ministry of Homes Affairs
 MLA: Member of Legislative Assembly
 MP: Member of Parliament
 NDMA: National Disaster Management Authority
 NDMC: New Delhi Municipal Corporation
 NDPL: North Delhi Power Limited
 NDRF: National Disaster Relief Fund
 NGO: Non-government organization
 PMB: Project Management Board
 PWD: Public Works Department

RRD: Relief Rehabilitation and Development
 SDRF: State Disaster Relief Fund
 UN: United Nation
 UN/ISDR: United Nations International Strategy for
 Disaster Reduction
 UNDP: United Nations Development Program

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