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Evaluation of Housing and Sanitation Conditions in Slum Areas of Industrial City, Panipat

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Abstract

Present study is an attempt to analyse housing and sanitation conditions in industrial city, Panipat. The study is based on primary survey of 384 households that comprises 2 percent of the total 19190 slum households in 25 clusters located in 36 colonies. The characteristics like the spatial pattern and concentration of the slum clusters have been analysed with the help of Nearest Neighbour Analysis (NNA) techniques. To calculate the composite index of each slum area, weights are assigned to each facility by following the formula given by Bhat (1976) and thereafter, the composite index using the formula given by Vij (1996). Based on the composite index, the slums have been divided into four categories reflecting access to facilities. Access to facilities have been analysed by income levels and social groups - namely general caste, backward caste and scheduled caste as defined by Haryana government. The study reveals that only about one thirds of the households stay in permanent and predominantly single storey dwellings. Room density is very high in most of the slum areas. Many of them lack access to safe drinking water and sanitation. Low income group and scheduled castes are the most deprived section.

Introduction

The Slum Area Improvement and Clearance Act, 1956, defined the slum as the area where the buildings are unfit for human habitation by reason of dilapidation, overcrowding, faulty arrangement of street, lack of ventilation, light and sanitation. The slum defined by the Maharashtra Slum Area Act 1971, is "an area in the state which is unfit for human habitation"(Desai and Pillai, 1972). These slums have different name in different parts of India. In Delhi they are known-as *Jhuggi-Jhopri*, in Bombay as *Zopadpatti*, in Calcutta as *Basties*, in Tamil Nadu, Kerala and Pandicherry as Cherries and in Andhra Pardesh as *Murikiwadalu* (Chandra and Nigam, 2003). *Jhuggi Jhopri* is the prevalent nomenclature in the study area.

Distribution of Slums

There are five nuclei around which slums have grown in Panipat city. They are; (1) along railway line (2) along G.T. road (3) industrial area (4) periphery of the city and (5) open drainage (*Ganda Nala*). Neighbourhood of the above locations are either low lying areas or in proximity to sources of noxious pollutants. Panipat is an important textile centre which offer opportunities to wide range of skilled, semi skilled and unskilled workers. Infrastructure development does not commensurate with large scale migration which led to growth of slums and squatter settlements as displayed in Fig. 1. Slums are found in clusters and many clusters have more than one colony (Table1). There is tendency of homogeneity in terms of caste, religion or

Table1 Panipat: Distribution of Slum Clusters, 2007

Location	Name of Clusters
Along Railway Line	Azad Nagar (11), Sanjay Colony (4), Gautam Nagar (6), Dhanak Basti (4), Idgah Colony (13), Gandhi Colony-Asand road (13), Parkash Colony (14), Raj Nagar (3), Kabir Panthi Colony (9), Mahabir colony (12), Shakti Nagar (9)
Along G.T. Road	Imam Sahib (10) Gandhi Colony (25), Khatik Colony (10)
Industrial Area	8 Marla Jattsal Road (5) Shastri Colony (8) , Jag Jiwan Ram Colony (8), Gausali Basti (15) Balmiki Basti (16), Deha Basti (16), Ravidas Basti (8), Kirshan Pura (7),
Periphery of the City	Gurunanak Pura(1), Rajput Colony (2),
Open Drainage (*Ganda Nala*).	Rajiv Colony (19), Chawala Colony (17), Saini Colony (18),Chandani Bag (18),Maiji Colony (20), Uttam Nagar(21), Vijay Nagar (21), Kaptan Nagar (20), New Ramesh Nagar (23), New Bhagat Nagar (23), Krishana Nagar (22), Bhagat Nagar (24)

regional background of the slum inhabitants in a particular cluster or colony.

The spatial pattern and concentration of the slum clusters have been analyzed with the help of Nearest Neighbour Analysis (NNA). The value of r is .18, which indicates that the distribution of slums in the study area is highly clustered or agglomerated.

Reason for Living in the Slum Areas

It is found that 85.56 percent slum dwellers live in the slum areas due to economic factors, 10.93 percent respondents due to proximity to place of work and 2.60 percent due to social factors. Figure 2 reveals that 62.5 percent respondents in the income group Rs.2000 to Rs. 2499 per month live in slum areas due to job opportunity whereas this proportion is 14.27 percent in the higher income group. More than half of the high-income group people assigned low land value as reason for living in slums. Only 1.38 percent respondents in the low-income group have assigned this reason. It is identified that 64.28 percent slum dwellers among the scheduled castes live in slum areas due to job opportunities whereas 54.43 percent respondents in the general group have expressed such compulsions.

Occupational Pattern

The figure 2 presents the pattern of occupations in the slum areas. About thirty-five percent slum dwellers are working in factories, followed by housewives (12.50 percent) domestic helpers (11.68 percent), shopkeepers (10.82 percent), and rickshaw pullers (7.60 percent), sweepers (3.52 percent), drivers (6.02 percent), hawkers and vendors (5 percent) respectively. Being an industrial city mostly population are engaged in factories as low paid workers. Fig. 2.

Housing and Sanitation

Number of indicators displaying housing and sanitation has been selected such as accommodation facility; material used in house, size of house, number of story, water supply, drainage, toilet, bath room, separate

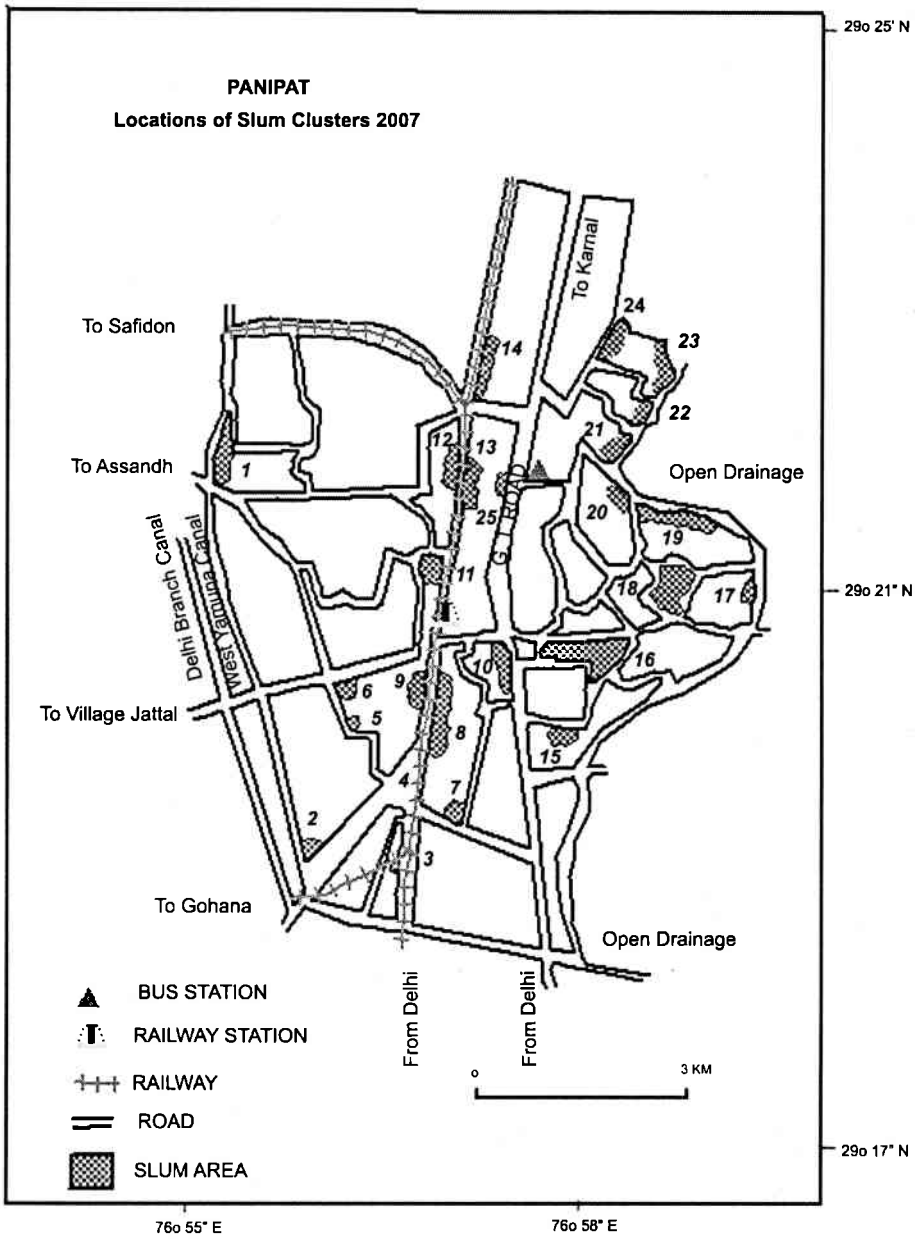


Fig.1: *Location code in parentheses corresponds to the code given in Fig. 1

Table 2: Nearest Neighbour Analysis (NNA)

D_o	D_r	R	S.E	Z	Remarks
.074	.41	.18	.043	-7.81	Cluster distribution

Table 3: Reasons for Living in the Slum Areas

Factors	Job opportunity	Low Land Value	Low Rent Value	Relatives	Business	Nearness to the Place of Work	Others
Income Level							
<1000	65.43	01.38	18.89	03.22	00.00	10.13	00.92
1000-1499	52.13	19,65	7.69	02.56	00.00	17.09	00.85
1500-1999	54.28	37.14	00.00	00.00	08.57	00.00	00.00
2000-2499	62.5	37.5	00.00	00.00	00.00	00.00	00.00
≥2500	14.28	57.14	00.00	00.00	28.57	00.00	00.00
Total	59.37	11.97	13.02	02.60	01.30	10.93	00.78
Social Group							
General Caste	54.43	16.45	12.65	01.26	06.32	06.32	02.53
Backward Caste	58.54	10.36	19.68	00.00	02.59	00.00	00.51
Scheduled Caste	64.28	11.60	01.78	03.57	18.75	00.00	00.00
Total	59.37	11.97	13.02	02.60	01.30	10.93	00.78

Source: Field Survey, (2007)

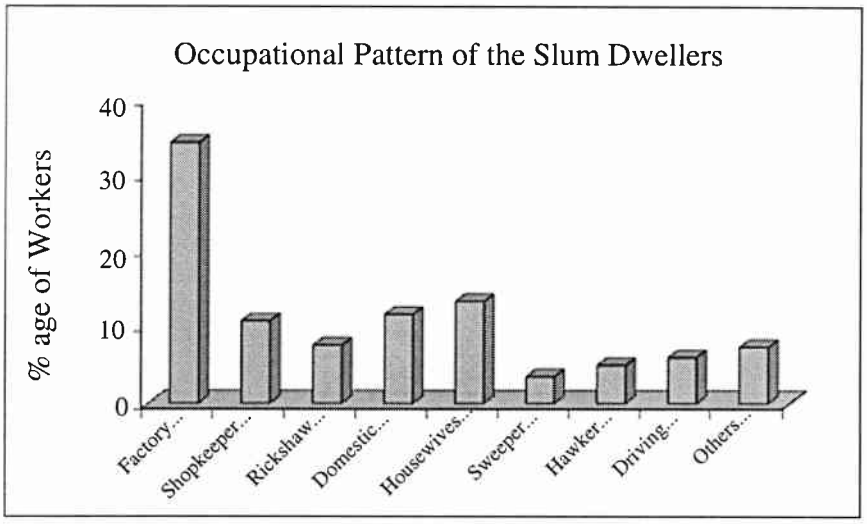


Fig. 2

kitchen, street light in slum clusters and the like.

Accommodation Facility

Figure 3 reveals that 71.88 percent slum dwellers have their own house and remaining 28.12 percent live in rented accommodation. Proportion of households with own house increased with income and social status. All the households with over Rs.1500 per month

Table 4: Condition of the Houses Source: Field Survey, 2007

Factors/ Income Level	Kutcha (%)	Semi-Pucca (%)	Pucca (%)
<1000	63.27	34.42	02.30
1000-1499	54.70	28.21	17.09
1500-1999	42.86	45.71	11.43
2000-2499	12.50	25.00	62.50
2500 & Above	00.00	14.29	85.71
Total	**52.23**	**37.34**	**10.42**

Source: Field Survey, (2007)

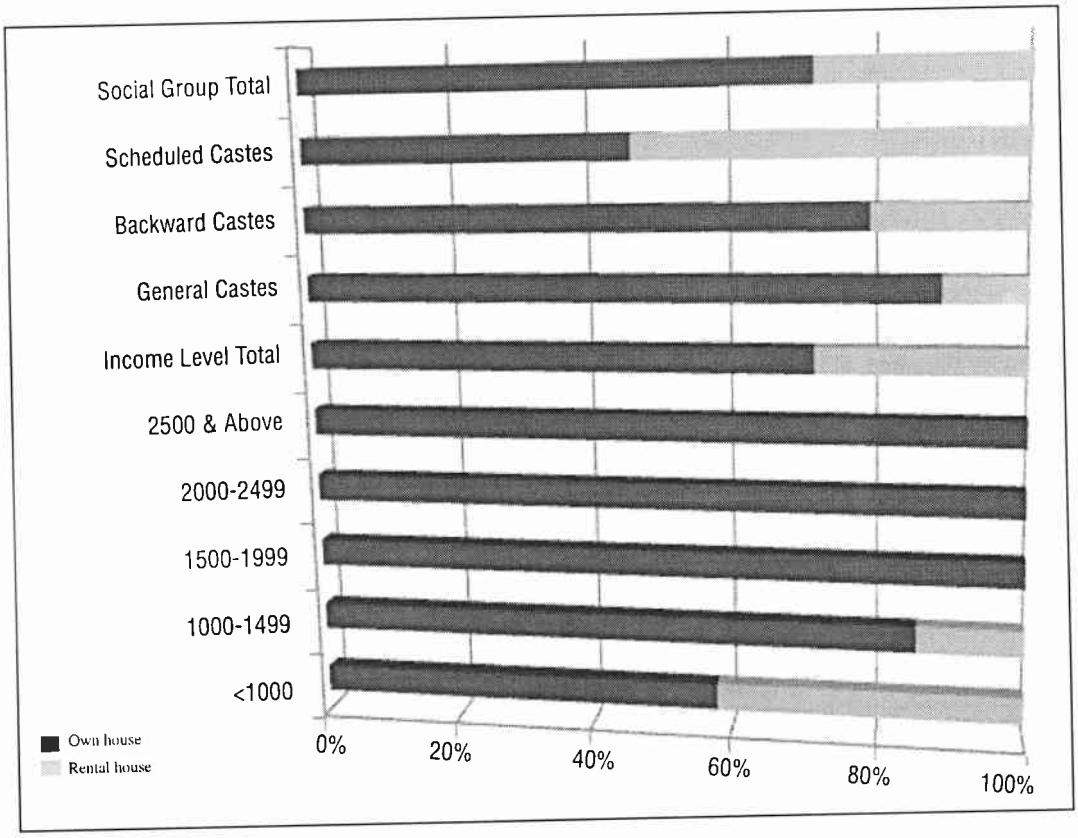


Fig. 3: Accomodation Status

income owned house. It is found that nearly 42 percent slum dwellers live on rent whose average family income is below Rs 1500 per month. It is the same pattern in the case of social status, 52.68 percent scheduled castes live on rented accommodation. Only 11.39 percent population of high status people live in rented accommodation.

Condition of House

The table 4 shows that overall, 52.23 percent slum dwellers have *kutcha* house, 37.34 percent have semi-*pucca* and remaining

10.42% live in *pucca* house. Quality of house varies greatly by level of income and social group. It is found that 63.27% slum dwellers have *kutcha* house, whose income is below Rs. 1000 per month. The slum dwellers whose average income are Rs. 2500 and above per month, largely live in *pucca* houses (85.71%) and semi-*pucca* house (14.29%). Quality of house by social group has display similar pattern. Great majority of scheduled castes people (84.42%) have *kutcha* house. This proportion declines to 40.63 percent among people of general caste group. Income is positively associated with *pacca* houses.

Surprisingly, only 2.08 percent slum habitants have taken housing loan. Mostly respondents have borrowed the housing loan at the rate of 9 percent to10 percent. It is revealed that maximum housing loan is taken by the general (5.06%) and backward (1.55%) social group slum dwellers. Only 0.85 percent respondents have taken the loan among the scheduled castes. It is found that only a small proportion of the slum dwellers (2.08%) have taken the housing loan because about one third of the respondents have no permanent address, no bank accounts thus do not fulfils the requirements of banks Secondly, they are not much aware about this facility.

Size of the House

There is no doubt that housing is the most essential part for every human being after bread (*Roti*) and cloth (*Kapda*).The table 5 reveals that there are 46.23 percent slum dwellers whose size of the house is below 50 sq. metres and 48.30% have 50 sq. metres to 79 sq. metres area. Only 0.52% people have more than 100sq. metres size of house. Size of houses increases with income level of family. It is found that 60.09 percent slum inhabitants in income group of less than Rs. 1000 has size of house below 50 sq. metres. About two third households in Rs.1500 to Rs.1999 category lived in 50 to 79 sq. metres house. Large size houses of

Table 5: Size of the House by Income Level and Social Group

	Size in sq. Metres			
	<50	**50 - 79**	**80-100**	**≥100**
Income Level				
<1000	60.09	39.90	00.00	00.00
1000-1499	38.46	61.54	00.00	00.00
1500-1999	05.71	65.71	28.57	00.00
2000-2499	00.00	50.00	50.00	00.00
2500 & Above	00.00	00.00	71.43	28.57
Total	**46.23**	**48.31**	**4.94**	**00.52**
Social Group				
General Castes	00.00	82.28	15.19	02.53
Backward Castes	44.85	51.55	03.61	00.00
Scheduled Castes	81.25	18.75	00.00	00.00
Total	**46.23**	**48.31**	**04.94**	**00.52**

Source: Field Survey, (2007)

Table 6: Number of Rooms by Income Level and Social Group

Factors/ Income Level	1	2	3	4 and Above
<1000	36.41	52.53	11.06	00.00
1000-1499	10.26	78.63	11.11	00.00
1500-1999	00.00	60.00	40.00	00.00
2000-2499	00.00	62.50	12.50	25.00
2500 & Above	00.00	85.71	14.29	00.00
Total	**23.70**	**61.98**	**13.80**	**00.52**
Social Group				
General Castes	03.80	69.62	24.05	02.53
Backward Castes	28.50	55.44	16.06	00.00
Scheduled Castes	29.46	67.86	02.68	00.00
Total	**23.70**	**61.98**	**13.80**	**00.52**

Source: Field Survey, (2007)

more than 80 sq. metres are more in higher income group, particularly in Rs 2500 and above income category. About 80 percent (81.25%) slum dwellers among scheduled castes has small size houses of less than 50 sq. metres. None of the general caste group has small size house. Instead, more than 80 percent (82.28 %) have 50-79 sq. metres area. Large size houses of more than 80 or 100 sq. metres area are the characteristics of general caste group only.

Source: Field Survey, 2007

Number of Rooms and Floor

Number of rooms is one of the indicators to find out whether the area under study is confronted with the problem of congestion or not. The average room density is 3.37 persons per room. Only about a quarter (23.70 percent) of slum inhabitants have one room tenement. On the other hand, 61.9 percent slum dwellers have two rooms. Four rooms dwellings are almost non existent. More than one-third of the slum dwellers (36.41%) with income of less than Rs.1000 have only one room tenement. Comparatively, only 10.26 percent slum inhabitants have one room in the income bracket of Rs.1000–Rs.1495 per month. All the slum dwellers with income of more than Rs 1500 have at least two rooms tenement. Thirty percent scheduled castes households live in one room tenement whereas it is only 3.80 percent in case of general caste group. None of the slum dwellers of backward and scheduled caste group have more than four rooms dwelling.

Great majority (85.16 percent) of slums dwellers have singe storey building and only 13.02 percent constitutes double storey houses. It is observed that most of the scheduled castes (95.85%) have single storey building. Comparatively, 65.82 percent people of general caste group come under the category of single storey building and further 6.32 percent have two storey dwelling. Expectedly, very low proportion (0.89 %) of the scheduled castes has large size houses with more than three rooms.

Table 7: Sources of Drinking Water

Factors	Tap (%)		Hand Pump (%)	
	WP	OP	WP	OP
Income Level				
<1000	83.87	16.12	00.00	00.00
1000-1499	84.61	13.67	00.00	01.70
1500-1999	88.57	08.57	00.00	02.85
2000-2499	100.00	00.00	00.00	00.00
2500 & Above	100.00	00.00	00.00	00.00
Total	**85.15**	**14.06**	**00.00**	**00.78**
Social Group				
General Castes	92.40	06.32	00.00	01.26
Backward Castes	86.01	12.95	00.00	01.03
Scheduled Castes	78.57	21.42	00.00	00.00
Total	**85.16**	**14.06**	**00.00**	**00.78**

(WP= Within Premises; OP=Outside Premises) Source: Primary Survey, 2007

Sources of Drinking Water

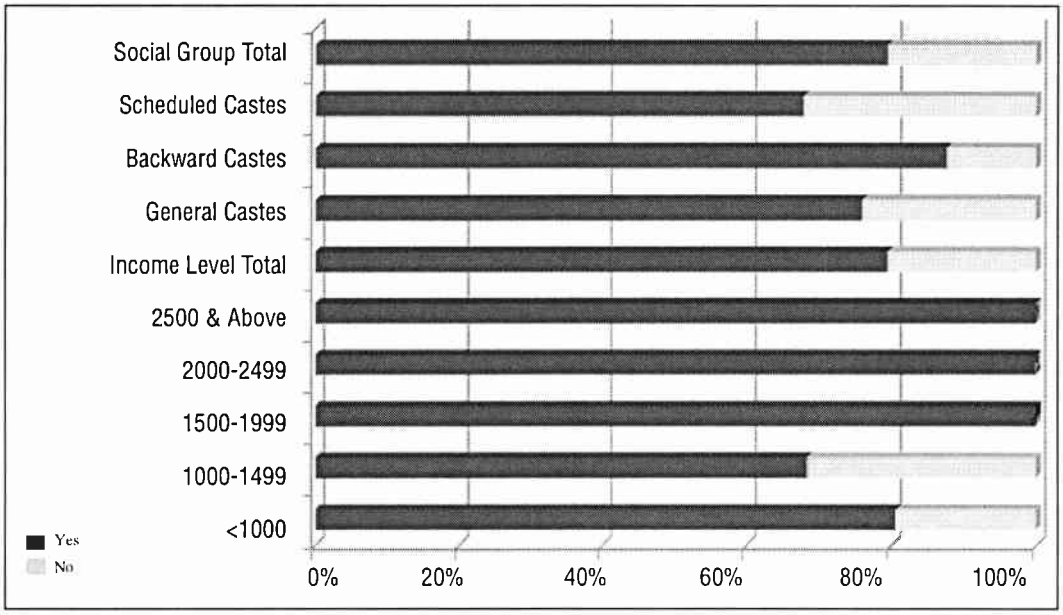
It is evident from the table 8 that great majority of the slum dwellers (99.21%) depend on tap for drinking water and remaining 0.78 percent depend on hand pump. There are 85.15 percent respondents who depend on tap for drinking water within premises whereas 14.16 percent people have to fetch drinking water from outside premises. It is observed that 83.87 percent slum dwellers with income below Rs.1000 income category depend on tap facility for drinking water within premises whereas all the slum dwellers those belong to Rs.2000 and more income group depend on tap sources for drinking water within premises. Proportion of household with tap water facility within premises increased with income.

It is observed that 78.57 percent slum dwellers of scheduled caste group depend on tap for the availability of drinking water within premises whereas great majority of slum dwellers (92.40%) of general caste group depend on tap for drinking water. A small proportion of 1.26 percent of them have hand pump within premises.

Duration of Water Supply

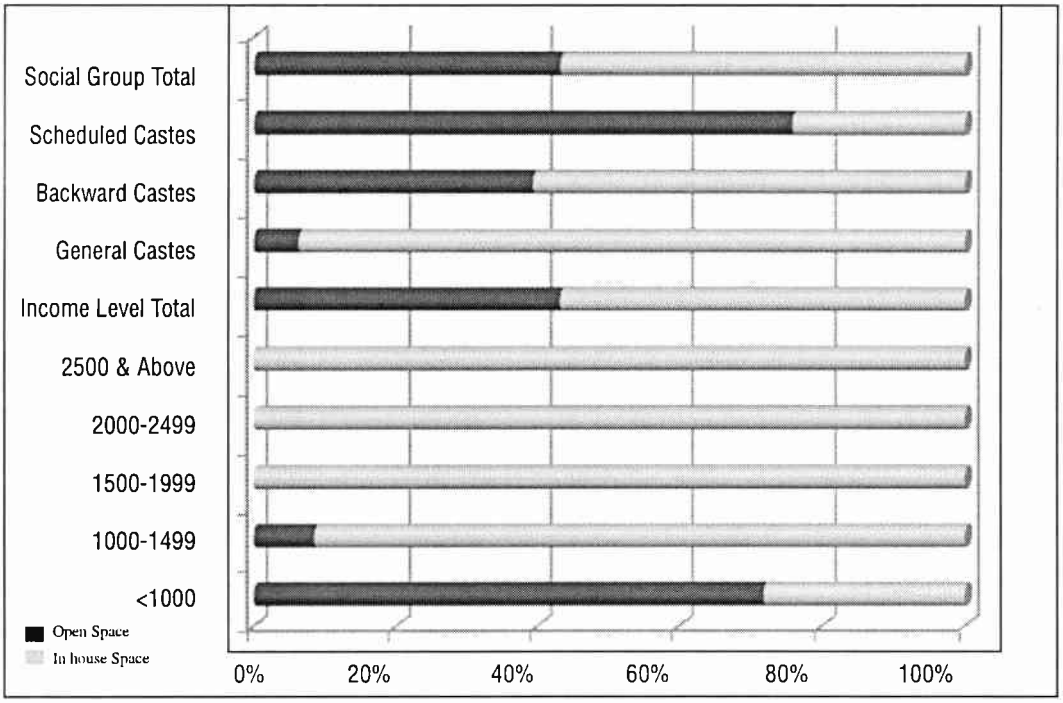
Water is supplied two hours each in the morning and evening. Three- fourth (76.82 percent) slum dwellers were satisfied by the tap water supply. About 11 percent people were partly satisfied and 20.31 percent feels that water supply was not satisfactory. It is found that three-fourth of slum inhabitants of low income category feels satisfied with water supply whereas all the slum dwellers of high income group gave satisfactory response for water supply. It is revealed that great majority (91.13 %) of the slum dwellers of general caste group gave the satisfactory response for water supply which is only 63.39 percent among the scheduled castes.

Fig 4: Separate Bathroom by Income Level and Social Group



Source: Field Survey, 2007

Fig 5: Toilet Facility by Income Level and Social Group



Source: Field Survey, 2007

Fetching the Water

Great majority of the female population (88.54%) fetch the water from outside sources. None of male involve in this kind of work exclusively. However, 11.45 percent of the respondents say that both male and female share this responsibility. Proportion of male contribution declined with increase in the average income.More than ninety percent females of general and backward caste groups fetch the water. Male contribution is abysmally low that too where both the sex share the responsibility. Comparatively, among scheduled castes male involvement is better. There are 20.53 percent respondents of both the sexes share this responsibility.

Separate Bathroom

The table 8 shows that out of 384 respondents, 79.42 percent have the facility of separate bathroom. All the respondents whose average income is more Rs.2000 have separate bathroom. It is 80.64 percent in low-income group. It is revealed that 87.56 percent respondents of backward and 75 percent of the general caste group have the facility of separate bathroom. About two third of the scheduled castes respondents have access to such facility and thirty percent of them are devoid of it.

Toilet Facility

The table 10 reveals that there are no community toilets in the study area. It is found that 56.77 percent respondents have the facility of separate toilets within houses and 43.23 percent respondents prefer to go to open space for toilet in all the categories. The toilet facility is compared by the average income of the family and found that 71.89 percent respondents with income of less than Rs.1000 per month, preferred to go to open space for toilet whereas all the respondents having average income of Rs.2000 per month and above have the separate toilets within their houses.

Table 11 Garbage Disposal by Income Level and Social Group

	In front of Hut (%)	Near By Open Area (%)	Municipal Dustbin (%)
Income Level			
<1000	02.30	94.93	02.76
1000-1499	00.85	89.74	09.40
1500-1999	00.00	88.57	11.43
2000-2499	00.00	100.00	00.00
2500 & Above	00.00	100.00	00.00
Total	**01.56**	**92.97**	**05.47**
Social Group			
General Castes	00.00	88.61	11.39
Backward Castes	01.55	93.26	05.18
Scheduled Castes	02.68	95.54	01.79
Total	**01.56**	**92.97**	**05.47**

Sources: Field survey, 2007.

Three fourth (75.89 percent) respondents among the scheduled castes do not have access to toilet facility within premises and use nearby open space for toilets. On the other hand, 93.67 percent respondents among the general and 60.62 percent of backward households have the facility of separate toilets within their houses. Recently, Haryana government has launched *nirmal* village (village in which all the houses have toilet facility and village is free from open defecation) programme. It is highly successful and is increasingly spearheaded by the local women.

Separate Kitchen

Less than half (44.01 percent) of the respondents have separate kitchen in the study area. It is found that 88.47 percent respondents don't have separate kitchen in low-income group. Comparatively, all the respondents of higher income group of more than Rs.2000 category have this facility. The facility of separate kitchen is analyzed by social group also and it is revealed that three fourth of scheduled castes households don't have separate kitchen. On the other hand, 75.94 percent slum dwellers among the general and 40.93 percent of backward group households have separate kitchen.

Modes of Cooking

The use of woods for cooking purpose in the study area is the most widespread fuel apart from kerosene stove, traditional *Chullahas* and liquefied petroleum gas cylinders (LPG).It is revealed that 38.87 percent respondents use the woods as a fuel for cooking, followed by traditional *Chullahas* (31.35%) and LPG (25.39%). It is found that most of the respondents use woods and traditional *chullahas* with average income less than Rs.2000 per month whereas, all the respondents in the higher income group use only LPG as a fuel for cooking.

It is observed that 37.85 percent respondents among the general caste group use LPG as a fuel whereas most

Table 12: Drainage Facility by Income Level and Social Group

Factors/ Income	Yes (%)	Open Drainage	Closed Drainage	No (%)
<1000	79.26	72.09	27.90	20.73
1000-1499	78.63	79.34	20.65	21.36
1500-1999	74.28	50.00	50.00	25.71
2000-2499	100.00	75.00	25.00	00.00
2500 & Above	100.00	85.71	14.28	00.00
Total	79.42	72.78	27.21	20.57
Social Group				
General Castes	76.47	47.69	52.30	23.52
Backward Castes	85.56	84.37	15.62	14.43
Scheduled Castes	71.42	70.00	30.00	28.57
Total	79.42	72.78	27.21	20.57

Source: Field Survey, (2007)

Table 13: Composite Index of Housing and Sanitation

Category	Name of Slum Cluster
Low (<1.00)	Saini Colony, Rajiv Colony, New Bhagat Nager, Bhagat Nager, New Ramesh Nagar, Prakash Colony, Kaptan Nagar, Ravi Das Basti, Gandhi Colony, Idgah Colony,Kabir Panthi Colony, Mahabir Colony, Rajput Colony, Krishan Nagar, Sanjay Colony, 8Marla Jattal Road, Shakti Nager and Dhank Basti.
Medium (1.00 to2.00)	Chawala Colony, Maiji Colony, Deha Basti, Ghaus Ali Basti, Balmiki Basti, Shastri Colony, Imam Sahib Colony, Khatik Basti, Jag Jiwan Ram Colony, Gandhi Colony, Raj Nagar and Gautam Nagar
High (□ 2.00)	Azad Nagar, Gurunanak Pura, Chandni Bag, Krishan Nagar, Uttam Nagar and Vijay Nagar

Source: Field survey, 2007

of the backward and scheduled castes use woods and traditional *Chullahas* as a fuel for cooking purposes. In the low income group the use of woods for cooking purpose is the most widespread fuel because small-uneducated children collect the dry branches of trees from public parks, along the roadside trees and waste material from the factories without any cost. High cost of LPG cylinder deters its use by low social and income group.

Modes of Light and Access to Street Light

The main source of light is the electric connection. It is examined that 93.75 percent respondents have electric connections either illegal connections or metered connections, 4.43 percent still use the kerosene lamps and a small proportion of respondents (1.82%) use candle. All the respondents in high income and general social group have electricity connections. However, this facility is enjoyed by more than 85 percent of low income and scheduled castes group.

It is reveals that 24.22 percent slum dwellers have street light in their slums colonies. Higher income and general caste group colonies have relatively better access to street light. According to Municipal Committee, Panipat (MCP) 681 street lights exist in the colonies excluding Saini Colony, Chawala Colony, New Ramesh Nagar, Ravi Dass Basti, Kabir Panthi Colony, Rajput Colony and Danak Basti.

Garbage Disposal

The table 11 depicts great majority of the slum dwellers (92.97 percent) dispose their household garbage in nearby open area in all the categories. It is found that only 5.47 percent respondents dispose their garbage in municipal dustbin and only 1.56 percent respondent dispose their garbage in front of their hut. The garbage disposal by social group revealed that 11.39 percent respondents among the general caste group dispose their household garbage in the municipal dustbin whereas only 1.79 percent among the scheduled castes does so. Garbage disposal in the study area is extremely

inefficient. The slum dwellers in most of the slum clusters express their indignation at the irregular manner in which the dustbin get cleaned or maintained. Mostly slums do not have this facility. Disposal of garbage is a major problem in the slums.

Road facility

The analysis reveals that out of 384 households, 29 percent respondents have cement blocks flooring road and further, 17 percent cemented road, 35 percent bricks road and 19 percent respondents have unmetalled road inside the slums. The roads, which are made of asphalt, stones and bricks have large dug, which is filled with rainwater or by broken sewerage. Thus, the analysis reveals that the conditions of roads in the slum areas are highly unsatisfactory.

Drainage Facility

The table 12 shows that 79.42 percent respondents have drainage facility. Among them 72.78 percent have the open drainage and 27.21 percent have closed drainage.

It is found that 78.09 percent of the slum dwellers of lower income have the open drainage whereas 85.71 percent slum dwellers of higher income group have this facility. The drainage system is also examined by the social group of the slum dwellers and similar pattern is observed in all the categories. To sum up, the drainage network does not follow a fixed pattern as it has evolved a distinctive character. Mostly drains are opened. They emanate bad odour and are choked with plastic packets and begs, which are threatening the environmental quality in the study area.

Composite Index

Each facility has been assigned weightage using the formula given by L.S. Bhat (1976) It may be expressed as:

$$W = \frac{N}{F}$$

Where, W = Weightage of each facility.

N= Total number of slum areas.

F= Total number of slum areas having that particular facility.

After giving weightage to each facility, the composite Index (C.I.) was obtained using the following formula given by Vij (1996). It may be expressed as:

Total score of the village

C.I= Total number of elements

Based on the C.I., the slums have been divided into three classes of low, medium and high level of access to facilities.

The table 13 reveals that more than half of the slum colonies come under the category of low development (<1.00 composite index). These are largely occupied by the scheduled castes and Muslims. Slum clusters occupied by the general caste and relatively high income group are better developed. However, infrastructural development is not sufficient in majority of slum clusters and need urgent upgradation by the civic authority.

Conclusion

Slums have developed at disadvantageous locations such as in low lying areas and in proximity to sources of pollution in clusters formation. It is evident from the study that majority of the slum dwellers lack basic

infrastructure and household amenities. Availability of basic amenities such as water supply, electricity and education are relatively satisfactory but health, sewerage and sanitation are highly unsatisfactory. Access to facilities increase with household income. Likewise, general caste group has better access to such facilities followed by backward castes. Scheduled castes and the Muslim dominated areas have low accessibility to basic facilities. These include Ravi Das Basti, Gandhi Colony, Idgah Colony, Kabir Panthi Colony and Dhank Basti.

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