

POPULATION GEOGRAPHY

POPULATION GEOGRAPHY : ISSN-0256-5331

Volume 39

Number 1 & 2

June-December 2017

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INTENSITY OF USE OF LAND IN URBAN AREAS

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Abstract

The present study is an attempt to analyse (a) the proportion of area occupied by urban settlements in India and across different states and union territories between 1991 and 2011, (b) trend in urban population growth *vis-à-vis* growth in urban area in India during the same period, (c) some correlates of urban population density in the context of state level data, and (d) intra-city variations in population densities of National Capital Territory of Delhi (2001) as a case study. The basic argument is that although India is a land starved country (with relatively high population density at the global level, and a growing population), the impending urban growth is unlikely to put much pressure on land resources and, by extension, on food security. This argument is based on the fact that urban population densities in many Indian cities are still low compared to international benchmarks, as much as the assumption that land productivity in agriculture will increase in India.

Introduction

In India, density of population is one of the indicators used for a human settlement to qualify as an urban entity as defined by the Census of India. Scanning available literature on urban population densities leads us to the conclusion that variation in population density within a city has attracted a lot more attention as compared to intercity comparisons. This is largely because of town planning interests in Floor Space Ratio (FSR) and land values. More recently there is also an emerging debate about the size of urban growth and its impact on agricultural land and food security. In this context, this paper is an attempt to analyse (a) the proportion of area occupied by urban settlements in India and across different states and union territories between 1991 and 2011, (b) trend in urban population growth *vis-à-vis* growth in urban area in India during the same period, (c) some correlates of urban population density in the context of state level data, and (d) intra-city variations in population densities of National Capital Territory of Delhi (2001) as a case

study. The basic argument is that although India is a land starved country (with relatively high population density at the global level, and a growing population), the impending urban growth is unlikely to put much pressure on land resources and, by extension, on food security. This argument is based on the fact that urban population densities in many Indian cities are still low compared to international benchmarks, as much as the assumption that land productivity in agriculture will increase in India.

Urban Population Density as an Indicator of Land Use Intensity

Land use in urban areas is usually classified into the following categories of uses: residential, industrial, commercial, transport, and open spaces (such as parks, stadia and water bodies). Of these, the use of land for residential purposes occupies the largest proportion of urban land—somewhere between 40 to 50 per cent. However, the

distribution of land between the above uses is a function of city size, historicity, and city function (such as industrial, administrative and commercial). The intensity of use of urban land for residential purposes can be measured in terms of gross population density of the city, that is, population of the city upon area of the city—the city boundary defined as in municipality, municipal corporation, *nagar palika*, etc., and the population contained in it. Another variant of this could be residential density, that is, population of the city upon residential area. The intensity of use of residential land as well as commercial land is also influenced by land values—an expected positive relationship—the higher the land value, the higher the intensity of use of land. High income residents do occupy more land per capita, therefore such areas have lower population densities.

In fact, among the attributes used to classify a human settlement as urban is the population density (a minimum of 400 per sq km) as per Census of India. As city population grows, it accommodates the additional population either through urban sprawl (physical expansion by eating into land in surrounding rural areas), or through vertical expansion (a higher floor space area), or both.

The Extent of Urban Area

Of the total area of the country, urban India occupied about 2 per cent in 1991, which increased

to 3.19 per cent by 2011 (Table 1). The areal expansion of urban area was much slower during 1991–2001 as compared to 2001–2011. The entire areal expansion in urban area is not only through horizontal sprawl of existing cities, but also includes areas occupied by new towns added during the inter-census period. For example, in 1991 the urban area spanned 4,615 towns whereas in 2001 there were 5,161 towns. This number increased to 7,935 in 2011.

While the decennial urban population growth remained more or less the same during 1991–2001 and 2001–2011 (31.5 and 31.8 per cent respectively), urban area during the corresponding decades grew at 20.86 and 30.9 per cent with a substantial jump in the growth of urban area between 2001 and 2011.

The growth in urban area and population between 2001 and 2011 was not uniform across states. Some, such as Andhra Pradesh, Haryana, Gujarat, Kerala, West Bengal and Chhattisgarh among larger states, had increased their urban area substantially as compared to the growth of urban population. Among the smaller states, Delhi and Tripura also increased their urban area—much more than the growth in urban population (Table 2). Urbanisation through infilling appears to have taken place in hill states like Uttaranchal and Himachal Pradesh as well as in larger states like Tamil Nadu, Uttar Pradesh, Karnataka and Madhya Pradesh and among smaller states like Manipur and Mizoram.

Table-1

India: Number of Towns, Area under Rural and Urban Settlements* (1991–2011)

	2011	2001	1991
Urban Area (sq kms)	102220.6	78091.61	64613
Rural Area (sq kms)	3101505.41	3118309.39	3101801
Per cent Urban to Total Area	3.19	2.44	2.04
Number of Towns	7935	5161	4615

*Urban area includes area under Urban Local Bodies (ULBs) and rural area includes abadi land and agricultural land.

Source: Primary Census Abstract, Census of India 1991, 2001 and 2011.

Table-2
India: Interstate Variation in Urban Area and Urban Population (2001–2011)

States	%Urban area/Total area (2011)	% Urban area/Total area (2001)	%Urban area growth (2001–11)	% Urban Population Growth (2001–11)
INDIA	3.191	2.44	30.90	31.80
J&K	0.561	0.43	31.13	36.42
Himachal Pradesh	0.486	0.43	12.04	15.61
Punjab	4.993	4.13	20.98	25.86
Chandigarh	96.079	69.60	38.05	26.96
Uttaranchal	1.686	1.49	13.20	39.94
Haryana	4.470	2.90	54.34	44.59
Delhi	81.959	62.35	60.38	26.83
Rajasthan	1.938	1.59	22.13	29.01
Uttar Pradesh	3.139	2.72	15.31	28.82
Bihar	2.469	1.92	28.82	35.43
Sikkim*				156.52
Arunachal Pradesh*				39.27
Nagaland	1.415	0.89	59.25	66.76
Manipur	0.804	0.64	24.74	44.83
Mizoram	2.784	2.78	0.01	29.65
Tripura	3.737	1.33	181.12	76.17
Meghalaya	1.246	0.10	23.15	31.12
Assam	1.606	1.23	31.00	27.89
West Bengal	5.768	3.75	53.98	29.72
Jharkhand	2.821	2.25	25.47	32.36
Orissa	2.278	1.79	27.11	26.94
Chhattisgarh	2.501	1.38	81.25	41.84
Madhya Pradesh	2.513	2.26	11.27	25.69
Gujarat	3.773	0.27	41.63	36.00
Daman & Diu	49.207	21.66	125.14	218.84
Dadra & Nagar Haveli	9.308	3.50	166.16	218.24
Maharashtra	2.952	2.39	23.50	23.64
Andhra Pradesh	2.760	1.67	59.77	35.61
Karnataka	3.132	2.69	16.26	31.54
Goa	21.579	13.82	56.13	35.23
Lakshadweep	73.167	33.09	107.27	86.64
Kerala	19.558	8.37	133.68	92.76
Tamil Nadu	10.481	9.63	8.84	27.05
Pondicherry	31.543	27.85	15.85	31.47
Andaman & Nicobar Islands	0.460	0.32	43.96	23.49

Source: Computed on the Basis of Primary Census Abstract, Census of India Census of India, 2001 and 2011.

* Area data are not available.

Gross Population Density by Size Class of Cities and Towns

Most of the smaller towns have a shorter history, with land values much lower compared to big cities (although the gaps in land values are reducing in many of the small resort towns) as well as low land use intensity. Table 3 shows that the intensity of land use increases with city size. In other words, urban land is more intensely used in large cities. Population density is defined here as aggregate city population of each size class of town divided by the total urban area of towns in that size class.

The general trend of increasing intensity of urban land use can be noted in almost all states (Table 4), barring minor discrepancies in the trend in some of the smaller states where the number of towns in some of the size classes are too few, thus affecting the mean value of the population density.

Interstate variation in gross urban population density is much smaller among large cities than among smaller ones, as brought out by the coefficient of variation (Table 5). The larger variation in smaller towns is mainly because many of these towns are new towns (reclassified from villages to towns) and their densities depend upon the municipal boundaries.

Intra-city Variations in Population Densities

While population and human settlements are classified as urban and rural, a high degree of heterogeneity and wide disparities within the urban population in a city is a basic feature. City plans in India, as in many other countries, are essentially land use plans—earmarking areas for residential, commercial, industrial, institutional, recreational and transportation land use. Residential land use is the anchoring feature that occupies the largest proportion of a city's land, and residents and their living conditions are the focus of city plans. Residential layouts planned by the Development Authorities attempt to accommodate disparities among the city population in planned residential areas by earmarking residential land for four categories: high income, middle income, low income and economically weaker sections. Obviously, residential densities increase with decreasing income level with highest densities among the economically weaker sections and the lowest in the case of the high income group. However, slums which do not come under the ambit of urban plans, in many instances, are low rise, low density with dwelling units as small as 150 sq ft.

Table-3
India: Gross Population Density by Size Class of Towns (2001)

City Size Class	Population Density (per sq km)
<10,000	1127
10,000 – 20,000	1462
20,000 – 50,000	2100
50,000 – 100,000	3294
100,000 – 500,000	5300
500,000 – 1 Million	5929
1 Million +	20713

Source: Census of India 2001. Data pertaining to 2011 was not available for all towns.

Table-4
India: Town Population Density (per sq km) by Size Class of Towns and States (2001)

	<10,000	10,000-20,000	20,000-50,000	50,000-1 Lakh	1 Lakh-5Lakh	5 Lakh-1 Million	Million +
Haryana	1596	3205	3413	3935	6462	-	5312
Himachal Pradesh	1533	2248	3659	-	5001	-	-
Jammu & Kashmir	1047	2275	1798	2235	3902	-	-
Punjab	1508	2207	2548	3435	6168	-	-
Uttaranchal	979	2073	1956	6549	9411	-	-
Chhattisgarh	958	1264	1829	2137	2970	6166	-
Madhya Pradesh	635	1059	4059	4059	3396	5909	6460
Uttar Pradesh	1603	2597	3952	6098	8490	7861	8777
Goa	783	1092	1827	2507	-	-	-
Gujarat	996	1054	1393	2900	5661	5689	11434
Maharashtra	1245	1599	2287	3873	7446	6080	11038
Rajasthan	1355	1182	1602	2363	3287	4456	4792
Andhra Pradesh	696	1322	2215	3279	4883	9856	13098
Kerala	1293	1710	1829	2269	3300	3300	-
Karnataka	1438	1563	1960	3140	3726	4755	19012
Tamil Nadu	767	1046	1829	2437	6576	8359	24969
Bihar	2703	2340	2504	4507	8479	-	3220
Jharkhand	1944	1780	2766	4171	3567	6159	-
Orissa	1548	1063	1353	1930	2851	4013	-
West Bengal	3150	3237	3607	5214	7086	-	23572
Assam	2109	3445	4696	6929	5405	3767	-
Arunachal	1467	2011	2173	-	-	-	-
Manipur	2271	3106	6794	-	5598	-	-
Meghalaya	982	1137	1506	3223	12825	-	-
Mizoram	276	556	767	-	1769	-	-
Nagaland	-	2016	1603	3609	-	-	-
Tripura	1177	3088	4379	-	11867	-	-
ALL	1127	1462	2100	3294	5300	5929	20713

Source: Primary Census Abstract, Census of India 2001.

Table-5
India: Coefficients of Variation in Gross Population Densities by Size Class of Towns (2001)

Size Class of Towns	Coefficients of Variation in Gross Population Densities
< 10,000	2.34
10,000 - 20,000	2.19
20,000 - 50,000	0.50
50,000 - 100,000	0.37
100,000 - 500,000	0.47
500,000 - 1,000,000	0.31
>1,000,000	0.51

Source: Computed on the basis of Data from Primary Census Abstract, Census of India, 2001.

The increasing demand for residential space in cities is accommodated by increasing densities—vertical growth or urban sprawl—eating into the agricultural land in the peripheral villages. Vertical growth in already established urban areas places stress on the system of services that were planned for lower densities. Increasing capacities is expensive, and the costs of such capacity expansion are borne by the government, while the profits accruing from increased density go to the property owners. Outward city sprawl is often a combination of leapfrogging and infilling processes and result in eating into usually irrigated agricultural lands that are often highly productive.

“Building regulations vary considerably across cities, and often widely within the same city. Apart from ensuring that your neighbour will have adequate light and ventilation, and that there is a sufficient gap between buildings to ensure that fire cannot spread from one building to the next, building regulations also generally make sure that the number of residents in a locality is not in excess of the capacity of that locality's infrastructure. Water and sewage lines must be adequate to sustain the expected load; and street widths sufficient to support travel demands of the local population. The minimum building setback lines from plot boundaries are usually specified (to manage light and ventilation and the fire hazard), as well as building heights (to limit the volume of construction on a plot), with the indirect objective of thus limiting the number of occupants to what the locality's infrastructure can bear” (Patel, 2013).

“Density also depends on how much public ground area per person is available on roads, footpaths, schools, hospitals, police stations etc. In India, this should take into account the needs of small traders and hawkers. In Manhattan, public ground area per person is an average of 24.6 sq m. In Mumbai, it is around 6.5 sq m per person. If one accepts 20 sq m per person as the norm then density will depend on how much built up area per person is provided. If we consider 6 sq m per person as adequate in one of the most crowded wards of Mumbai then density should be 385 persons per

hectare. With a built up area of 20 sq m per person, the density would be 250 persons per hectare” (Parikh, 2015).

Urban Population Densities in Delhi

In the background of the preceding sections one would expect a dipping density gradient with increasing distance bands from the city core(s). For a variety of reasons, the Delhi scene is more or less a reverse of this. New Delhi came up when the capital was shifted from Calcutta to Delhi. Lutyen's layout for this—symbolised by the Bungalow zone—was planned as a low density sprawling area. This part of Delhi had around 25 persons per hectare in the year 2011. Whereas with the advent of the Delhi Development Authority (late 1950's) and its real estate development activities since the 1970's, many high-rise, high-density areas were planned at the periphery such as Patparganj and Mayur Vihar in East Delhi, Rohini-Pitampura in the north and Dwarka in the South West. Low-rise developments also took place for housing of government officers and employees, and many layouts came up in Kidwai Nagar, Sarojini Nagar, Kaka Nagar, Moti Bagh, Chanakya Puri, most of them with ground + 1 floor buildings.

Despite sharp variation in the intensity of use of residential land recorded in Table 6, varying between 4,000 and 36,000, these values hide many features of the use of residential land in Delhi that come out when specific residential localities are analysed.

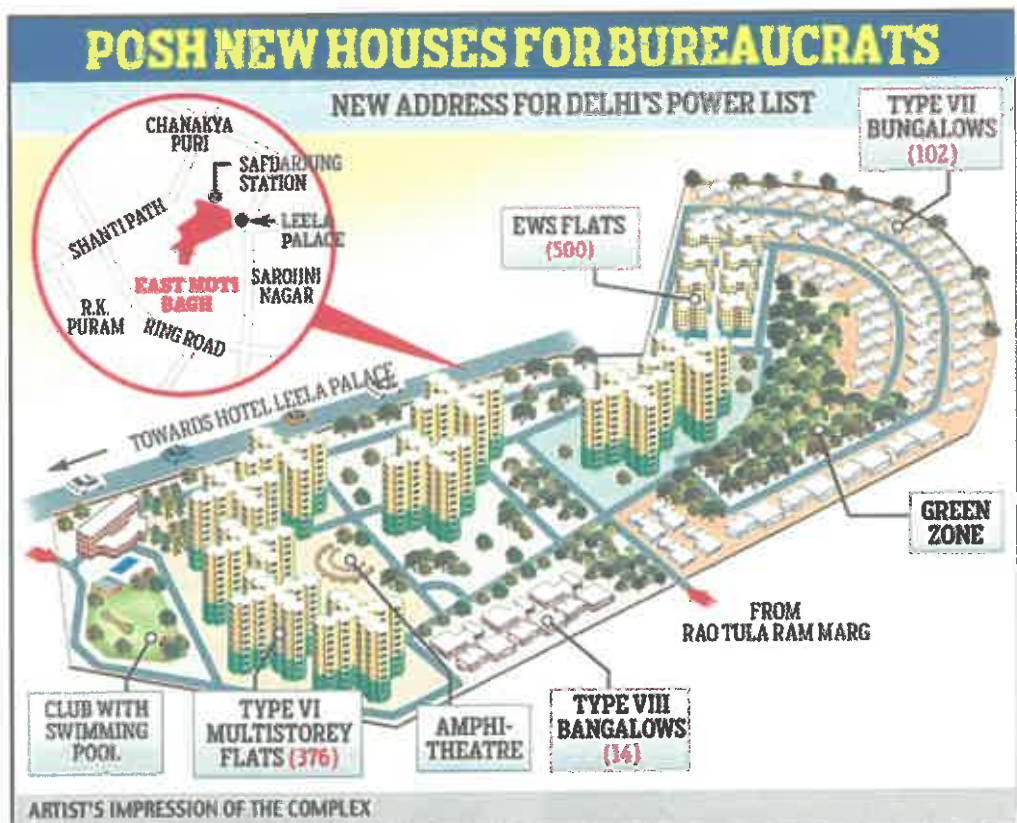
The mind-set of low intensity use of urban land continues even today, despite the huge growth in the population of cities like Delhi. An artist's image of such a development that came up as recently as 2012 and where work is still in progress, is the case of New Moti Bagh (Figure 1). In order to raise resources to develop this complex, a three-acre government lot was auctioned to a private party (See Box 1). Population density in this complex works out to 70 persons per hectare of land.

While reasonable range in population densities associated with income are expected, this

Table-6
Urban Population Densities in NCT Delhi (2011)

District	Urban Area sq Km	Urban Population	Density per sq km.
North West District	443	3442589	8254
North	61	8,70,232	14557
North East	62	2220097	36155
East	63	1705816	27132
New Delhi	35	142004	4057
Central	21	582320	27730
West	130	2536823	19563
South West	421	2149282	5446
South	247	2719736	11060
All Districts	1483	16368899	11320

Source: Census of India, 2001, Primary Census Abstract, Data Highlights, NCT of Delhi.



Source: Babu luxury: <http://www.dailymail.co.uk/indiahome/indianews/article-2145528/> 16 May 2012

Fig. 1 Artist's Impression of the New Moti Bagh Residential Complex

New Moti Bagh is a gated, high security, low density, government-built luxury residential colony made for the exclusive use of senior civil servants, judges, and high-ranking politicians. New Moti Bagh occupies an area of 143 acres, in the exclusive New Delhi Municipal Council (NDMC) area of New Delhi. It is located in South Delhi, near the original Moti Bagh, adjoining Chanakyapuri, one of Delhi's most expensive areas, where land rates vary from 10 lakhs to 12 lakhs a sq yd. "Living in New Moti Bagh" according to a senior Government official is "next best thing to living in a Lutyens bungalow."

To raise funds for construction of New Moti Bagh, a three-acre parcel of land contiguous to the project was sold to the Leela Group, a hotel chain, for Rs 650 crore, or about Rs 216 crores an acre, which works out to about US\$ 35 million an acre at the exchange rate of Rs 62 to a US dollar. At this rate, the total land value of the 143 acre New Moti Bagh town ship, called colony in Delhi, at current market rates, works out to about Rs 31,000 Crores or about 5 billion US Dollars.

Source: https://en.wikipedia.org/wiki/New_Moti_Bagh

Box 1: New Moti Bagh Project

stretches in the case of Delhi, for example, from less than 50 persons per sq km in the Lutyen's Bungalow Zone in central Delhi to over 40,000 per sq km in areas like Paharganj. It is also clear that the per capita costs of providing urban infrastructure (such as sewage lines, water pipes and electrical connections) would decrease with increasing densities. Conversely, environmental conditions (congestion, crowding, etc.) deteriorate with increasing densities beyond a point. Thus, there is a trade-off between urban residential density and per capita infrastructural and environmental costs (Malini, 1988; Cali, 2009). Generally, it is the high-cost, low-density, high-income areas that have better urban services.

Concluding Observations

Despite earmarking residential land in city plans for different economic strata, such planned layouts are grossly inadequate to meet the demand—particularly of the lower middle income groups and the poor. The inadequacy of planned layouts results in the mushrooming of unplanned residential areas, which often account for a larger proportion of residential area than the planned layouts. It is such unplanned areas that accommodate the poor and the lower middle class

urban population. The moot question is: Where would the low income population occupying unplanned areas go, if cities are fully planned devoid of unplanned areas?

Economic and social churning is taking place on a large scale in villages located in the fringe areas of large cities in terms of increasing heterogeneity in the village population, sudden change in lifestyle through enormous cash inflows from the selling of now high-priced agricultural land, and increasing youth unemployment.

The not-so-inclusive urban planning in so far as low income population is concerned is not limited to the housing issue, but extends to the provision of transportation facilities that promote high-speed personalised transport, without any space for slow moving non-motorised vehicles, pedestrians, etc. It has also been shown that even in the provision of open spaces (parks), in Delhi, as in many other urban centres, high density areas record much fewer green spaces than low density areas (Gandhi, 2013).

However, the current approach to urban residential planning that merely carves out areas required for high, middle and low income as well as the economically weaker sections, and leaves out perhaps more than 50 per cent of the people

living in urban areas, must change radically. At present, this unserved segment of the city population occupies unplanned areas—both legitimate and encroached—with very poor basic services. As Patel (2014) notes, “They call for the preparation of an existing land use plan, followed by forecasts of what the situation will be 20 years from now: population growth, migration, job growth and what kind of jobs, incomes and income distribution, travel demand and by what mode of transport. Based on this anticipation of what the future holds, the planner draws up a land use plan showing residential, commercial and industrial areas, open spaces, schools, hospitals and other amenities. The development plan is, thus, essentially a land use plan designed to fit a particular imagined future. It is presumed that this kind of land use regulatory control is all that is needed to make that future happen. Unbelievable as it may seem, it is drawn up without reference to any kind of transportation plan. That is someone else's responsibility.

And naturally, it is no surprise that the anticipated future doesn't happen. Invariably, after repeated cycles of such plans, every country has found that the reality, 20 years down the line, is far from what was anticipated. No wonder, the planners have an impossible task. There are too many parameters outside their control. They have no way of anticipating how the world around them will change - how the economy will develop, what differences new technology will bring, or how larger policy changes will impact development.” The practice of raising floor space index without reference to infrastructure, crowding and pressure on amenities defeats the very purpose of city planning. Patel (2014) further observes, “... another significant flaw is the exclusion of large tracts of land from the purview of the plan. Slums are excluded—3,404 hectares of slum areas form 8.2 per cent of Greater Mumbai's total land area, and 32.9 per cent of its residential area. ...The goals in our development plans should focus on what people want, not what planners want.”

A slightly varying view is that of Parikh (2015), who observes: “To reduce energy used for

transport, it is important to have cities with high density, with cycle paths and public transport. ...Density can be controlled by controlling floor area ratio and number of family units. The use value of a piece of urban land depends on access to facilities, jobs, recreation, education and health institutions. This depends on how the city infrastructure develops and has little to do what the owner of a piece of land does by herself. It is public investment that brings value to the property. This accretion of value when public facilities are provided should be captured by the city government. This can be done by increasing the permissible floor area ratio and auctioning what is additional. This can help generate resources for further development of infrastructure.” However, as pointed out in the previous paragraph, *ad hoc* increase in Floor Space Index has its own negative implications.

“Large Indian cities have high population density. However, FSI in these cities are low compared to many smart cities in the world. This results in low per capita availability of urban space. Strategic densification of cities through higher FSI has numerous advantages: it makes the cities compact and efficient and frees space for accommodating more people as well as for providing urban amenities. Pricing of higher FSI also generates resources for funding urban infrastructure projects. In Manhattan, as well as in other international best practice examples, FSIs vary by location and land use density zones are typically small and are determined by street width and capacity as well as land use patterns. Commercial and office districts typically have higher FSIs than residential districts. FSIs are set in conjunction with the formulation of development and strategic plans. Optimising infrastructure and density is a central element of urban planning” (Planning Commission, 2013). Adequate attention to the trade-off between density and infrastructure in urban sprawl areas and in green field urban development is required as much as in medium-sized towns. This would avoid periodic and often arbitrary increase in FSIs.

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SPATIO-TEMPORAL PATTERN OF CRIME/VIOLENCE AGAINST WOMEN IN HARYANA: 1991 TO 2014

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Abstract

Crime exists in all societies around the world. Women as a separate class are subjected to various kinds of social, economic, physical, mental or psychological violence. The large scale primary surveys, (National Family Health Survey I, II III and IV), conducted over a period of time however reveal that violence against women is on continuous increase. In this context, the present paper attempts to study the spatial pattern and variations in crime against women by selecting Haryana as study area. The analysis is based on secondary data obtained from NCRB. Since the nature of crime is closely related with social, economic, legal and political structure of society, hence this paper also attempts to study the types of crime against women in the state over a period of 24 years i.e. from 1991 to 2014.

Introduction

The terms 'Crime' and 'Violence' are used interchangeably as both these include any sort of physical aggression or cruelty, which is direct or indirect. When this aggression or cruelty is directed specifically against women and in which 'only women are victims' these are characterized as crimes or violence against women. Violence against women is a worldwide phenomenon and not restricted to a specific region or country. It has also been registered across all races, religions, age groups, education and income groups (Carrilo, 1992; Fried, 2003). Globally, 35 percent women are victims of violence during their lifespan; however, there are variations across countries. This proportion is as high as 46 percent in low and middle income countries of Africa and 40 percent in South-East Asia. In case of America, it is 36 percent, while its proportion is 27.2 percent in Europe (WHO, 2013). The position of women in terms of violence and crime is quite vulnerable and India has been listed as the fourth most dangerous country for women in terms of sexual violence,

trafficking, health and economic resources (Thomson Reuters Foundation, 2011).

Women are victims of various kinds of ill treatment, humiliation, torture and exploitation, which start even before birth and remain till the end of life. A girl embryo becomes victim of sex selective abortion and during stages of infancy discrimination towards access to food and medical care is a common disgrace (Heise, et al., 1994; Rajeshwari, 1996; Rajeshwari and Pritika, 2011). Further, during their adolescence period, young girls often face harrasment, trafficking, genital mutilation, child marriage and sexual abuse by family members and strangers (Heise, et al., 1994; Gracia and Herrero, 2006). During reproductive age, this process continues and women are subject to honor killings, acid throwing, rape, intimate partner violence, dowry related violence etc. While, some of these violations are considered as less violent in nature such as wolf whistling, winking and passing loud remarks. Yet there are some such as molestation, rape, sexual

harassment, kidnapping and abduction, dowry deaths and torture by husband, which are more violent and serious in nature. A comprehensive definition of violence against women as adopted by United Nations is: 'any act of gender based violence that result in, or is likely to result in physical, sexual or psychological harm or suffering to women including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in private or public places' (United Nations, 1993).

In India, women are subject to various kinds of violence because socially, culturally and economically they are subjugated and have secondary position in society. A recent data of National Crime Record Bureau (NCRB) shows that the incidence of cruelty by husband is reported in every five minutes in India. Further, a woman is raped every 21 minutes and a young married woman burnt or driven to suicide due to dowry every 64 minutes (NCRB, 2015). The factors responsible for these evils are social, economic, cultural and individual in nature. Social factors are low level of education, denial for love and choice marriage by girls, gender inequality and dissatisfaction with dowry. Further, unemployment and poverty stands out as economic factors (Karleker, 1998; Rathod and Gundappa, 2000; Aswar, et al., 2013). Among cultural factors there is acceptance of power differentials based on sex and man having a right to discipline women (Visaria, 2008). There are some other factors such as alcohol consumption, extra marital affairs, drugs use, refusal to have sex by female, which are responsible for domestic violence in India (Subadra, 1999; Coker, et al., 2000; Vranda, 2013; Aswar, et al., 2013; Chandarsekhran, 2013).

It may be noted that the nature of crime is related with the structure of society and its social, legal, political, economic and demographic conditions. Since it changes with time, it may be expected that nature of crime also change with this dynamism. Hence, the present paper attempts to trace the pattern of crime and changes therein over

a period of time in the state of Haryana. It needs mention that Haryana is one among the economically developed states of India; however in terms of social and demographic indicators, the state does not position itself at the same place (Rajeshwari, 2015). In terms of sex ratio the state ranks at 34th position, and in female literacy, its rank is 23rd in India. In terms of crime against women, it ranks 5th and about 32 percent women in the state are found to be victims of spousal violence (NFHS- 4, 2016).

Objectives

In this context, the present paper aims to achieve the following objectives:

1. to study the spatial pattern and type of crime against women in Haryana within the context of overall crime in the state in 2014.
2. to study the temporal variation and shift in crime against women from 1991 to 2014.

Data Source and Research Methodology

The present study is based on secondary data, published by National Crime Record Bureau, Government of India. In India, National Crime Record Bureau (NCRB) compiles and disseminates yearly data on all types of crimes since 1953. It may however be noted that these statistics do not portray entire ground reality of crime situation in society due to the fact that the reported crimes are far less to actual incidences. This is particularly relevant to women as it has been noticed that unless women clearly label hurtful behaviour as 'criminal' in their mind, they do not tend to report them (Rajeshwari, 2017). Further, reporting of women assault is also related to family honor and hence it is hushed up and remains unreported. Despite all these problems of underreporting the existing data enables one to understand the magnitude of existing problem in Indian society.

It may also be understood that all crime are

listed as cognizable crimes and non-cognizable crimes. Non-cognizable offences are those where a police officer has no authority to take action or arrest without warrant. These both are reported under two heads i.e. Indian Penal Code (IPC) and Special and Local Laws (SLL). The crimes under IPC are recorded and listed under 32 crime sub heads. In the present study these have been broadly categorized into 9 major groups for convenience. These are: i) Crimes against body comprising murder, attempt to commit murder, culpable homicide not amounting to murder, attempt to culpable homicide, kidnapping and abduction, grievous hurt, causing death by negligence, causing injuries under rash driving; ii) Crime against women and sexual offences: rape, attempt to rape, assault on women with intent to outrage her modesty, insult to modesty of women, dowry deaths, cruelty by husband; iii) Crimes against property i.e. dacoity, making preparation and assembly for committing robbery, criminal trespass/ burglary and theft; iv) Crimes against public order which include riots, arson, unlawful assembly and offences promoting enmity between different groups; v) Economic crimes such as criminal breach of trust, cheating, forgery and counterfeiting; vi) Human trafficking: human trafficking under section 370/370A of IPC, importation of girls from foreign country; vii) Offences against the State: offences against the state under section 121, 124A IPC and promoting enmity between different groups; viii) Unnatural offences; and ix) Other crimes.

In SLL category, crimes are reported under 56 sub heads. Some of these are; Arms Act, 1959, Narcotic Drugs And Psychotropic Substances Act, 1985, Gambling Act, 1867, Excise Act, 1944, Prohibition Act, Electricity Act, 2003, Dowry Prohibition Act, 1961, The Indecent Representation of Women (Prohibition) Act, 1986, The Commission of Sati Prevention Act, 1987, The Protection of Women from Domestic Violence Act, 2005, The Immoral Traffic (Prevention) Act, 1956 etc. It may also be noted that the umbrella of IPC crimes related to women got widened with

time. After 2011, three other crimes against women have been added and these are- attempt to commit rape, abetment of suicide of women and violations at place of work. In SLL category The Protection of Women from Domestic Violence Act 2005, also has been added to the list since 2014.

In the present paper, crime against women has been the major focus, which is being listed in both IPC and SLL categories. The total number taken here includes both cognizable and non-cognizable offences in both categories. In the present paper, crime incidence rate, as well as its prevalence have been computed. Incidence rate is number of violent incidents per lakh population, while prevalence is proportion of population that has experience violence in a given period. It has been computed by taking total population as well as by taking women population. The nature of crime has been studied in terms of its composition, i.e. proportion of specific crimes from total reported crimes.

Results and Discussion

I

The overall crime scenario (Table 1) reveals that about 72.3 lakh criminal cases were reported in India during 2014. In other words, there were 571 criminal incidences per lakh population. The state of Haryana is better placed if one compares it with all India average, as its incidence rate in Haryana was 435 per lakh population. However, it needs emphasis that the state has poor record in reporting of crimes - more specifically which relate to women, children and marginal section of society.

As discussed in methodology, the crimes are reported under two categories i.e. IPC and SLL. At all India level, the share of SLL crimes is three-fifth (i.e. 59 percent); while that of IPC, 39 percent (Table 1). In case of Haryana however, the proportion of IPC crime in total crime cases are about 70 percent. The crimes in IPC category are further grouped into 9 broad categories, which are presented in Table 1. It shows that at all India level,

Table-1
Crime Scenario in India and Haryana: 2014

Crimes Categories	India		Haryana	
	Total Reported Crime Incidences (Numbers)	Percent	Total Reported Crime Incidences (Numbers)	Percent
SLL Crimes	4377630	60.62	35522	30.76
IPC Crimes	2843367	39.37	79947	69.23
Crimes against body	804570	28.29	17068	21.34
Crimes against property	600861	21.13	28365	35.47
Crime against women and sexual offences	264271	9.29	6871	8.59
Economic crimes	142560	5.01	3417	4.27
Crimes against public order	85537	3.00	2150	2.68
Human trafficking	733	0.02	9	0.01
Offences against the State	176	0.00	0	0
Unnatural offences	1148	0.0	143	0.17
Other crimes	943511	33.18	21925	27.42
Total Crimes (IPC+SLL)	7220997		115469	

Source: *Crime in India: 2014, NCRB, New Delhi, 2015*

about 29 percent of total IPC offences relate to crime against body, i.e. murder, kidnapping, abduction, culpable homicide and deaths due to negligence. Crime against property comprise of another one-fifth of total IPC crimes. It may be said that half of total IPC crimes are crime against property and body. The offences against women which are of sexual nature comprise another 10 percent of total IPC crimes. In comparison to all India picture, more than one third of IPC crimes constitute crimes against property in Haryana. This is followed by crime against body such as murder etc. The offences related to women comprise about 9 percent of total IPC crimes.

Crime against Women and Its Typology

Crimes against women are listed in both

IPC and SLL categories. However, 96 percent of total crimes against women are recorded under IPC. In this head, crimes are reported under many sub-heads. Broadly 9 types of offences are listed and these are (i) cruelty by husband and relatives- this is a continuing mental, physical, intentional or unintentional offence; (ii) kidnapping and abductions i.e. forcibly, fraudulently or deceitfully taking away a women without the consent of the lawful guardian; (iii) rape, it is considered as a forceful sexual intercourse with a woman without her consent; (iv) attempt to rape; (v) dowry death- relates to death of young women which is caused by any burns or bodily injury that occur other than under normal circumstances within seven years of her marriage; (vi) assault on women with intent to outrage her modesty- relates to molestation and

Table-2
 Crime against Women and Its Types: 2014

IPC Crimes	India			Haryana		
	Incidences of crime	IPC+SLL Crime (Percentage)	IPC Crimes (Percentage)	Incidences of crime	IPC+SLL Crime (Percentage)	IPC Crimes (Percentage)
Cruelty by Husband or his Relatives	122877	36.36	37.77	3478	38.82	39.00
Kidnaping and Abduction	57311	16.96	17.62	1922	21.41	21.51
Assault on women with intent to outrage her modesty	82235	24.34	25.28	1688	18.81	18.90
Rape	36735	10.87	11.29	1174	13.14	13.12
Dowry Deaths	8455	2.50	2.60	293	3.33	3.21
Attempt to Rape	4234	1.25	1.30	136	1.54	1.52
Abetment of Suicides of Women	3734	1.10	1.15	120	1.32	1.33
Insult to modesty of Women	9735	2.88	2.99	102	1.12	1.11
Importation of girls	13	0.00	0.00	0	0	0
Total	325329		96.27	8913		99.3
SLL Crimes			SLL Crimes (Percentage)			SLL Crimes (Percentage)
Immoral Traffic (Prevention) Act	2070	0.61	16.44	43	0.52	70.42
Dowry Prohibition Act, 1961	10050	2.97	79.81	13	0.13	21.31
Protection of Women From Domestic Violence Act, 2005	416	0.13	3.38	4	0.0	6.55
Indecent Representation of Women (Prohibition) Act, 1986	47	0.01	0.37	1	0.0	1.63
Total (IPC+SLL)	12593		3.72	61		0.67
Total (IPC+SLL)	337922			8974		

Source: Crime in India: 2014, NCRB, New Delhi, 2015

sexual harassment; (vii) insult to the modesty of women- it is related to advances involving unwelcome gestures, sounds, words or intruding upon the privacy of women; (viii) importation of girls and (ix) abetment of suicide. Under SLL category, the crimes and offences for which special laws have been formulated include crimes - dowry prohibition, immoral trafficking, sati prevention etc. These crimes constitute about 4 percent of total offences (Table 2).

The India level statistics (Table 2) reveal that more than one third of crime relates to cruelty by husband and relatives. Assault on women with intent to outrage her modesty comprises another 25 percent of total incidences. Kidnapping and abduction and rape constitute 17 and 11 percent of total crimes respectively. A comparative picture of these crimes in Haryana however reveals that cruelty by husband constitute almost 40 percent. Kidnapping and abduction and assault on women with intent to outrage her modesty constitutes another one fifth each of total offences committed against women. It is equally distressing to find that the incidences of rape constitute 13 percent of total committed crime against women.

Spatial Variation in Crime against Women: 2014

Geographical expression of prevalence of crime against women is presented in Figure 1 which reveals its prevalence across all districts. The geographical pattern however reveals that there are nine districts in the state, where crime against women is higher than the state average. It is shockingly high in district Gurugram followed by district Ambala (120 and 108 respectively per lakh women). It may be noted that incidences of crime is higher in eastern Haryana, in the districts lying on National Highway with an exception of district Sonipat. The districts of western Haryana show comparatively low crime against women as compared to state average. This pattern may not be related to better women position in these districts, rather it may be noted that the districts with low

crime are also the ones with low female literacy in rural as well as in urban areas. The reported crime against women is least in Jind and Bhiwani followed by Mewat, Kaithal and Kurukshetra districts.

As stated earlier also, reported statistic may differ from the real ground situation as reporting is generally more where awareness regarding crime is more. In those districts, which have high rate of crime against women, literacy rate is better which may have a bearing on reporting of crime. The nature of crime against women in terms of composition of crime has also been studied at district level and has been presented in Figure 2 and Table 3. It reveals that cruelty by husband is the most prominent crime against women among all crimes directed against women at state level. The pattern remains almost same in almost all districts as cruelty by husband and relatives is the most commonly reported crime. Its prevalence is reportedly high in western districts of state namely in the districts of Hissar, Fetehabad and Sirsa where it constitutes more than half of total offences against women. Its prevalence is reported to be one-fourth in two southern districts of state namely in Rewari, Mahendergarh, and Panchkula in the north.

The second most prevalent offence is kidnapping and abduction as it constitutes 25 percent of total crime against women. Its prevalence is high in Panchkula, Faridabad and Ambala districts constituting more than one third of total offences. The crime of kidnapping and abduction may be related with degree of urbanization, as it is least in Mewat, Jhajjar and Fetehabad districts. The prevalence of rape in total crime against women is reportedly high in the district of Mewat, where it constitute 25 percent. Its prevalence is equally high in Jhajjar, Rohtak, Panchkula and Karnal districts, comprising 15 percent of reported crimes against women. The lowest share has been reported in Jind district, where it comprises 7 percent of total offences against women.

The prevalence of crimes such as dowry

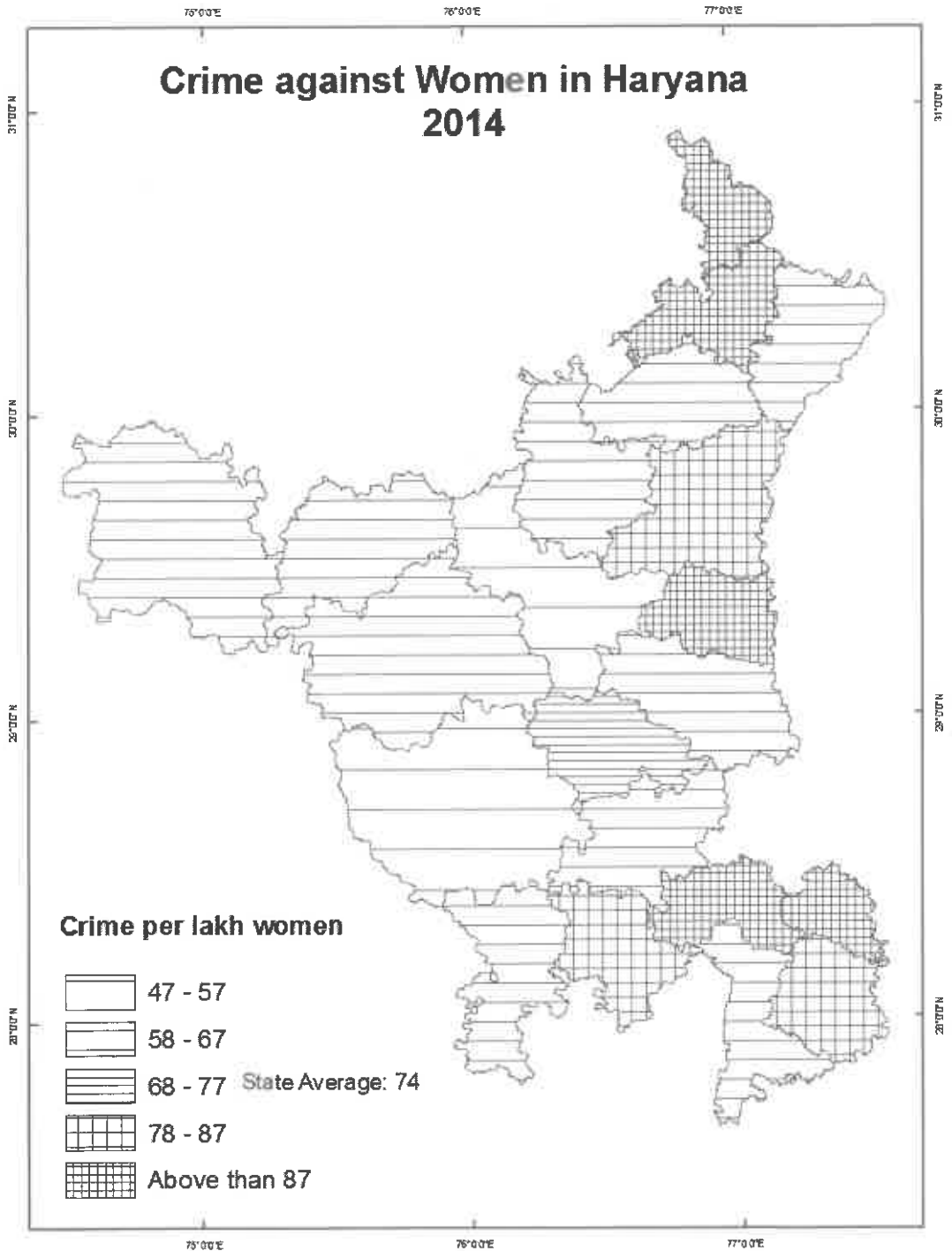


Fig. 1

Table-3
Type of Crime against Women in Haryana: 2014

District	Total Incidences	Rape	Attempt to commit rape	Kidnapping and abduction	Dowry deaths	Assault on Women with intent to outrage her Modesty	Insult to the Modesty of Women	Cruelty by husband or his relatives	Abetment of Suicides of Women
Ambala	433	12.93	2.08	33.26	3.93	9.24	0.23	37.64	0.69
Bhiwani	377	11.37	2.58	21.45	3.10	25.58	0.26	30.75	2.33
Faridabad	809	12.42	0.49	33.46	2.46	11.56	1.97	37.15	0.00
Fatehabad	285	9.41	0.35	11.50	2.44	19.51	0.70	53.66	1.74
Gurugram	860	13.40	1.49	29.78	2.18	17.75	1.49	31.73	0.69
Hisar	558	9.82	0.54	11.07	2.50	16.25	0.18	57.68	1.61
Jhajjar	284	19.44	0.69	5.90	8.68	16.32	2.43	43.40	1.74
Jind	307	7.49	1.95	21.82	3.91	21.82	0.00	39.09	3.91
Kaithal	305	10.82	0.33	25.25	3.28	19.02	0.00	38.03	3.28
Karnal	639	15.48	1.55	28.79	2.63	14.71	0.46	34.52	0.77
Kurukshetra	273	12.77	3.28	20.80	2.19	21.53	2.55	36.50	0.00
Mahendergarh	268	8.96	2.61	22.01	5.60	29.10	2.61	29.10	0.00
Mewat	316	26.65	0.63	9.40	1.57	26.96	0.31	33.23	0.31
Palwal	433	11.29	0.69	16.59	3.69	22.12	0.00	44.47	0.92
Panchkula	224	14.75	0.82	36.89	2.05	12.30	1.23	29.92	2.05
Panipat	516	12.36	2.32	17.76	3.47	18.73	0.00	43.82	1.16
Rewari	356	11.42	4.46	23.12	3.06	18.11	9.75	29.25	0.00
Rohtak	388	17.26	0.76	4.82	4.06	24.87	0.00	42.64	4.06
Sirsa	388	12.60	1.80	16.71	1.29	22.11	0.51	44.73	0.00
Sonapat	439	13.67	2.05	15.49	6.38	22.32	0.46	36.90	2.73
Yamunagar	392	12.76	1.79	20.92	1.79	19.39	0.00	43.37	0.00
Haryana	8870								
GRP* and SLL**	43+61								
Total	8974	10.87	1.25	16.96	2.50	24.34	2.88	36.36	1.10

Source: Crime in India: 2014, NCRB, New Delhi, 2015

* Crime in Railways

** Crimes under SLL

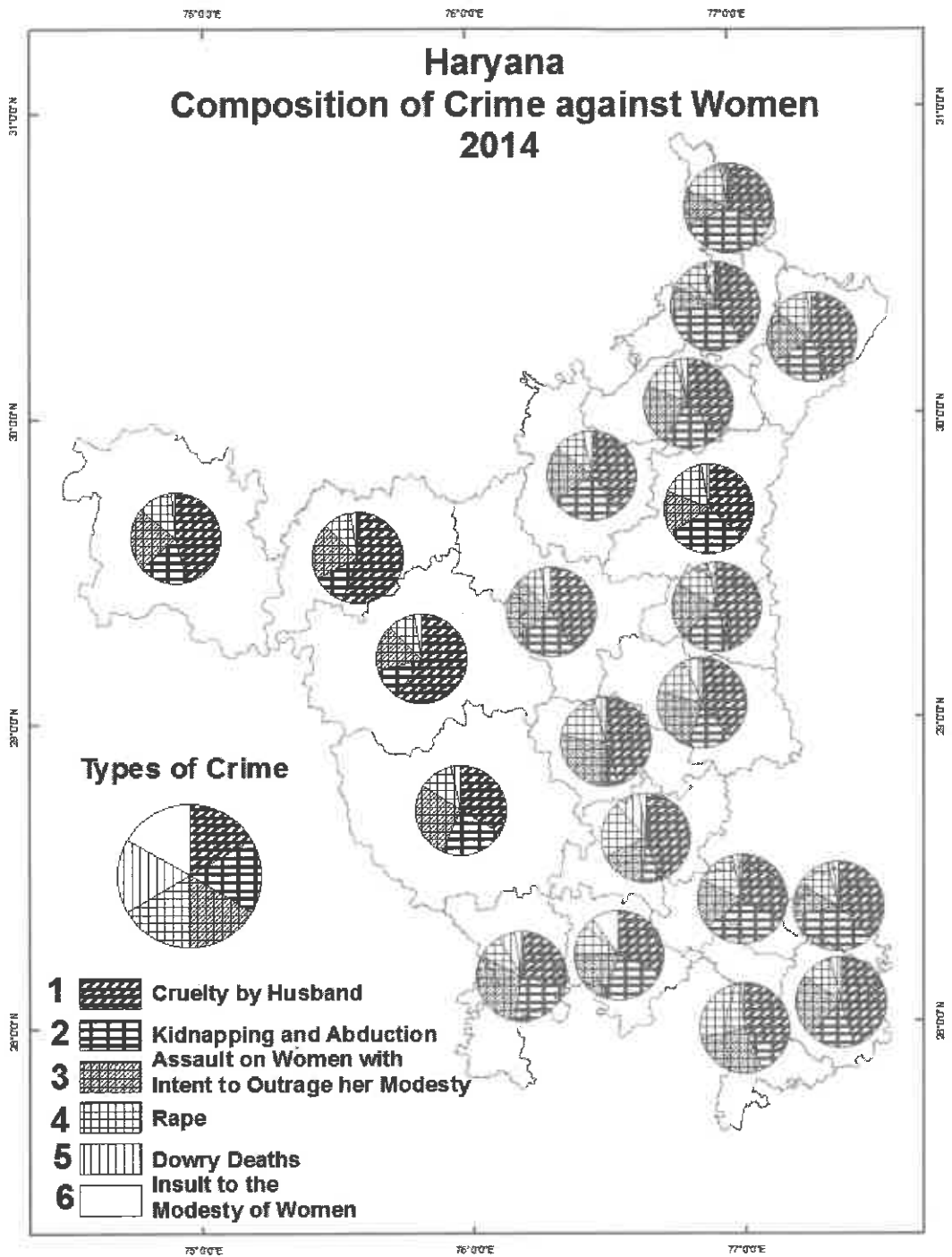


Fig. 2

deaths, attempt to commit rape, insult to the modesty of women and abetment of suicide of women is reportedly low as these constitute less than 5 percent each of total reported crime against women in the state. Dowry deaths seem to still constitute a major proration in Jhajjar followed by Mahendergarh and Sonipat districts of the state.

II

Temporal Pattern of Crime against Women : 1991 to 2014

The incidence of crime for a period of 24 years i.e. from 1991 to 2014 has been presented in Table 4. It shows that incidence of crime - in absolute number and also in terms of rate (per lakh population), has increased over this time period. The crime rate for all India shows a rising trend from 1991 to 1997. Thereafter it keeps fluctuating till 2006, and after 2007, there is a continuous increase in crime rate till 2015. In case of Haryana, however, the incidence of crime against women has increased from 313 to 435 per lakh population during 1991 and 2014 (Table 4).

A comparative picture of crime against women for all India with the state of Haryana for the reference period has been presented in Figure 3. It shows that its incidence measured as per lakh women has increased from 1991 to 2014. The threshold year seems to be 1997, when the increase is high at state level as compared to national average. At all India level, its incidence has increased three times, i.e. from 18 in 1991 to 55 in 2014. In case of Haryana the rate has increased five times from 14 in 1991 to 73 in 2014 (Table 4).

The temporal trend of type of crime against Women in Haryana during 1991-2014 has been presented in Figure 4 and Table 5. Its composition over a period of time has undergone change. During 1991, the most common or prevalent crime was the offence of insult of women to outrage her modesty, which constituted one fourth of all crimes. This composition has changed by the end of decade and by the year 2000, the most common was domestic violence or cruelty by husband and

relatives as it constituted about 45 percent of all crimes against women. Though the absolute number of dowry deaths have increased over a period of time. Yet its prevalence has declined steadily from a whopping 13.02 percent to 3.26 percent (Table 5). There has been a phenomenal increase in domestic violence as the crime reported under the head cruelty by husband and relatives has shown an increase. Similarly, kidnapping and abduction has seen a rise in case of Haryana over the 24 years of study period.

The temporal picture of district level variations in crime against women is presented in Table 6. It carries the statistics at five years interval from 2001 to 2014. The state average reveals that the crime against women has almost doubled in the last 15 years with all the districts showing an upward trend. It is shocking to find that none of the district in Haryana has witnessed a decline in its occurrence. The increase is phenomenal in case of Gurgaon, Rewari, Mahendergarh and Ambala districts. It is only in Jind district where the rate of increase is less than the state average. It may again be noted that increase is sharper after the year 2011. This might be due to large scale awareness due to campaign regarding crime against women after the recent Nirbhya incident in the capital.

Conclusion

The present paper discusses the overall crime scenario in India by giving an account of various types of crimes with special emphasis on crime against women. As far as crimes are concerned, at the India level crime rate is 571 cases per lakh population as compared to the state of Haryana which fared better with 435 reported cases per lakh population. The paper highlights that crime against women are reported under IPC and SLL categories in which proportion of offences under IPC constitutes 96 percent of total crime against women. It also highlights that with time some offences have been added under the sub-heads of crime against women due to which its rate has increased. As far as incidence of crime is concerned, crime against women at all India level

Table-4
Incidences of Crime against Women : 1991-2014

Years	India				Haryana					
	Total reported crimes (IPC+SLL)	Crime Rate per lakh population	Crimes against Women		Total reported crimes (IPC+SLL)	Crime Rate per lakh population	Crimes against Women			
			Total	Incidences /lakh women			Percent (total crimes)	Total	Incidences /lakh women	Percent (total crimes)
1991	5049346	594	74093	18	51521	313	1106	14	2.1	
1992	5247789	605	79037	19	52711	310	1612	20	3.1	
1993	5433574	615	83954	19.7	58807	339	1640	21	2.8	
1994	5512285	612	98948	23	57075	322	1779	21	3.1	
1995	5993072	654	106471	24	57917	320	2041	24	3.5	
1996	6296562	676	115723	26	86142	467	2335	27	2.7	
1997	6411259	671	121265	26	110245	579	2314	26	2.1	
1998	6182399	637	131338	28	71545	562	3002	33	4.2	
1999	4911730	498	135771	28	59476	503	3248	35	5.5	
2000	5167750	516	141373	29	62220	311	3311	35	5.3	
2001	5344538	520	143795	29	63786	303	3393	35	5.3	
2002	5526528	526	143034	29	68067	315	4385	44	6.4	
2003	5494814	514	140601	27	66437	301	4170	41	6.3	
2004	6028781	555	154333	30	64263	287	4276	41	6.7	
2005	5026337	456	155553	29	65264	286	4161	40	6.4	
2006	5102460	456	164765	31	72730	314	4617	43	6.3	
2007	5733407	504	185312	34	71123	302	4645	43	6.5	
2008	5938104	515	195857	35	78499	329	5142	47	6.6	
2009	6675217	571	203804	36	79372	327	5312	48	6.7	
2010	6750748	569	213585	38	80895	329	5562	49	6.9	
2011	6252729	517	228650	39	82976	327	5491	46	6.6	
2012	6041559	498	244270	42	92213	358	6002	50	6.5	
2013	6640378	543	309546	52	121243	464	9089	75	7.5	
2014	7220997	571	337922	55	115469	435	8974	73	7.8	

Source: (i) Crime in India: 2014, NCRB, New Delhi, 2015

(ii) Yearly report of crime in India from 1992 to 2015, NCRB, New Delhi

Crime against Women: 1991 to 2014

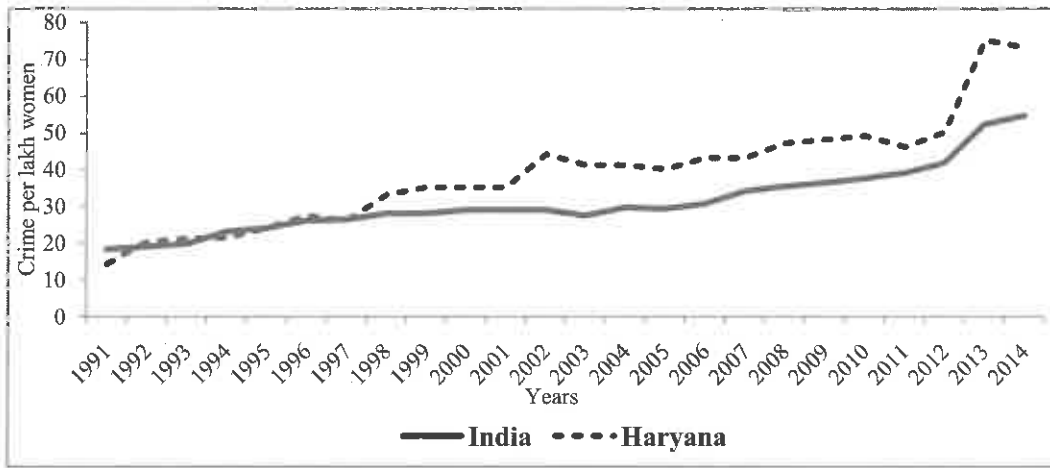


Fig. 3

Type of Crime against Women in Haryana: 1991 to 2014

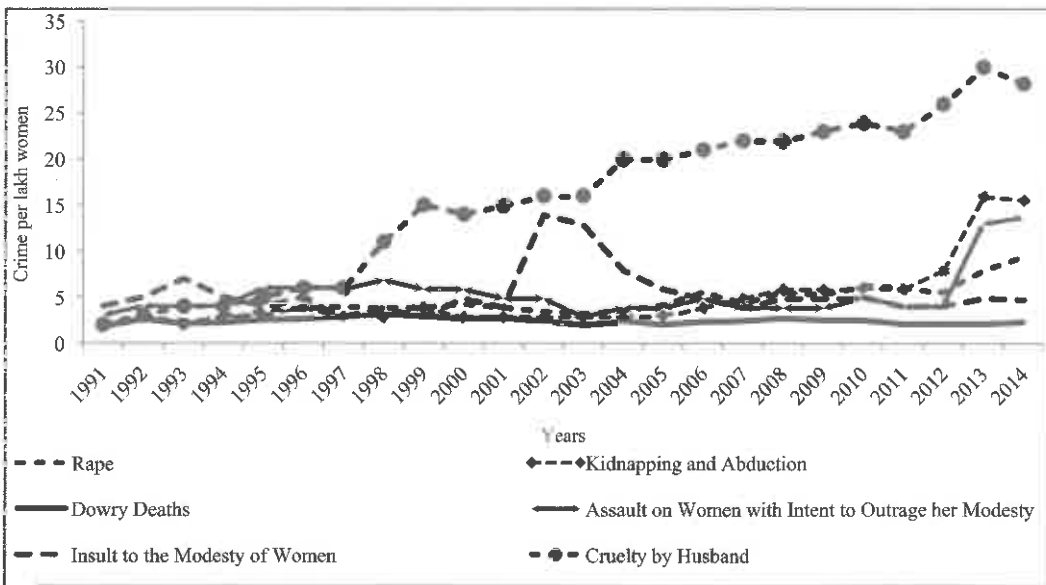


Fig. 4

Table-5
Type of Crime against Women in Haryana: 1991 to 2014

Year	Total Crime against Women	Rape		Kidnapping and Abduction		Dowry Deaths		Assault on women with intent to outrage her modesty		insult of women to outrage her modesty		Cruelty by husband	
		Total Cases	Percentage	Total Cases	Percentage	Total Cases	Percentage	Total Cases	Percentage	Total Cases	Percentage	Total Cases	Percentage
1991	1106	134	12.12	158	14.29	144	13.02	213	19.26	272	24.59	185	16.73
1992	1612	215	13.34	228	14.14	209	12.97	306	18.98	417	25.87	237	14.70
1993	1640	169	10.30	180	10.98	166	10.12	273	16.65	536	32.68	293	17.87
1994	1779	198	11.13	240	13.49	191	10.74	356	20.01	426	23.95	351	19.73
1995	2041	311	15.24	297	14.55	218	10.68	483	23.66	296	14.50	426	20.87
1996	2335	336	14.39	307	13.15	223	9.55	529	22.66	434	18.59	490	20.99
1997	2314	373	16.12	291	12.58	267	11.54	546	23.60	287	12.40	533	23.03
1998	3002	364	12.13	318	10.59	309	10.29	611	20.35	385	12.82	977	32.54
1999	3248	372	11.45	350	10.78	288	8.87	553	17.03	300	9.24	1369	42.15
2000	3311	421	12.72	299	9.03	263	7.94	605	18.27	423	12.78	1286	38.84
2001	3393	398	11.73	297	8.75	285	8.40	478	14.09	401	11.82	1513	44.59
2002	4385	361	8.23	290	6.61	256	5.84	454	10.35	1424	32.47	1565	35.69
2003	4170	353	8.47	271	6.50	322	5.32	344	8.25	1302	31.22	1618	38.80
2004	4276	386	9.03	292	6.83	251	5.87	403	9.42	850	19.88	2026	47.38
2005	4161	461	11.08	344	8.27	212	5.09	380	9.13	597	14.35	2075	49.87
2006	4617	608	13.17	431	9.34	255	5.52	486	10.53	491	10.63	2254	48.82
2007	4645	488	10.51	554	11.93	269	5.79	417	8.98	409	8.81	2412	51.93
2008	5142	661	12.85	644	12.52	302	5.87	435	8.46	605	11.77	2435	47.36
2009	5212	603	11.57	659	12.64	281	5.39	451	8.65	605	11.61	2617	50.21
2010	5562	720	12.94	714	12.84	284	5.11	476	8.56	580	10.43	2720	48.90
2011	5491	733	13.35	733	13.35	255	4.64	474	8.63	490	8.92	2740	49.90
2012	6002	668	11.13	900	15.00	258	4.30	524	8.73	434	7.23	3137	52.27
2013	9089	971	10.68	1957	21.53	263	2.89	1560	17.16	643	7.07	3617	39.80
2014	8974	1174	13.08	1922	21.42	293	3.26	1688	18.81	102	1.14	3478	38.76

Source: Yearly report of crime in India from 1992 to 2015, NCRB, New Delhi

Table-6
Crime against Women as Per Lakh Women in Haryana :2001 to 2014

Districts	2001		2005		2011		2014	
	Total Reported cases	Crime per lakh women	Total Reported cases	Crime per lakh women	Total Reported cases	Crime per lakh women	Total Reported cases	Crime per lakh women
Panchkula	101	48	113	53	120	46	224	90
Ambala	213	45	212	45	304	57	433	108
Yamunapur	152	33	186	41	274	48	392	66
Kurukshetra	159	41	176	46	176	39	273	58
Kaithal	157	36	158	36	182	36	305	58
Karnal	199	34	360	61	315	45	639	87
Sirsa	157	30	171	33	282	46	388	61
Jind	158	29	91	17	199	32	307	47
Fatehabad	157	41	120	32	140	31	285	61
Hissar	202	29	229	32	415	51	558	66
Panipat	178	41	236	54	339	61	516	89
Sonapat	132	23	238	41	282	41	439	62
Bhiwani	110	16	182	27	224	29	377	48
Jhajjar	224	56	156	38	226	51	284	62
Rohtak	138	32	176	41	312	63	388	76
Mewat	#	#	173	22	189	36	316	59
Palwal	#	#	#	#	217	45	433	85
Rewari	65	18	122	34	190	45	356	81
Mahendergarh	69	18	63	16	182	42	268	59
Gurgaon	259	33	178	22	265	38	860	120
Faridabad	506	51	607	61	454	54	809	93
Total	3338	34	3940	40	5287	45	8870	73
GRP*	34		129		138		43	
SLL**	21		92		66		61	
Haryana (Total)	3393		4161		5491		8974	

Source: Crime in India, NCRB, GOI, New Delhi

Refers to non-availability of separate data due to reorganization of district boundaries

* Refers to Crime in Railways

** Refers to Crimes under SLL

is reported to be 55 per lakh women while in case of Haryana it is much higher i.e. 75 per lakh women. The spatial pattern reveals its widespread occurrence across geographical boundaries. The type of offences within this however reveals that the most common reported offence is cruelty by husband and relatives which accounts about half of the total offences against women.

The western districts of the state reported low rate of crime in comparison to eastern districts of state. However, in all districts the proportion of cruelty by husband and relatives remains much higher than other offences. In case of proportion of kidnapping and abduction, northern and southern districts reported a large proportion as compared to Hissar, Sirsa and Ferozabad districts. Besides, proportion of rape is high in those districts which are socially and economically better placed in comparison to other districts.

The study also reveals that the rate of crime against women has increased at national level as well as state level. Except dowry deaths, all IPC crimes in state and the country have increased over the study period. This increase is sharp after 2012, which may be related to increased awareness in reporting after Nirbhaya Case in 2012. The study also reveals that there is a shift in pattern of crime against women. In earlier decades proportion of dowry deaths was much higher which has declined to 12 percent, though this proportion is still quite distressing. The proportion of crime or violence in terms of molestation, rape and insult of women to outrage her modesty have shown an upward trend and increase of its proportion in total crime against women suggest that place of women in society is still subordinate and speaks of their low status in volumes. The reasons for this violence needs a thorough investigation which can be made with more detailed micro level data.

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IMPACT OF POPULATION GROWTH AND ECONOMIC DEVELOPMENT ON ENVIRONMENT IN PUNJAB

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Abstract

Population, economic development and environment are related with one another as the population depends on the natural resources of an area and any change in the number of people, their attitude and life style affects the natural resources. Any increase in the number of people pressurizes the natural resources and it disturbs the carrying capacity of an area. The present study focuses on the population and present conditions of environment in the state of Punjab, India. In this paper, the main discussion is based on four major aspects i.e. agriculture intensification, population density and urbanization, number of registered vehicles, and industrialisation. The state of Punjab is highly urbanised and densely populated. Punjab has made progress in almost every field during the last four decades but this progress has come up at a huge price. Due to relentless development and high population pressure, the state is now facing several environmental problems ranging from air, water and soil to the health of people

Introduction

Population of any area depends on the natural resources (land, water, soil, air, etc.) of that area; and when there is any change in the number of people, their attitude and life style, it affects its resources and environment. Increase in the number of people pressurizes the natural resources and disturbs the carrying capacity of that area. Carrying capacity is determined by three factors, viz., food production, resource supply and environment's ability to assimilate pollution.

The present study focuses on the population and present conditions of environment in the state of Punjab. Punjab is an economically and agriculturally developed state. The economic development of the state is related to the agricultural prosperity of the state with the initiation of Green Revolution.

The state of Punjab experienced economic and social changes during the period 1971-2011 due to the impact of Green Revolution on agricultural conditions in rural areas and

introduction of Integrated Urban Development Programme during the Fourth Five-Year Plan (1969-74) in urban areas (Krishan, 2005). Punjab has also followed the classical growth path-agricultural development first, then industrial development, and consequently urbanization (Bhasin, 2001). In fact, overall development of Punjab is related with agricultural development through agriculture intensification. Agriculture intensification further affects the urbanization processes and environmental conditions of the state.

Methodology

The present study is based on secondary data taken from Statistical Abstract of Punjab for the years 2000, 2007 and 2012; Punjab Human Development Report, 2004; Reports of Pollution Control Boards, Environmental Statistics of Punjab, 2011 and General Population Tables of Punjab and India for the years 1971, 1981, 1991,

2001 and 2011.

The discussion is based on three major aspects i.e. population density and urbanization, number of registered vehicles, agriculture intensification and industrialisation.

Population Density and Urbanisation

Punjab is a highly dynamic state. It is relatively more urbanised and densely populated state as compared to its neighbouring states (Table 1).

The ratio of land and people has been increasing in Punjab since 1971. Table 2 shows that density of population is higher in the state as compared to the national average during the period 1971-2011.

Density of population in Punjab was 268 persons/ km² in 1971, and it rose to 550 persons/ km² in 2011. There is an addition of 282 persons/ km² during this period, while in the case of India this increase is 205 persons/ km². The difference in density of population between Punjab and India

has been increasing since 1971.

The density of population is also high in all the districts of the state. Table 3 shows that the highest density of population is recorded in Ludhiana district, i.e., 975 persons/km² and the lowest in Muktsar district, i.e., 348 persons/km².

Table 4 depicts that even the lowest density of population in Muktsar district of Punjab state is much higher than that of 16 states in India, namely, Andhra Pradesh, Karnataka, Gujarat, Orissa, Madhya Pradesh, Rajasthan, Uttaranchal, Chhatisgarh, Nagaland, Himachal Pradesh, Manipur, Meghalaya, Jammu & Kashmir, Sikkim, Mizoram and Arunachal Pradesh. In these states, density of population ranges between 17 in Arunachal Pradesh and 319 in Karnataka.

The situation is becoming more appalling in urban areas as these areas are supporting more population than rural areas because of diversification of economic activities. In the beginning of 20th century 12.39 per cent of the total population of Punjab was living in urban areas, but at the dawn of the 21st century this figure

Table-1
Density and Proportion of Urban Population in India, 2011

State/ Country	Density of Population		Proportion of Urban Population	
	2001	2011	2001	2011
Punjab	484	550	33.95	37.49
Haryana	477	573	28.92	34.79
Himachal Pradesh	109	123	9.80	10.04
Jammu & Kashmir	100	124	24.81	27.21
Rajasthan	165	201	23.39	24.89
Uttar Pradesh	690	828	20.79	22.28
India	325	382	27.82	31.16

Source : Census of India, General Population Tables of 2011.

Table-2
Density of Population in Punjab and India 1971-2011

Year	Punjab	India	Difference
1971	268	177	91
1981	333	216	117
1991	403	267	136
2001	484	325	159
2011	550	382	168

Source: Census of India, General Population Tables of 1971, 1981, 1991, 2001 and 2011.

Table-3
District-wise Density of Population in Punjab, 2011

District/ State	Density of Population
Amritsar	932
Gurdaspur	649
Jalandhar	831
Hoshiarpur	466
Kapurthala	501
Nawanshahr	479
Ludhiana	975
Ferozepur	380
Faridkot	424
Moga	444
Muktsar	348
Mansa	350
Bathinda	414
Rupnagar	488
Sangrur	449
Patiala	596
Fatehgarh	508
Tarn Taran	464
S.A.S Nagar	830
Barnala	419
Punjab	550

Source: Census of Punjab, Provisional Population Tables of 2011.

Table-4
State-wise Density of Population in India, 1981-2011

State / Country	1981	1991	2001	2011
West Bengal	615	767	903	1029
Bihar	402	685	881	1102
Kerala	655	749	819	859
Uttar Pradesh	377	548	690	828
Haryana	292	372	478	573
Tamil Nadu	372	429	480	555
Punjab	333	403	484	550
Jharkhand	N.A.	274	338	414
Assam	230	286	340	397
Goa	272	316	364	394
Maharashtra	204	257	315	365
Tripura	196	263	305	350
Karnataka	194	235	276	319
Andhra Pradesh	195	242	277	308
Gujarat	174	211	258	308
Orissa	169	203	236	269
Madhya Pradesh	118	158	196	236
Rajasthan	100	129	165	201
Uttaranchal	N.A.	133	159	189
Chhatisgarh	N.A.	130	154	189
Meizalaya	66	79	103	132
Jammu & Kashmir	59	77	100	124
Himachal Pradesh	77	93	109	123
Manipur	64	82	103	122
Nagaland	47	73	120	119
Sikkim	45	57	76	86
Mizoram	23	33	43	52
Arunachal Pradesh	8	10	13	17
India	216	267	325	382

Source: Census of India, General Population Tables of 1981, 1991, 2001 and 2011.

Table-5
Trends of Urban Population in Punjab, 1971-2011

Population Characteristics	1971	2001	2011	1971-2011
Urban Population (in lacs)	32	82	103	71
Total Number of Towns	106	157	217	111
Class-I Cities	4	14	18	14
Urban Area (km ²)	692	2097	-	-
Proportion of Urban Population	23.73	33.95	37.49	13.76

Source: Census of Punjab, General Population Tables of 1971, 2001 and 2011.

Table-6
Growth in number of Towns and Villages in Punjab : 2001-2011

Year	2001	2011	Change(2001-2011)
Number of Towns	157	217	60
Number of Villages	12673	12581	92

Source: Census of Punjab, General Population Tables of 2001 and 2011.

reached at 33.95 per cent and in the next decade to 37.49 per cent (Table 5). It shows that every third person in Punjab is an urbanite by residence.

In 2011, the state's urban population was 103 lacs, while the total population of the state was 277 lacs. Table 5 shows that the urban population has gained 71 lac persons in 2011 as urban population in 1971 was 32 lacs. There has been 33 per cent increase in the number of towns which rose from 106 in 1971 to 217 in 2011. In 1971, there were only four Class-I cities in the state, and their number increased to 18 in 2011. The urban area in Punjab increased from 692 km² in 1971 to 2097 km² in 2001 showing a net increase of 1405 km² which constitutes more than three-fold increase in thirty years. Furthermore, urban population has observed an increase of 13.76 per cent during this period.

Another implication of increasing urbanization in Punjab is that the state which was primarily rural is losing its villages at a fast pace. The perusal of Table 6 provides a view into the declining number of villages with a simultaneous increase in number of towns from 2001-11.

The pace of urbanisation can be elucidated from the fact that in one decade only i.e. 2001-2011, the state lost 92 villages while 60 new towns

were added. This shows that the urbanization in Punjab is happening at the cost of its rural fertile area.

Increase in the number of people, number of towns, especially Class-I cities, proportion of urban population, expansion of urban areas, etc. are exerting pressure on the natural resources which ultimately leads to environmental pollution.

Number of Registered Vehicles

Rapid increase in urban population needs more infrastructural facilities and transportation is the most important among such facilities. Punjab is a well-connected state. Transportation facilities are also considered as an index of development. However, a rapid increase in the number of vehicles has resulted in polluting the environment with emission of gases such as carbon-monoxide, oxides of sulphur and nitrogen, and unburnt hydrocarbons. The Lancet's Global Health Burden, 2013 report also termed air pollution as the sixth biggest killer in India (The Hindustan Times, January 29, 2014) and increasing number of vehicles is a big contributor in it. Table 7 reveals that the total number of vehicles has increased by approximately 15 times (3.60 lacs to 53.74 lacs) during the period 1980-81 to 2009-10.

Table-7
Number of Registered Motor Vehicles in Punjab
as on 31st March 2010

Year	Passenger Vehicles					Goods Vehicles				Total
	Buses	Cars and Station Wagons	Jeeps	Taxis	Three Wheelers	Two Wheelers	Three and Four Wheelers	Tractors	Others	
1980-81	5850	25888	5495	1867	2897	17655	22092	118845	665	360154
1990-91	9470	66312	12453	4034	13555	877837	54411	289064	2351	1329482
2000-01	16425	194756	24705	7192	29071	2103526	96703	434032	3823	2910223
2006-07	21982*	370401	46889	10318**	46218	3181759	1333054	479845	4982	4298962***
2009-10	27146*	486670	54798	13231**	57879	3956279	169553	498517	10181	5374254***

Source: Statistical Abstract of Punjab 2010, pp. 530-531.

* Includes 86 buses registered at Chandigarh.

** Includes 4333 taxis registered at Chandigarh.

*** Includes buses & taxis registered at Chandigarh.

There has been tremendous increase in two and three wheeler vehicles since 1980. The table given above indicates that this increase is almost 22 times in the case of two wheelers, and 19.98 times in three wheelers. A large increase in the number of vehicles is itself an indicator of vehicular pollution. Apart from it, the poor maintenance of vehicles, improper traffic management and poor conditions of road are the other major reasons of high vehicular emission and environmental pollution in the state. In this way, increasing population is responsible for the degradation of environment.

Agriculture Intensification

Agriculture intensification in the state has generated a number of environmental problems, such as deposition of chemical and pesticide residues in groundwater, air and soil, and depletion of ground water.

Punjab is known as an agriculturally highly developed state. However, presently it is suffering from a number of environmental problems. India has gone from a food-deficit to a food-surplus country largely because of the agricultural

transformation of Punjab. Punjab led the country's Green Revolution of the 1960s and earned for itself the distinction of becoming India's 'Bread Basket' as it is contributing, on an average, about fifty per cent in respect of wheat and rice to the central pool of food grains.

The cropping intensity in Punjab has increased from 126 per cent in 1960-62 to 188 per cent in 2012. (Government of Punjab, 2012). All the districts of the state recorded an increase in the cropping intensity during the period 1991-2012 (Table 8). The net sown area as a percentage of the geographical area rose from 75 per cent (1960-62) to 83 per cent in 2010-11. In addition to this, an increasing trend has been observed in the use of all the inputs. The number of tractors rose from 10,646 during 1962-65 to 4,98,517 in 2009-10. The consumption of fertilisers increased from 30,060 tonnes during 1962-65 to 213 thousand tonnes in 1970-71, 1692 thousand tonnes in 2006-07 and 1866 thousand tonnes in 2009-10 (Statistical Abstract of Punjab 2000, 2007 and 2010).

Punjab accounts for almost 10 per cent of the total consumption of fertilizers in the country.

Table-8
Cropping Intensity in Punjab, 1991-2001

District / State	1991*	2001*	2008-09**	2012***
	Percentage			
Amritsar	178	184	194	194
Bathinda	171	188	187	190
Faridkot	176	187	197	199
Fatehgarh Sahib	---	188	190	187
Firozpur	183	190	184	192
Gurdaspur	156	169	176	188
Hoshiarpur	160	168	182	172
Jalandhar	177	174	178	152
Kapurthala	177	194	205	194
Ludhiana	185	199	194	188
Mansa	--	181	194	191
Moga	--	198	193	198
Muktsar	--	184	200	181
Nawanshahr	--	171	194	191
Patiala	186	196	198	198
Rupnagar	179	167	181	183
Sangrur	193	198	199	191
Tarn Taran	--	--	182	196
S.A.S Nagar	--	--	160	183
Barnala	--	--	199	198
Punjab	178	186	190	188

Source: * Punjab Human Development Report, 2004, p. 197

**Government of Punjab, Statistical Abstract of Punjab, 2010 p. 107;

***Statistical Abstract Punjab, 2012, p. 245

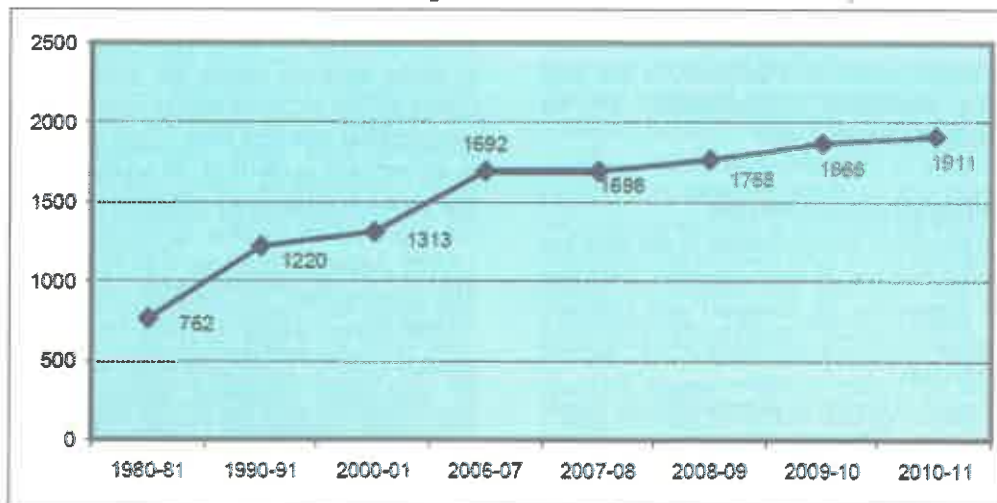


Fig. 1: Consumption of Fertilisers (NPK) in Punjab (1980-2011)

It uses the highest amount of fertilizers per hectare (228.97 kg/hac) followed by Haryana (227.85 kg/hac) as compared to average use of 141.30 kg/hac. in India (Government of India, 2012). Figure 1 shows that the use of fertilizers in Punjab has increased from 762000 nutrient tonne to 1911000 nutrient tonne in 2010-11 (Environmental Statistics of Punjab, 2011).

In fact, Green Revolution was the result of new technology of production in agriculture. The technology consisted of a package of inputs, i.e. high-yielding varieties of seeds, assured irrigation, chemical fertilizers, pesticides and insecticides, machines and modern agricultural practices. Punjab has made a commendable progress after Green Revolution but at the cost of its environment.

Consumption of insecticides and pesticides has also increased from 3200 metric tonnes in 1980-81 to 7300 metric tonnes in 1994-95 but after a cut down to 5970 metric tonnes in the year 2005-06 it again increased to 6080 metric tonnes in 2007-08 and came down to 5760 metric tonnes in 2008-09. Out of this, more than 90 per cent of insecticides and pesticides were being used in the cultivation of cotton, rice and vegetables (Singh, 2002). Punjab with just 2.5 per cent of the country's farming land consumes 13 per cent of total insecticides and pesticides used in India in 2008-09.

The top three states accounting for 50 per cent of the total pesticide consumption in India are Andhra Pradesh, Maharashtra and Punjab (FICCI, 2013). This data indicates that other states are using much less quantities of insecticides and pesticides than Punjab. It becomes evident that Punjab is one of the highest users of both chemical fertilizers, insecticides and pesticides.

The use of all these inputs (HYV seeds, tractors, chemical fertilizers and insecticides and pesticides) has increased the food grain production from 3162 thousand metric tonnes in 1960-61 to 27329.8 thousand metric tonnes in 2008-09 (Government of Punjab, 2010). However, this tremendous increase in the production of food grains has deteriorated the environmental conditions.

It is estimated that often less than 0.01 per cent of an applied insecticide and pesticide reaches the target insects and pests leaving 99.99 per cent as a pollutant in environment including the soil, air, water or nearby vegetation (Pimental, 1995). After polluting the environment, insecticides and pesticides are adversely affecting the human health.

A study conducted by the *Kheti Virasat* in 2004 found that the excessive use of chemical fertilizers, and insecticides and pesticides resulted in a number of diseases. The incidence of cancer, asthma, and diseases of kidney, skin and digestive tract has increased by 20-25 per cent in the Punjab state. Youngsters at the age of 25-30 are suffering from heart ailments and male infertility (Kalra and Chawla, 1983).

The incidence of cancer, asthma, and diseases of kidney, skin and digestive tract has increased by 20-25 per cent in the Punjab state. The first statewide survey of cancer victims in Punjab has revealed the high incidence of disease in the Malwa Belt (The Tribune, January 29, 2013) that coincides with the agriculturally prosperous Malwa Region of Punjab. The survey reported 33,318 deaths in the last five years. According to Indian Council of Medical Sciences in 2014, Punjab occupied 15th rank among the states for cancer patients and it reported 30 deaths per day.

Furthermore, agriculture intensification has increased the demand for water, which is higher than the recharging capacity of the state. This deficit is met from over exploitation of groundwater resources through tube wells (Government of Punjab, 2004). The World Development Report, Agriculture for Development, 2008 noted that Punjab region is well-known for overexploitation of groundwater. Fig. 2 shows ground water developed and over exploited aquifers for selected Indian states.

The water table has been falling fast. Map 1 shows that the districts of Amritsar, Kapurthala, Jalandhar, Nawanshahr, Ludhiana, Moga, Sangrur, Patiala and Fatehgarh Sahib are labeled as dark area from groundwater point of view. Here, the draft of groundwater is higher than recharging. The water table in central Punjab is going down at the

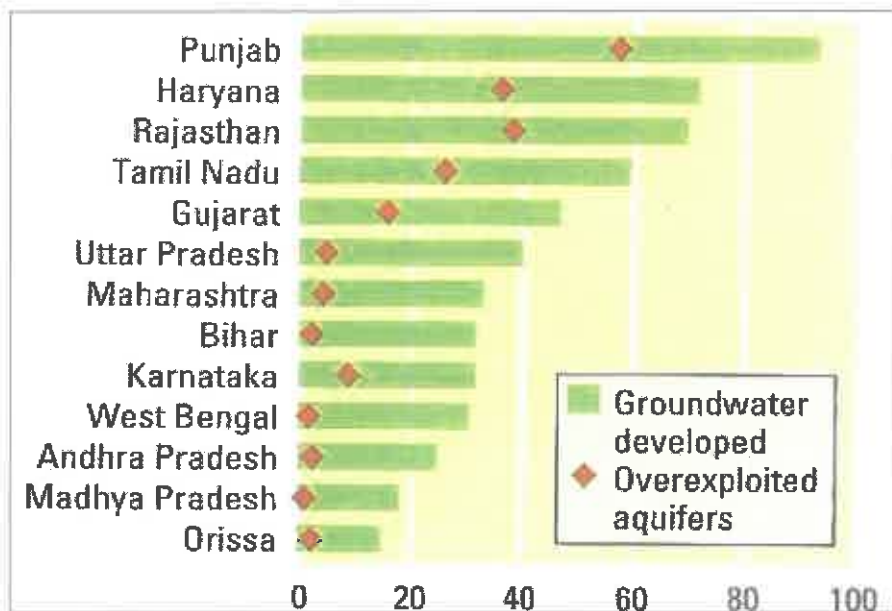
rate of 0.23cm per annum (Directorate, Water Resources and Environment, Punjab, 2006). Map 2 indicates that in the southern districts of the state groundwater is not fit for irrigation. Intensive use of canal irrigation has made the land prone to water logging. Malwa belt is the worst off with nearly 60 per cent of its area affected by saline and sodic elements. Almost all the districts are suffering from different water quality problems (Table 9).

Industrialisation

With the increase in number of people both in rural and urban areas, the demand for goods and services has increased and so has the number of industries. In the state of Punjab whether the growth rate of industries is quite low, their impact on environment is increasing manifold. The small scale industries dominate the industrial scene in Punjab as their number increased from 43338 in 1980-81 to 168000 in 2010-11 and the number of large and medium scale industries increased from

228 to 425 industrial units from 1980-81 to 2010-11 (Table 10). In Punjab, the industries are clustered in large cities like Ludhiana, Amritsar and Jalandhar. These industries are continuously contributing to environment pollution as the effluent discharge of these industries is causing serious damages to the environment of Punjab. In the state all the large scale industries have set up air pollution control devices but many small scale industries are doing without it (Table 11).

Among the large and medium scale industries, the number of industries with installed Air Pollution Control Device (APCD) increased from 494 in 2007-08 to 489 in 2010-11. In small scale industrial units this number increased from 8975 industrial units in 2007-08 to 9585 industrial units in 2010-11. The table also shows that the number of small scale industrial units without Air Pollution Control Device (APCD) has decreased from 227 (2007-08) to 74 (2010-11). Even though the number of industries with air pollution control



Source: World Development Report, Agriculture for Development, 2008, p. 186.

Note : Groundwater Developed is a per cent of all available groundwater in a state.
Overexploited Aquifer is a per cent of administrative blocks in which groundwater extraction exceeds recharge.

Fig. 2: Depletion of Ground water Aquifers in India



Map 1



Source: Hindustan Times Nov. 23, 2010.

Map 2

Table-9
Ground Water Quality Problems in Punjab

Contaminants	District Affected (in parts)
Salinity (EC > 3000 μ S/cm at 25 ° C)	Bhatinda, Faridkot, Ferozpur, Gurudaspur, Mansa, Moga, Muktsar Patiala, Sangrur
Fluoride (>1.5 mg/l)	Amritsar, Barnala, Bhatinda, Faridkot, Fatehgarh Sahib, Firozpur, Gurdaspur, Jalandhar, Ludhiana, Mansa, Moga, Muktsar, Patiala, Ropar, Sangrur, Tarn-Taran
Iron (>1.0 mg/l)	Bhatinda, Faridkot, Fatehgarh Sahib, Firozpur, Gurdaspur, Hoshiarpur, Mansa, Rupnagar, Sangrur
Nitrate (>45 mg/l)	Amritsar, Barnala, Bhatinda, Faridkot, Fatehgarh Sahib, Firozpur, Gurdaspur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Mansa, Moga, Muktsar, NawanShahr, Patiala, Ropar, Rupnagar, Sangrur, Tarn-Taran

Source: Central Ground Water Board

Table-10
Number of Industries in Punjab (1981-2008)

Year	Small Scale Industries	Large & medium Scale Industries
1980-81	43338	228
1990-91	160368	373
2000-01	200306	629
2006-07	191639	340
2007-08	167722	355
2008-09	162559	373
2009-10	164732	400
2010-11	168000	425

Source: Directorate of Industries, Punjab

Table-11
Number of Air Polluting Industrial Units in Punjab (2008-2011)

Year	Large and Medium Scale Industrial Units		Small Scale Industrial Units		Category-wise Units		
	With APCD	Without APCD	With APCD	Without APCD	Red	Orange	Green
2007-08	494	--	8975	227	11703	--	6245
2008-09	394	--	7216	169	10753	--	7867
2009-10	507	--	9027	116	12238	--	92689
2010-11	489	--	9585	74	12877	25	83

*APCD- Air Pollution Control Device

Source: Punjab Pollution Control Board, 2013

Table-12
Ambient Air Quality in different Cities/Towns for the year 2010
(residential / industrial / rural / others & ecologically sensitive areas)

Name of the City/Town	SO ₂		NO ₂		PM ₁₀	
	Annual Average ug/m ³	Air Quality	Annual Average ug/m ³	Air Quality	Annual Average ug/m ³	Air Quality
Amritsar	14	L	36	M	219*	C
Bhatinda	9	L	21	M	216*	C
Dera Bassi	10	L	23	M	162*	C
Pathankot/Dera Baba	7	L	14	L	76*	H
Gobindgarh	18	L	35	M	224*	C
Jalandar	11	-	29	-	144*	-
Khanna	9	L	31	M	231*	C
Ludhiana	9	L	32	M	214*	C
Naya Nangal	7	L	16	L	94*	C
Patiala	7	L	20	L	143*	C

L: Low, M: Moderate, H: High, C: Critical; '-' No monitoring; Monitoring not conducted; * - exceeding NAAQS. Low, moderate, high, critical classification based on Pollution Level

Classification. Source: Central Pollution Control Board, 2012.

devices increased from 2007-08 to 2010-11 but the number of red industries i.e highly polluting industries increased from 11703 in 2006-07 to 12877 in 2010-11. The number of green industries i.e. marginally polluting industries declined from 6245 industrial units in 2007-08 to 83 in 2010-11. The perusal of Table 12 reflects the alarming rate of PM10 levels in some of the important cities of Punjab. All the cities reported critical 'C' levels of PM10 while level of NO2 witnessed medium to low levels in these cities.

Pollution is becoming a perpetual problem in India as India has been ranked 155 in the Global Environment Performance Index (EPI) 2014 with Delhi being the most polluted city of the world (The Hindustan Times, January 29, 2014). Ludhiana, the biggest city of the state of Punjab is among the four most polluted cities in the world in terms of respirable suspended particulate matter (RSPM) in the atmosphere (The Hindustan Times, October 3, 2013).

The increasing number of vehicles, industrial units and the burning of agricultural residuals of wheat and paddy for 20-25 days in a year add to the air woes. For the last few years north Indian states namely Punjab, Haryana, Chandigarh and Union Territories of Chandigarh and New Delhi are engulfed by smog during winter. Large volumes of smoke are released during this process which keeps on hanging in the

air throughout the year, but in winters when the temperature lowers water drops are mixed with smoke and produce smog which is dangerous for human health.

The number of water polluting industries has also increased during the same time period (Table 13). The number of large and medium scale industrial units with effluent treatment plants increased from 369 units (2007-08) to 496 units (2010-11). It also increased from 1915 units in 2007-08 to 3558 units in 2010-11 in small scale industries. In small scale industries the number of units without effluent treatment plant fell from 92 units in 2007-08 to 41 in 2010-11. However, the number of red industries increased from 7683 units in 2007-08 to 12971 units in 2010-11.

Therefore, it becomes evident from both the tables (Table 11 and 13) that although the number of industries installing air pollution control devices and effluent treatment plants has been increasing yet the number of highly polluting industries i.e. the red category industries is on rise.

In the absence of adequate sewerage treatment and effluent treatment plants, the rivers of Punjab are turning into *nullahs*. The most suitable example is that of *Buddha Nullah* that run through Ludhiana from east to west. The untreated industrial effluents falling in the water turned "*dariya*" into a "*nullah*". A study conducted in 2008 by Post Graduate Institute of Medical

Table-13
Number of Water Polluting Industrial Units in Punjab

Year	Large and Medium Scale Industrial Units		Small Scale Industrial Units		Category-wise Units		
	With ETP	Without ETP	With ETP	Without ETP	Red	Orange	Green
2007-08	369	1	1915	92	7683	0	6073
2008-09	353	1	2101	96	8804	-	7868
2009-10	456	-	3200	106	12238	-	9289
2010-11	496	0	3558	41	12971	19	83#

*ETP- Effluent Treatment Plant

Information for large and medium scale industries only.

Source: Punjab Pollution Control Board, 2013.

Education and Research (PGIMER) found that *Buddha Nallah* is so choked with the industrial effluents and sewage that calcium, magnesium, fluoride, mercury, beta-endosulphan and heptachlor pesticide make both ground water and tap water unfit for drinking. Compared to the other 65 wards in Ludhiana, 1.2 lakh people living in the 10 wards along *Buddha Nallah* have much a higher incidence of chronic stomach disorders, hepatitis A and cancers of bladder, kidneys, lung, skin and liver (Centre for Science and Environment, 2014).

Conclusion

Population, economic development and

environment are related with one another. According to Census 2011, Punjab is home to 2.29 per cent people of India while it occupies only 1.53 per cent of the total area of the country. It shows that Punjab is accommodating more people than its carrying capacity. Punjab has made progress in almost every field of life during the last four decades. However, the state is facing severe environmental problems ranging from air, water and soil to the health of people. Its high population density, high rate of urbanization and intensification of agriculture are putting great strain on its natural resources which has severely entrapped it into environmental degradation.

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POPULATION PATTERNS AND PERSPECTIVES : A STUDY OF LEH DISTRICT, JAMMU AND KASHMIR (INDIA)

TSETAN DOLKAR

Leh, Jammu and Kashmir (India)

Abstract

Leh district in north India is distinct not only in terms of geography, but also in demography. It has a very limited population, and more recently recorded very low total fertility rate of 1.3 children per women in 2001 census. Its decadal growth also reduced drastically from 30.7% to 13.4% in 1991-2001 and 2001-2011 respectively. This decline is not without a religious element and thereby generated multiple perspectives and has invoked scholarly interest in the demographic dynamics of mountain inhabitants of Leh. This paper explores the intertwined nature of population perspectives and patterns. It is an attempt to understand demographic history of the district and the factors causing decline in the growth rate of population.

Introduction

The population profile of an area is a result of the interplay between natural environment and the level of socio-economic development attained through time. This causal relation becomes more visible in certain areas, where natural environment is constraining due to harshness; low temperature, low rainfall, rugged terrain and thin soil. Leh district in the Western Himalaya, being one of the most elevated (2500 to 8000 metres above mean sea level) inhabited areas in the world is a resource-scarce environment that supports a limited population. It is one of the least populated districts in India with only 133,487 persons while it has a geographical area of 451,110 square kilometres (Census, 2011). The population of Leh district accounted for only 1.06% of the total population of Jammu and Kashmir in 2011. Due to its peculiar topography it has scattered population that exhibits low density of only 3 persons per square kilometre. The studies of population discourse in this region over time show various interspersing facets of this relation. It also captures various other forces that possess the potential to affect the demography of

this place. The growth of population during 1901-2011 in Leh district has undergone various phases as shown in Figure 1.

This graphical trend of population growth shows roughly three distinct phases. Population growth is stagnant initially with less than 10 % decadal growth rate until 1961, except in 1901-11. This exception is attributed to enlargement of area in District Census Handbook 1961, as cited by Singh (1978). Then there is a sharp rise in the growth rate in two subsequent decades 1961-1981, later it slowed down and remained more or less stable for two decades 1981-2001. However, the last Census (2011) shows a sharp decline in the growth rate from 30.1% in 2001 to 13.8% in 2011 in Leh, while it was 29.04% and 23.64%, for the state of Jammu and Kashmir in 2001 and 2011 respectively. Such a drastic decline is hard to explain especially when there was no change in the territorial jurisdiction of the district during this decade. This invokes an interest to explore the possible factors that might be affecting the demography of this district.

This paper is an attempt in this direction. It explores the intertwined relation between population patterns and perspectives in Leh district. There are various perspectives that have studied the population of this region; number, composition, growth and change therein over the years. It can be broadly characterized as deterministic or ecological perspective, policy perspective, geopolitical perspective, religious or cultural perspective, feminist's perspective and so on. Although, these perspectives cannot be presumed as water tight compartments for the conceptual fluidity and intricate interrelation amongst them, nevertheless this characterization highlights major leanings in the population discourse and provides a structure to the paper.

These perspectives reinforce each other and collectively portray a complex picture, where reality gets diffused to the realm of obscurity, yet through these strings of perspectives one can unearth a basic problem i.e., there is a trade-off between the national goal of fertility reduction and how to maintain a minority population politically significant, economically viable and culturally sustaining. How real is this trade-off? What are the current trends and patterns of population under study? How it is likely to behave in decades to come? How the current decline in decadal growth rate can be explained? This paper endeavours to

answer these questions by studying various perspectives and patterns of population. This would be achieved through exploring the intertwined nature of various perspectives generated by different phases of population history.

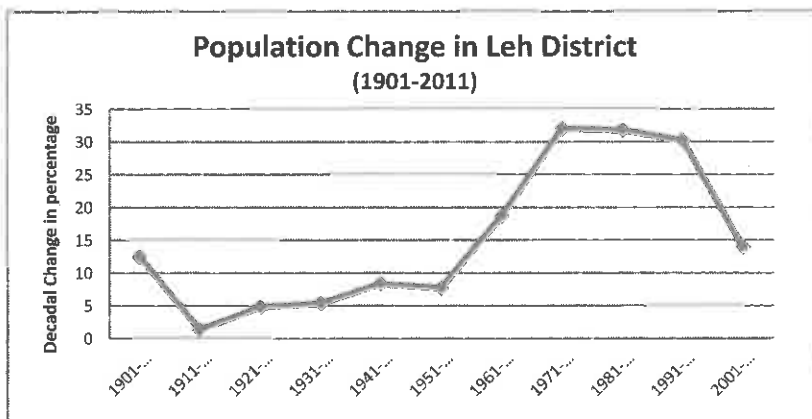
Ecological Determinism

Various studies on Ladakh have built a consensus that the way of life or culture has been determined by the physical conditions, and it has been explained that the constraining nature of

Table – 1
Leh District: Growth of Population (1901-2011)

YEAR	Decadal Change in Per cent
1901-1911	12.45
1911-1921	1.31
1921-1931	4.78
1931-1941	5.33
1941-1951	8.3
1951-1961	7.66
1961-1971	18.65
1971-1981	31.96
1981-1991	31.72
1991-2001	30.14
2001-2011	13.87

Source: Digest of Statistics, J&K, Based on Census of India



Source: Census, 1991 data is projected, as the census was not conducted

Fig. 1

natural environment has kept the population low (Moorecroft, 1841; Koshal, 2001; Norberg, 1991). These studies have also explained those cultural mechanisms developed in response to the ecological settings that helped in limiting population growth, for example, socio-cultural practices of polyandry system, inheritance law on the basis of primogeniture and the offering of children to the monastic institution of Buddhism. These mechanisms ensured that the population did not exceed the carrying capacity of the land (Norberg, 1991; Mann, 2000; Kingsnorth, 2000) and that land holdings remained intact as viable units of economic production. In a high altitude arid zone the traditional socio-economic organizations are formed as an adaptation to the environmental 'encapsulation' and the population must adjust to this reality' (Goldstein, 1981). Encapsulation refers to a situation in which the potential for increased production of energy by agricultural exploitation of new areas and by internal intensification of production is virtually nil. The limited population situation was accentuated by the non-availability of adequate health facilities (Singh, 1978). Therefore mortality rates were high. Singh (1978) further proposed that slow process of population growth enhanced the problem of shortage of manpower since the growth rates are intimately intertwined with the processes of development. Initial stagnant phase can be attributed to this perspective of constrained environmental settings, which implicates in a cultural setting that limits the population growth.

Migration

There are numerous studies which acknowledge the changed situation in the region in recent time. Owing to various factors, like opening up of highways, subsidised supply of food, access to medical facilities, deployment of army and burgeoning tourism industry; thereby diversifying the economy are collectively changing the constrained nature of environment. It seems fairly logical to conclude that these factors might have lessened the degree of nature's hold on compulsion of limiting population. Polyandry marriage is no

longer a compulsion in a household simply because the dependence on land is not as much as it was in the past, neither it is in vogue. The in-migration to Leh from the nearby areas is a recent new factor gaining currency gradually. This proposition is substantiated by the trends of decadal growth rate of the district, which shows steep rise since 1961- 1981. Singh (1978) explained this surge as a result of influx of the outsiders in the service sector; the opening of new offices, schools and dispensaries and subsequent in-migration of officials and functionaries. The deployment of a large army in the wake of Indo-China war in 1962 has also been cited by many studies as a factor that contributed to this surge.

Family Welfare Programmes

A significant step which had direct bearing on the growth rate of population was the introduction of planned fertility regulation policy. This policy has been known as 'Family Planning' in common parlance, although officially it is named as 'Family Welfare Programme'. It was started in 1952 in India in order to curb rapid increase in population and it got strengthened in 1970s. 'Family planning-which was first introduced in Ladakh during the early 1980s-has been instrumental in changing contraceptive behaviour, even as it also evokes controversy' (Aengst, 2013).

The next phase of stable growth during the 1981-1991 and a slight decline in 2001 can be attributed partly to this fertility reduction policy and partly to the changing socio-economic conditions such as increasing levels of education in the area. While analysing district level fertility behaviour of Leh, Guilmoto and Rajan, (2002) state 'though it has been steadily growing since 1970s, even as the growth rate has been declining since 2001'.

Since Leh is one of the least populated districts in India, a perceived decline in its population has been generating multiple perspectives; among these the most predominant ones question the rationale of the implementation of population policy focussing on reducing fertility

rate, in an area with very limited population. This perspective gets articulation in the form of opposition to family planning for it is ill-suited to the area. The latest Census 2011 validates the concern of population decline and particularly the declining share of majority Buddhists community. These facts leave the scope for various other perspectives to emerge. Though this concern is not new but currently is orchestrated by powerful groups, thereby giving way to 'Pronatalism' movement in the area as a resurrection. 'Family planning-which was unproblematic just over a decade ago-is becoming politicized and increasingly linked to ethnic and religious conflict. Public support for family planning has waned while religious opposition to particular contraceptive methods and practices has escalated' (Smith, 2009; Aengst, 2013). Apart from the access to contraceptive measures, rising level of education might have had an impact on the growth rate of population. Although, literacy level lagged behind the steady rise in population, however it seems to have an impact on stabilising the growth in later decades of 1991-2001. Literacy rates in Leh district during 1961-2011 and the corresponding growth rate of population are shown in Table 2. Literacy rate for 1961 and 1971 was taken of Leh *tehsil*, one of the three *tehsils* of former Ladakh district. Later in 1979, Ladakh district was bifurcated into two districts of Leh and Kargil district, where Leh *tehsil* was constituted into Leh district and Kargil and Zaskar *tehsils* were combined to form Kargil district.

Table-2
Leh District: Literacy and Population Growth (1961-2011)

Years	Literacy (%)	Population Growth(%)
1961	10.8	7.66
1971	15.8	18.6
1981	25.2	31.9
2001	65.3	30.1
2011	77.2	13.9

Source : District Census Handbook

Regional Identity in Majoritarian Polity

Another perspective is premised on the

logic that, in a majoritarian polity, the voices of the minority located in a geographically marginal area are hardly paid heed to. Frustrated with the lack of regional representation and cognizant of Jammu and Kashmir's status as the only Muslim majority state, many Ladakhis feel doubly marginalized—by both the state and the Indian nation (Bhan, 2006). Political opposition to family planning is articulated as an issue of representation, where having a lower population means less power and visibility within the state (Aengst, 2013). The sense of neglect on the part of the Centre as well as State Government due to insignificant number is widely predominant and has persisted over the years. While population numbers are currently politically charged, fears of a growing Muslim population have long existed among Ladakh's Buddhists (Bray, 1991; van Beek, 2004). According to Ul-Hassan, (2007) as cited by Aengst, (2013), 'in November 2007, the Ladakh Buddhist Association (LBA) requested the Jammu and Kashmir state government to stop promoting family planning in Ladakh, with the ex-president of LBA writing, "The Ladakhi race has limited population in the country and there is apprehension of its extinction. Hence, you are requested not to apply small family norms in the district as a special case. The Buddhists see 'an assault on their culture and traditions through the conversion of Buddhist girls and a planned effort of Muslims to outnumber Buddhists through a population aggression. In 1992 an agreement was signed between the Ladakh Muslim Association and Ladakh Buddhist Association (LBA), the supreme organization of Ladakh representing Buddhists, at the intervention of Ministry of Home Affairs ensuring that the Buddhists converted to Islam shall be allowed to return to their original faith' (<https://timesofindia.indiatimes.com>, 2008). 'The perception of being a minority fuels ongoing anxieties among both Buddhist and Muslim communities in Zangskar and Ladakh. Politicians on both sides have spoken against contraception and abortion in efforts to promote the population growth of their respective communities (Gutshow, 2006).

The political perspective can be constructed mainly around three layers of concerns; firstly, the sense of political marginalization bolstered by peripheral location on the part of both Centre and State governments, this concern is largely shared by both the communities. Secondly, the discriminatory treatment by Muslim majority state government towards insignificant number of Buddhists inhabiting a remote terrain, and thirdly, the fear of losing political significance in the wake of population aggression by local Muslim population buttressed by state government, polarised the perspective on religious lines. Also Leh is the only district in the state of Jammu and Kashmir (the only Muslim-majority state in India) with Buddhists forming majority population though small in absolute numbers. Moreover, it has both strategic as well as symbolic significance for India due to its sandwiched location between occupied territory by Pakistan in the west and China in the east.

Religion and Culture

This perspective is not articulated in pure political terms, but also invariably concomitant with religious and cultural perspective. 'Geopolitical boundaries intersect with bodily boundaries when Muslim-Buddhist marriages are forbidden-but on occasion those same boundaries are undone by romantic love' (Smith, 2009). As stated by Smith (2012) 'the politicisation of religious identities and territorialisation of marriage, love affairs and the babies to be born on religious lines' indicates the growing number of forces coming into play in determining the demography in Leh district.

The public preachings by Buddhist monks often draws people's attention to the 'sin' like sterilization and abortion. 'Though Buddhist and Muslim women both describe family planning as a sin, they also express how grateful they are to space their pregnancies' (Aengst, 2013). This perceived decline or relatively low growth rate of population, alarms people not only about their

political fate, but also about the likely succession crisis in their cultural lineage. However, delineating beyond these highly orchestrated apparent political perspectives a more nuanced layer is the sense of crisis amongst the people with regard to their cultural succession. Growing instances of fallow agricultural land in villages are often explained by villagers as lack of manpower to carry on the agricultural practices 'due to adopting small family size'. An observation which can be cited here in this context is during a workshop on organic farming in a village, one gentleman asked a critical question, at the end of the programme, 'who will cultivate?', where are the people?. Many of the fields are left uncultivated'. Similarly pastoralists and shepherds express their concern about the succession crisis in their occupation. Goodall (2004) captures the trends of intra- district out-migration amongst the three pastoralist's communities in Leh district and highlights the loss of productivity from pastoralist's areas and supply of animal products such as Pashmina. An internationally acclaimed documentary film called, 'Shepherdess of Glacier' highlights the concern about the declining population in traditional activities like rearing of sheep. One can often hear from elderly parents, 'till the time we are alive these (cultural activities) will go on, who is going to do it later'. Another layer of threat perception which penetrates here is the changing composition of the population, which is seen as threat to the Buddhists culture. Rising share of Muslims and Hindu population in successive censuses strengthened this feeling, irrespective of empirical evidence to ascertain the magnitude of change and its implications.

Age and Community Specific Fertility Rates

To gain a better insight, it becomes imperative to check the available facts. However, it is not to suggest that quantitative facts are unabridged, over counting and inconsistency amongst various data sources are not uncommon. But it can be used to draw some vital inferences.

Due to the absence of reliable vital statistics for Indian districts, fertility levels are assessed using a set of indirect methods. An attempt has been made to study fertility differentials by community in Leh district, by estimating various fertility rates using Census data from fertility tables.

1. *General Fertility Rate (GFR)* is a refined measure of fertility, defined as the number of live births per thousand women in the reproductive age-group 15-49 years. (Sample Registration System Report, 2012). The estimated GFR using Census 2011 'Fertility Tables' (F10) shows

$$GFR = \frac{\text{Number of live birth in a year}}{\text{Mid year female population in the age group (15 - 49) years}} \times 1000$$

33.6 children per thousand women in the age group of 15-49 for the district as a whole while it is 45 for Muslims and 32 for Buddhists.

2. *Age Specific Fertility Rates (ASFR)*: Age of women is an important factor affecting the fertility levels. On the basis of data on births to women by specific age groups in the reproductive span 15-49 years ASFR is calculated. The ASFR is higher amongst Muslim women in all age groups as

$$ASFR = \frac{\text{Number of live births in a particular age group}}{\text{Mid year female population of the same age group}} \times 1000$$

compared to the Buddhists women. In the age-group of 15-19 years ASFR is very low in both the

communities, it rises gradually and reaches the peak at the age group 25-29, this indirectly indicates that the age at marriage is relatively high (Fig.2, Table 3).

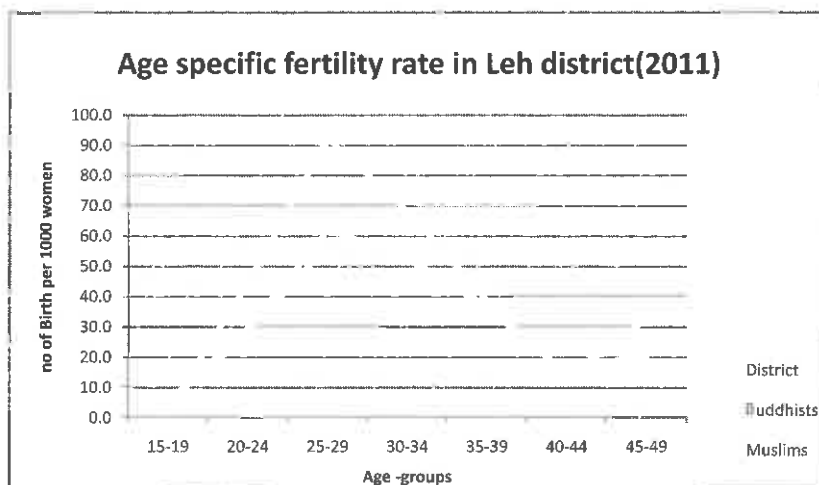
3. *Total Fertility Rate* : The cumulative value of the age specific fertility rates at the end of the child bearing ages gives a measure of fertility known as Total Fertility Rate (TFR). TFR indicates the average number of children expected to be born per woman during her entire span of reproductive period assuming that the age specific fertility rates, to which she is exposed to, continue to be the same.

$$TFR = \frac{\sum_{15-19}^{45-49} \times 5}{1000}$$

Table-3
Leh District: Age Specific Fertility Rates (2011)

Age groups	Total	Buddhists	Muslim
	ASFR		
15-19	4.9	5.24	2.5
20-24	29.6	27.6	44.7
25-29	62.1	57.4	92.1
30-34	52.9	52.2	68.1
35-39	37.6	36.5	38.7
40-44	14.4	14.7	13.5
45-49	21.9	20.4	32.6

Source: Fertility Table F10, Census 2011.



Source: Fertility Table F10, Census 2011.

Fig. 2

The TFR is perplexingly low in the district i.e. 1.1 children per women in 2011 (Table 4). This is not unexpected as the TFR for Leh district in 2001 was one of the lowest in India with 1.3 children per women as estimated by Guilmoto & Rajan, (2002). Though it was 4.3 in 1981 (IIPS,2003-04, <http://iipsindia.org>). The proportion of child population (0-6 years) to the total population in 2001 was 10.83% which got reduced to 9% in 2011, making an absolute reduction of about 700 child population (0-6 years) during this decade. The percentage decadal change in child population (0-6 years) during 2001-11 is (-)5%.

The absolute population change in population of three major communities shows that the Buddhists community got reduced by almost 2000 persons, Muslims increased by 2901 persons and Hindus by 13249 persons. Change is also shown in terms of percentage in Table 5. The decadal growth rate, the fertility rates and absolute population change in terms of general population as well as child population of 0-6 age group, have shown a negative change except for the Hindu

community - which is mostly attributed to in-migration- suggests that the perceptions about the declining fertility rates is validated by the Census data. Though the Jammu and Kashmir Census data for 2011 is alleged for over counting and inflated child population, but this concern is expressed with regards to the Kashmir Valley only (Guilmoto & Rajan, 2013). In the case of Leh under reporting or unreliability of data cannot be ruled out completely.

Pronatalism

Since the low fertility rates get manifested in the successive Census data in the form of low growth of population and reduction in absolute population, the perspective based on fear of getting outnumbered, underrepresented and cultural out get strengthened which in turn emboldens the 'Pronatalism' movement. It is in this context that the most important perspective of all the perspectives discussed above emerges. Although, in its nascent stage at present, this perspective is likely to gain currency in the times to come and

Table-4
Leh District: General and Total Fertility Rates (2011)

Communities/Total	GFR	TFR
District	33.6	1.1
Muslims	45	1.5
Buddhists	32.1	1.07

Source: Fertility Table F10, Census 2011.

Table - 5
Leh District: Population Change among Religious Communities (2001-2011)

Communities	2001	2011	Absolute Decadal Change	Change in Percentage
Buddhists	90618	88635	-1983	-2.2
Muslim	16156	19057	2901	18
Hindus	9573	22822	13249	138

Source: Census of India, 2011.

play dialectic to 'Pronatalism'. As it is based on an endeavour to understand what these multiple perspectives implicate for a woman. The promotion of pronatalism not only affects the rights of women as an individual to take reproductive decisions, it also undermines the prerogative of a family to realize their own sense of an ideal family size. The contradiction that Aengst (2013) has highlighted in her paper based on hospital survey, between the population discourse and the fertility behaviour is manifestation of the dilemma that usually a women goes through, although implicitly. She draws on two interesting reproductive subjects, basically creation of this perspective, that is, 'hyper fertile Muslim women' and 'vulnerable Buddhists women', both these subjects are central to Buddhists pronatalism. Discussions of demography quickly become discussions about women's bodies (Smith, 2009). In an attempt to understand population discourse, conversation with many people becomes imperative. In one such conversation a member of LBA said "these days women are figure (body) conscious, and fashionable, therefore they don't go on producing babies, thereby reducing our community's number". This statement may bewilder and compel one to reflect on their understanding of concepts of demography. Does being 'fashionable' determine the fertility in any sense? This implicates that the onus of the 'family planning' whether for reducing or increasing the fertility, falls almost solely on women. Needless to say that the major permanent contraceptive methods such as sterilization are done only by women not only in Leh but in whole country. NFHS IV found highest prevalence of Intrauterine

Contraceptive Device (IUCD) in the country as a method of spacing in Leh to be 35.5%. This indicates the multiple ways that reproduction in Ladakh is "stratified," where power relations- especially those in the religious and political spheres-are shaping reproductive practices and ideologies (Ginsberg and Rapp, 1995). 'These women cannot extract their intimate decisions from the political practice' (Smith, 2009). It may be inferred safely that these political, community and cultural perspectives might have implications on availing health care services by women voluntarily or involuntarily.

Contribution to fertility decline can be related to both a rise in age at marriage and fall in marital fertility. The mean age at marriage in Leh is fairly high, for males it is 25.8 years and for females it is 23.5 years, as per the district level household survey (DLHS-III, 2007-2008). The survey also distinguishes Leh district for having zero per cent of boys and girls marrying at the age lower than legal age of marriage of 21 years and 18 years respectively. That means the fertility level in the age cohort of less than 15 and 15-19 age groups must be very low. Although literacy rates have been improving for the last fifty years but show a glaring gap between the males and female literacy. That means there is a wide scope for female literacy to improve, which indirectly points to a more likely fall in fertility and fertility regulation on individual level. With rising level of education and aspirations amongst the women, age at marriage is more likely to rise further.

The conscious choice amongst the potential couple to realize their own sense of ideal family size is one phenomenon that has departed from the

Table-6
Leh District: Literacy and Population Growth (1961-2011)

Years	Literacy rate	Males literates	Females literates	Population Growth rate
1961	10.8	15.5	1.03	7.66
1971	15.8	22.2	2.2	18.6
1981	25.2	41.2	13.7	31.9
2001	65.3	75.5	52.7	30.1
2011	77.2	86.3	63.5	13.9

Source: District Census Handbook

past believes of children as the 'gift of God' or something which is not under control. As found by Aengst, (2013) there is a contradiction between population discourse and fertility behaviour which reflects the fact that fertility regulation is becoming widely prevalent despite presence of discourses which promote pronatalism. The rising aspiration amongst the parents to ensure high quality of life for their children translates into less number of children. According to Becker and Lewis (1974) 'Some couples desire to have children of higher quality thereby raising the cost of rearing children which then reduces the number of children they can afford given the income constraint resulting in the quantity-quality trade-off.' There is a trade-off between the quality and the quantity of children that entails reduction in fertility.

Increase in urban population can play a vital role in the years to come as it resonates increase in number of small families. Urban residence as compared to rural one also seems to exert a negative impact on fertility (Bhasin and Nag, 2002). Better health facilities, diverse employment opportunities, better education, and more work force participation of women largely reassures lower fertility. The urban population in Leh district has been increasing rapidly. In Census, 1981 it was recorded at 12.75% which increased to 34.2 % in Census 2011, although two new census town were included. That can also explain partially the rising urban population.

Along with fertility migration is another factor which is affecting the growth rate of population in an area. Migration has not been studied much except for some intra-district migrations in Leh district. However, out migration from Leh to other places of India has to be looked into further. Orebeg (2013) captured, the educational migration amongst the youth, mostly of 18-30 years of age group, from Leh district to other cities of India, such as Srinagar, Delhi, Jammu, Chandigarh etc. She estimates migrants to be around 10,000-12,000 in numbers. 'Compared to other migrant populations in India, the primary cause of migration from Ladakh to urban areas is

not economic opportunities, but for the pursuit of higher education' (Orebeg, 2013). These migrants though move out without the family members and are mostly intend to return back, however they are migrant by place of last residence. Currently increasing purchase of land plots, houses and flats in cities like Jammu, Srinagar, Chandigarh by Ladakhis and job opportunities in these cities can be seen as a precursor to more out migration in times to come.

Concluding Remarks

The demography of Leh seems to have responded to the natural environment and the socio-economic development level over the years. With the rising level of socio-economic development the population dynamics has also improved, for instance mortality and fertility rates got reduced, and migration is gaining currency with increased connectivity and diversification of economy. To delineate further, there are various factors that have direct or indirect impact on the population under study. Increasing level of literacy, particularly amongst the females, rising aspirations of people and rise in the age at marriage have contributed to reduction of fertility. With the current level of fertility, the population is likely to reduce further. The process will be more accentuated by out migration. The drastic decline in the decadal growth rate can be explained by the low level of fertility, but the role of out migration cannot be neglected. Therefore it is imperative to study net migration in Leh district. The harsh climatic conditions coupled with improving economic lot will induce more migration. Population numbers are also affecting the politics and society by dividing people on religious lines. Change in the religious composition may also concretise the communal perspective which might affect the communal harmony of the region. It is imperative to consider the local demographic situation before it is subjected to the national population policy. It is particularly important for a place like Leh district, which is located at a borderland. The number and the prosperity of the border-lander is essential for national security.

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POPULATION CHARACTERISTICS OF THE SNAKE CHARMER COMMUNITY IN WEST BENGAL

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Abstract

Social and cultural diversity of India is evident in its having a number of communities, castes, creeds which add to the unique multiethnic feature to Indian society. There is an abundance of literature on the population characteristics of the country in comparison to studies related to the individual social communities such as the snake charmer community. This study pertains to describing the population characteristics of this community in the state of West Bengal. The characteristics covered are distribution of population and basic population characteristics such as sex composition and sex ratio, social composition, size of family and literacy rate. This study is based on secondary as well as primary data. The source of primary data is intensive field survey. The snake charmer community is found throughout the state except for four districts, i.e. Darjiling, Uttar Dinajpur, Dakshin Dinajpur and Kolkata. The study is based on 65 sample village level primary data of 1115 households aggregated into the six micro regions of the state identified by the Census of India. This community plays an important role not only in case of environment conservation but also possesses knowledge of indigenous medicinal plants and supply of raw venom of snakes.

KEY WORDS: Snake charmer community, Ethno-occupational group, Micro regions, Indigenous knowledge, Environment conservation.

Introduction

The members of snake charmer community are popularly known by such different names in various states and regions of India as *Khar* in Odisha, *Sapera* in North India, *Ageriman* in Assam, and *Bedey* in West Bengal. According to Abedin (2006) the Bengali word *Bedey* came from *Baidda* which means village doctor. The snake charmers traditionally know the art of healing which they use as a source of living. The *Bediya* caste is believed to comprise of 42 or 43 clans and sub-clans. It is worthy to mention here that not all the clans traditionally practice snake charming or snake juggling and only 6 clans are connected with this type of livelihood (Hunter, 1875; Wise, 1883; Risley, 1891; Williams, 1912). The snake charmer community has been categorised as an ethno-

occupational group. Snake charmers are believed to have magical powers to tame snakes, and to cure snake bites. The village community regards snake charmers with respect as well as with curiosity. The members of this community usually reside at villages some distance away from urban areas in West Bengal. The snake charming occupation is today in danger of dying out and most of the members of this ethnic group have shifted to some other non-traditional occupation. A recent study by the Wildlife Trust of India has revealed that more than 40 percent of them have turned to alternative professions (Bose, 2003) This is due to a variety of factors main among these being the recent enforcement of a 1972 law, banning ownership of serpents (Bagla, 2002; Lawson, 2003; Bose,

2003). This study seeks to find out the population characteristics of this ethno-occupational group in West Bengal.

Objectives

1. To describe the population and its distribution of this community in West Bengal.
2. To describe micro region wise recent changes in the population of snake charmer community.
3. To describe the sex ratio, size of family, social composition and literacy rate of snake charmer community

Study Area

The geographical extent of West Bengal is 21° 31' to 27° 14' N latitudes and 85° 51' to 89° 52' E longitudes, covering an area of 88,752 km². The present study pertains to the six micro-regions based on West Bengal Administrative Atlas (2011) by Census of India. Except for four districts, namely Darjiling, Uttar Dinajpur, Dakshin Dinajpur and Kolkata, all the districts have snake charmer village settlements, some of them at remote locations and some of them in urban fringe areas.

Data Sources

Information regarding the history and historical evidence of snake charmer community has been taken from various works, old Gazetteers of Bengal and Bangladesh, and online published articles. Reference to these has been made in the text. Secondary data such as village-wise total, male and female population of snake charmer community for 2004, 2008 and 2012 has been collected manually from the concerned Panchayat Offices. The details of micro-regions and sub-regions have been taken from the West Bengal Administrative Atlas (2011) by Census of India. But the major portion of this work is based on the primary data collected through intensive field survey of 65 sample villages spread over 15

districts covering 1115 sample households and 5392 individuals.

Methodology

The location of residential villages of snake charmer community was identified through a pilot survey in each district of the state based on snow-ball sample method. On the basis of information collected through the pilot survey the identified villages from each district were aggregated according to the scheme of regionalisation by the Census of India, 2011. The field survey was conducted, with the help of a model schedule, during June 2012 to August 2014. Random sampling method was followed for the field survey. The details of micro-regions, their sub-regions, the names of districts comprising these, the names of villages in each district and the number of sample households in each village are given in Table 1. The household schedule consisted of questions on basic demographic profile of each household member, i.e. age, sex, marital status, level of education, caste, language spoken and relationship to the head of the household. During field survey the locations of villages of snake charmer community were recorded with the help of GPS technology and the field documentation was made with the help of Canon SX-30-IS camera, audio recorder etc. The collected secondary data from concerned Panchayat Offices, regarding snake charmer population, were tabulated and calculated village-wise and micro region wise. The discussion of the characteristics of snake charmer community in the state has been attempted according to micro-regions.

Distribution, Composition and Change of Population

Table 2 shows micro-region wise snake charmer total sample population, number of males and females, and sex-ratio. Table 3 shows the change in the population of this community between 2004 and 2012 in terms of number of persons, instead of per cent change, because of the

Table - 1
Regionalisation and Size of Samples

Micro regions	Sub-Micro Regions	Districts	Name of Villages of Snake Charmer	No. of Samples (Household)
Darjiling Himalayas including Duars	Central Duars	Jalpaiguri	Panbari	26
		Jalpaiguri	Ponnabari	25
		Jalpaiguri	Baragila-naktanibari	09
Barind Tract	East Koch Bihar Plain	Koch Bihar	Charaljani	25
		Koch Bihar	Baraibari	84
	Lower Mahananda Plain	Maldah	Kandaran	37
Moriband Delta	Nabagram Plain	Murshidabad	Nabagram	20
		Murshidabad	Mogram	16
	Mayurakshi Dwarka Plain	Murshidabad	Kandi	07
		Murshidabad	Amlai	05
		Murshidabad	Karbelia	18
	Jalangi Bhagirathi Interfluve	Murshidabad	Bhandardaha	14
	Nadia Plain North	Nadia	Haulia	30
	Krishnanagar-Santipur Plain	Nadia	Mahatpur	06
	Ranaghat-Chakdaha Plain	Nadia	Uttar Panch Pota	05
Nadia		Brohi-Aayespur	17	
Proper Delta	Kaksa Ketugram Plain	Barddhaman	Bhedia	24
		Barddhaman	Guskara	06
		Barddhaman	Somaipur	07
		Barddhaman	Ausgram	28
	Barddhaman Plain	Barddhaman	Nimo	60
		Barddhaman	Memari	12
	Bhagirathi Basin	N 24 Parganas	Marakpur	11
		N 24 Parganas	Atghara	58
	North Bidyadhari Plain	N 24 Parganas	Jiratgram	43
	Dwarakeswar Plain	Hugli	Mandaron	16
	Hugli Damodar Plain	Hugli	Mrigala	35
		Hugli	Kalipur	12
		Hugli	Bhimpur	11
		Hugli	Rampara	27
Hugli Damodar Plain	Haora	Hafezpur	27	
	Haora	Patihal	20	
South Bidyadhari Plain	S 24 Parganas	Sonpur	10	

	Hugli Delta	S 24 Parganas	Baruipur	12
Rarh Plain	Bakrewar Upland	Birbhum	Itagaria	19
	Suri Bolpur Plain	Birbhum	Saota	10
		Birbhum	Pakurhans	14
		Birbhum	Jalandi	12
		Birbhum	Santra	06
		Birbhum	Khujutipara	08
		Birbhum	Benuria	06
		Birbhum	Shian	04
		Birbhum	Itanda	06
	Lower Kasai Basin	Paschim Medinipur	Munibgar	10
		Paschim Medinipur	Kanubar	27
	Lower Kasai Basin	Purba Medinipur	Sundarnagar	32
	Bankura Uplands	Bankura	Jorhira	06
	Bankura Bishnupur Rarh Plain	Bankura	Kamladanga	28
Bankura		Shitla	09	
Patrasair Plain	Bankura	Patrasair	08	
Puruliya Uplands	Damodar Dwarakeswar Upland	Puruliya	Poradi	24
		Puruliya	Cheyama	06
		Puruliya	Santaldih	04
		Puruliya	Kunardi	09
		Puruliya	Hirakun	13
		Puruliya	Chharra	04
		Puruliya	Jahajpur	12
		Puruliya	Kalakata	09
		Puruliya	Talajuri	16
		Puruliya	Gohaldang	05
		Puruliya	Hura	04
		Puruliya	Palgan	04
		Puruliya	Khairipihira	07
	Puruliya	Bhatpahari	06	
Upper Kasai Basin	Puruliya	Loharsol	22	
West Bengal	27	15	65	1115

Source: Census of India, 2011; on the basis of Regionalisation Map (p. 24) and Table (pp. 25-26).
N.B. Alipurduar District was formed in 2014.

Table - 2

West Bengal: Sample Population and Sex Ratio of Snake Charmer Community

Category	Darjiling Himalayas including Duars Region	Barind Tract Region	Moriband Delta Region	Proper Delta Region	Rarh Plain Region	Puruliya Uplands Region	Total
Male	156 (50.6)	335 (49.3)	314 (48.2)	1044 (50.1)	490 (50.2)	360 (51.9)	2699 (50.06)
Female	152 (49.4)	345 (50.7)	338 (51.8)	1038 (49.9)	486 (49.8)	334 (48.1)	2693 (49.94)
Total Population	308 (100.0)	680 (100.0)	652 (100.0)	2082 (100.0)	976 (100.0)	694 (100.0)	5392 (100.0)
Sex Ratio	974	1029	1074	994	992	928	997

Source: Field Survey (data of 1115 households - around 5392 individuals), 2014.

Parenthesis shows percentage.

Table-3

West Bengal: Micro Region Wise Population Change among Snake Charmer Community

Name of Micro-Region	2004 (Persons)	2008 (Persons)	2012 (Persons)	Change 2004-08 (Persons)	Change 2008-12 (Persons)
Darjiling Himalayas including Duars Region	820	831	839	11	8
Barind Tract Region	1746	1759	1769	13	10
Moriband Delta Region	1944	1964	1978	20	14
Proper Delta Region	5546	5591	5649	45	58
Rarh Plain Region	2811	2828	2853	17	25
Puruliya Uplands Region	2053	2069	2085	16	16
West Bengal	14920	15042	15173	122	131

Source: Concerned Panchayats, 2004- 2012.

N.B. Only those Panchayats are considered where snake charmers reside permanently.

Before 2004 there was no official Panchayat level data on snake charmer population.

very small change, at three points of time i.e. 2004, 2008 and 2012. The total population of this community, as per the sample survey is 5392 persons. The highest proportion (38.6 per cent) of total sample population of snake charmer community is concentrated in Proper Delta Region (2082 persons) while the lowest (308 persons) is concentrated in Darjiling Himalayas including Duars Region (5.7 per cent). The second highest proportion (18.1 per cent) was recorded in Rarh Plain Region (976 persons). The remaining three regions have an almost similar proportion of snake charmer population i.e. between 13 and 12 per cent or 694 and 652 persons respectively. The sex composition of population in the micro-regions follows a pattern which, with minor variations, is almost similar to the distribution of population e.g. the Proper Delta Region has the highest number of male (1044 persons) and female (1038 persons) population (50.1 per cent and 49.9 per cent respectively of the total population of the region) and in Darjiling Himalayas including Duars Region the male and female population is the lowest among the various micro-regions i.e. 156 (50.6 per cent) and 152 (49.4 per cent). Among the four remaining regions the proportion of male population varies between 490 persons in Puruliya Uplands Region and 314 persons in Moriband Delta Region, and female population varies from 345 persons in Moriband Delta Region to 334 persons in Puruliya Uplands Region. Broadly, the proportion of male and female population does not vary by more than 3 percent points among these micro regions (Table 2). The sex ratio however follows a somewhat different pattern with the highest sex ratio (1074 females/thousand males) being in Moriband Delta Region followed by a sex ratio of 1029 females/thousand males in Barind Tract Region. Both these regions have a low proportion of combined population of the regions (12.0 and 12.6 per cent respectively). Among the other four regions the sex ratio varies between 994 females/thousand males in Proper Delta Region to 928 females/thousand males in Puruliya Uplands Region. The sex ratio of the sample population in every region is more than the state average of 924

females/thousand males. A comparison of number of persons recorded in the Panchayat records between 2004, 2008 and 2012 shows that there has not been any major change in the population of members of this community during this period (Table 3). The aggregate change in absolute numbers in all the regions was 122 persons and 137 persons during 2004-08 and 2008-2012 respectively and all the regions recorded an increase in the number of persons of this community. The highest aggregate increase (103 persons) during 2004-2012 was in Proper Delta Region which also had the highest concentration of population. Of these 103 persons 45 and 58 were added during 2004-08 and 2008-2012 respectively. The smallest increase (11 and 8 persons) was in the Darjiling Himalayas including Duars Region during this period. Broadly, except for Proper Delta Region and Rarh Plain Region the increase in numbers was less during 2008-2012 as compared to 2004-2008 (Table 3).

Distribution of Family Size of Snake Charmer Community

Table 4 shows the micro region wise distribution of family size. The size of sample households varies between less than 3 persons to more than 12 persons. The households can be categorised into small (less than 3 members), medium (4 to 6 members), large (7 to 9 members) and very large (10 to 12 members) and extremely large (more than 12 members). The size of family of snake charmer community of the sample households varies from less than 3 members (small size) to 7 to 9 members (large). Only two households in Moriband Delta Region have 10 to 12 members each (very large) and three households in Proper Delta Region have a strength of more than 12 members (extremely large). The most common size of family comprises of medium sized families (4 to 6 members) at the aggregate level (761 families out of a total of 1115 sample households or 68.2 per cent) as well as the level of individual micro-regions in which their proportion varies from 76.7 per cent (46 households) in

Table - 4
West Bengal :Size of Family of Snake Charmer Community

Size of Family (number of members)	Darjiling Himalayas including Duars Region	Barind Tract Region	Moriband Delta Region	Proper Delta Region	Rarh Plain Region	Puruliya Uplands Region	Total
	Households	Households	Households	Households	Households	Households	Households
Below 3	6 (10.0)	39 (26.3)	28 (20.3)	77 (18.4)	43 (21.0)	30 (20.7)	197(17.6)
4-6	46 (76.7)	88 (59.5)	97 (70.3)	283 (67.5)	146 (71.2)	101 (69.7)	761(68.2)
7-9	8 (13.3)	21 (14.2)	11 (8.0)	56 (13.4)	16 (7.8)	14 (9.7)	126(11.3)
10-12	--	--	2 (1.4)	--	--	--	2(0.17)
More than 12	--	--	--	3 (0.7)	--	--	3(0.26)
Total	60 (100.0)	148 (100.0)	138 (100.0)	419 (100.0)	205 (100.0)	145 (100.0)	1115(100.0)

Source: Field Survey data of 1115 households, 2014.
Parenthesis shows percentage.

Table-5
West Bengal :Social Composition of Snake Charmer Community

Category of Social Groups	Darjiling Himalayas including Duars Region	Barind Tract Region	Moriband Delta Region	Proper Delta Region	Rarh Plain Region	Puruliya Uplands Region	Total
	Households	Households	Households	Households	Households	Households	Households
Schedule Tribe (ST)	60 (100)	--	--	--	8 (3.9)	144 (100)	212(9.01)
Schedule Caste (SC)	--	121 (81.8)	119 (86.2)	392 (93.3)	187 (91.2)	--	819(73.45)
Other Backward Caste (OBC-A)	--	27 (18.2)	19 (13.8)	28 (6.7)	10 (4.9)	--	84(7.53)
Total	60 (100)	148 (100)	138 (100)	420 (100)	205 (100)	144 (100)	1115(100.0)

Source: Field Survey data of 1115 households, 2014.
Parenthesis shows percentage. N.B. None of them are categorised as OBC-B.

Darjiling Himalayas including Duars Region to 59.5 per cent (88 households) in Barind Tract Region. The small families (less than 3 members) are at the second rank at the aggregate (197 households or 17.4 per cent of the total sample households) as well as micro region level except in the case of Darjiling Himalayas including Duars

Region where these are at the third rank and large families occupy the second rank. In the case of all other regions the large families are at the third rank and at the aggregate level also their rank is third (126 households or 11.3 per cent of the total 1115 sample households). In terms of absolute numbers also the pattern is the same i.e. highest number of

households are of medium size, followed by small and large families (Table 4).

Social Composition of Snake Charmer Households

Table 5 shows the distribution of sample households according to their social composition. At the aggregate level the majority of total sample households (819 or 73.45 per cent) belong to the Schedule Caste community. They have maximum concentration in four out of the six micro-regions i.e. in all the regions except Darjiling Himalayas including Duars Region and Puruliya Uplands Region. The proportion of these households in the four regions varies from 93.3 percent in Proper Delta Region to 81.8 per cent in Barind Tract Region. Interestingly, the two regions which do not have any Schedule Caste household have a 100 per cent concentration of Schedule Tribe households in addition to the Rarh Plain Region which has a small proportion of Schedule Caste households also. In fact in this region all the three categories i.e. Schedule Caste, Schedule Tribe and Other Backward Caste households are present. The distribution of Other Backward Castes is the same as the Schedule Caste households except that these occur in smaller proportions. All these households belong to Other Backward Caste (A) category as there is no Other Backward Caste (B) category in the state (Table 5).

Literacy among Snake Charmer Community

The field survey covered sex wise data on three aspects of literacy *viz.*, formal literacy, reading and writing capability, which would indicate some level of education, and illiteracy at the individual level excluding population below six years of age. The aggregated data on these three aspects, according to individual micro-regions are presented in Table 6. At the aggregate level 2792 persons (61.13 per cent) were found to be literate, 406 persons (8.88 per cent) had some reading and writing capability, and 1369 persons (29.97 per

cent) were illiterate. Thus the total persons covered for this aspect were 4567 out of the total of 5392 persons comprising the 1115 sample households covered in the survey. Out of the total 2792 literate persons 1452 (52.25 per cent) were males and the remaining 1333 (47.74 per cent) were females. Interestingly in the case of reading and writing capability of the total 406 persons females outpaced (235 or 57.88 per cent) males (171 or 41.87 per cent). However, female illiteracy was higher as compared to males where as their proportion among literates was lower in all the micro-regions. The highest total literacy rate was observed in Barind Tract Region (63.9 per cent) and the lowest (49.4 per cent) in Darjiling Himalayas including Duars Region. The other regions in terms of literacy values were Proper Delta Region (63.0 per cent), Rarh Plain Region (60.2 per cent), Moriband Delta Region (59.8 per cent) and Puruliya Uplands Region (58.8 per cent) in the same order. The highest male literacy is in Proper Delta Region (65.6 per cent) and the lowest in Darjiling Himalayas including Duars Region (52.9 per cent). This region also has the lowest total literacy. The highest value for female literacy is in Barind Tract Region (62.6 per cent) which also has the highest total literacy and the lowest value is in Darjiling Himalayas including Duars (46.0 per cent). This region also has the lowest total as well as male literacy (Table 6). The highest proportion of persons with reading and writing capability is in Darjiling Himalayas including Duars Region (10.5 per cent) and the lowest in Barind Tract Region (6.5 per cent). The absolute numbers involved in this aspect are small but indicative of the significant difference in being literate and educated up to some level. Gender gap in literacy is a vital measure to analyse the inequalities between male and female members of snake charmer community. The highest gender gap in literacy is in Rarh Plain Region (10.4 per cent) and the lowest in Barind Tract Region (2.7 per cent). In between these extreme values are Darjiling Himalayas including Duars Region (6.9 per cent), Proper Delta Region (5.2 per cent), Puruliya Uplands Region (5.2 per cent) and Moriband Delta Region

Table-6
West Bengal: Literacy Rate of Snake Charmer Community

Category	Darjiling Himalayas including Duars Region			Barind Tract Region			Moriband Delta Region			Proper Delta Region			Karb Plain Region			Puruliya Uplands Region		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Illiterate	44 (36.4)	55 (43.7)	99 (40.1)	81 (28.5)	91 (30.6)	172 (29.6)	76 (27.1)	89 (31.2)	165 (29.2)	233 (26.6)	258 (29.6)	491 (28.1)	124 (29.1)	136 (32.5)	260 (30.7)	91 (31.1)	91 (31.4)	182 (31.2)
Reading & Writing Capable	13 (10.7)	13 (10.3)	26 (10.5)	18 (6.2)	20 (6.8)	38 (6.5)	26 (9.3)	26 (9.0)	52 (9.2)	68 (7.8)	87 (10.0)	155 (8.9)	24 (5.6)	53 (12.6)	77 (9.1)	22 (7.5)	36 (12.4)	58 (10.0)
Literate	64 (52.9)	58 (46.0)	122 (49.4)	185 (65.3)	186 (62.6)	371 (63.9)	178 (63.6)	170 (59.8)	348 (61.6)	573 (65.6)	526 (60.4)	1099 (63.0)	279 (65.3)	230 (54.9)	509 (60.2)	180 (61.4)	163 (56.2)	343 (58.8)
Total	121 (100)	126 (100)	247 (100)	284 (100)	297 (100)	581 (100)	280 (100)	285 (100)	565 (100)	874 (100)	871 (100)	1745 (100)	427 (100)	419 (100)	846 (100)	293 (100)	290 (100)	583 (100)

Source: Field Survey (data of 1115 households - around 5392 individuals), 2014. *Parenthesis shows percentage*

N.B. Excluding below 0-6 years age child.

(3.8 per cent) in the same order. An important aspect related to low literacy among snake charmer community found during field survey was that many members of this community for quite some time till a few decades back practiced nomadic lifestyle and enrolment of children in schools was not possible for them.

Summary

The vernacular name of snake charmer community, *Bedey*, comes from the term *Baidda* which means village doctor. The snake charmers traditionally know the art of healing, which they use as a source of living. The *Bediya* caste is believed to comprise of 42 or 43 clans and sub-clans. However, not all the clans traditionally practice snake charming or snake juggling and only 6 clans are connected with this type of livelihood. The snake charmer community, categorised as an ethno-occupational group, is believed to have magical powers to tame snakes, and to cure snake bites. The members of this community usually reside at villages some distance away from urban areas in West Bengal. The snake charming occupation is today in danger of dying out and most of the members of this ethnic group have shifted to some other non-traditional occupation due to a variety of factors main among these being the recent enforcement of a 1972 law banning ownership of serpents. Except for four districts in West Bengal namely Darjiling, Uttar Dinajpur, Dakshin Dinajpur and Kolkata, all the districts have snake charmer village settlements. The study is based mainly on primary data collected through intensive field survey of 65 sample villages spread over 15 districts covering 1115 sample households and 5392 individuals. The collected data covers sex composition, sex-ratio, size of family, social composition and literacy. These data have been aggregated at the micro-region level and presented in the form of tables. Panchayat Office records have been used to identify the villages where this community resides and for noting the change in their population.

The highest proportion (38.6 per cent) of

total sample population of snake charmer community is concentrated in Proper Delta Region (2082 persons) while the lowest (308 persons) is concentrated in Darjiling Himalayas including Duars Region (5.7 per cent). The sex composition of population in the micro-regions follows a pattern which, with minor variations, is almost similar to the distribution of population. Broadly, the proportion of male and female population does not vary by more than 3 percent points among these micro regions. The sex ratio however follows a somewhat different pattern with the highest sex ratio (1074 females/thousand males) being in Moriband Delta Region followed by a sex ratio of 1029 females/thousand males in Barind Tract Region. Both these regions have a low proportion of combined population of the regions (12.0 and 12.6 per cent respectively). A comparison of number of persons recorded in the Panchayat records in 2004, 2008 and 2012 shows that there has not been any major change in the population of members of this community during this period e.g. the aggregate change in absolute numbers in all the regions was 122 persons and 137 persons during 2004-08 and 2008-2012 respectively. All the regions recorded an increase in the number of persons of this community. Broadly, except for Proper Delta Region and Rarh Plain Region the increase in numbers was less during 2008-2012 as compared to 2004-2008. The family size varies between less than 3 persons to more than 12 persons. The most common size of family comprises of medium sized families at the aggregate as well as the level of individual micro-regions in which their proportion varies from 76.7 per cent (46 households) in Darjiling Himalayas including Duars Region to 59.5 per cent (88 households) in Barind Tract Region. The small families (less than 3 members) are at the second rank and the large families are at the third rank. In terms of absolute numbers also the pattern is the same i.e. highest number of households are of medium size, followed by small and large families. At the aggregate level the majority of total sample households belong to the Schedule Caste community which have maximum concentration

in four out of the six micro-regions. Interestingly, the two regions which do not have any Schedule Caste household have a 100 per cent concentration of Schedule Tribe households. The Rarh Plain Region has all the three categories i.e Schedule Caste, Schedule Tribe and Other Backward Caste households. The distribution of Other Backward Castes households is the same as the Schedule Caste households except that these occur in smaller proportions. There is no Other Backward Caste (B) category and all these households belong to Other Backward Caste (A) category. At the aggregate level 61.13 per cent persons were found to be literate, 8.88 per cent had some reading and writing capability, and 29.97 per cent were illiterate. Out of the literates 52.25 per cent were males and the remaining 47.74 per cent were females. Female illiteracy was higher as compared to males where as their proportion among literates was lower in all the micro-regions. The highest total literacy rate was observed in Barind Tract Region (63.9 per cent) and the lowest (49.4 per cent) in Darjiling Himalayas including Duars Region. The highest male literacy is in Proper Delta Region (65.6 per cent) and the lowest in

Darjiling Himalayas including Duars Region (52.9 per cent). This region also has the lowest total literacy. The highest value for female literacy is in Barind Tract Region (62.6 per cent) which also has the highest total literacy and the lowest value is in Darjiling Himalayas including Duars (46.0 per cent). This region also has the lowest total as well as male literacy. The highest proportion of persons with reading and writing capability is in Darjiling Himalayas including Duars Region (10.5 per cent) and the lowest in Barind Tract Region (6.5 per cent). The absolute numbers involved in this aspect are small but indicative of the significant difference in being literate and educated up to some level. The highest gender gap in literacy is in Rarh Plain Region (10.4 per cent) and the lowest in Barind Tract Region (2.7 per cent). Though the people of snake charmer community are lagging behind in terms of literacy but in the arena of indigenous knowledge regarding serpents and herbal medicinal usage, snake-bite healing (especially non-poisonous snake), collection of raw venom, environmental conservation through cooperative society model this community has much potentiality.

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NEW MAP SERIES: 7 INDIA: MUNICIPAL WARDS IN MILLION CITIES: 2011

GOPAL KRISHAN
Chandigarh, India

In the nature of a local authority area, a municipal ward is an administrative or political subdivision of a town or city. At present it is typically used for electoral purposes. Hence every civic election is preceded by a precise delineation of such wards.

Indeed municipal governance has a long history in India. A city, particularly the capital one like Pataliputra, was divided into a number of wards in ancient India for administrative purposes. A ward was placed under the charge of a *sthanik*, who supervised the work of *gopas*, the care-takers of a group of households. All the *sthaniks* or *gopas* were under the control of *Nagraka* or city-superintendent, who was responsible for overall management of city affairs.

During the Mughal period, the *kotwal* was the head of the city administration, as in the case of Agra. He was obliged to ensure an efficient, safe and peaceful functioning of the city. For this purpose, the city was carved into a number of neighbourhoods or wards, each under one of his subordinates.

Municipal governance became pervasive and systematized during the colonial days. Formation of wards became a common feature of every town or city. Initially these spatial units were meant for management of sanitation, water supply, and drainage, among other things. These were also used as the basic territorial units for collection of property tax. The sanitary inspector and property tax official held an important position in municipal governance. At a later stage, the wards became electoral in nature in some selected cities.

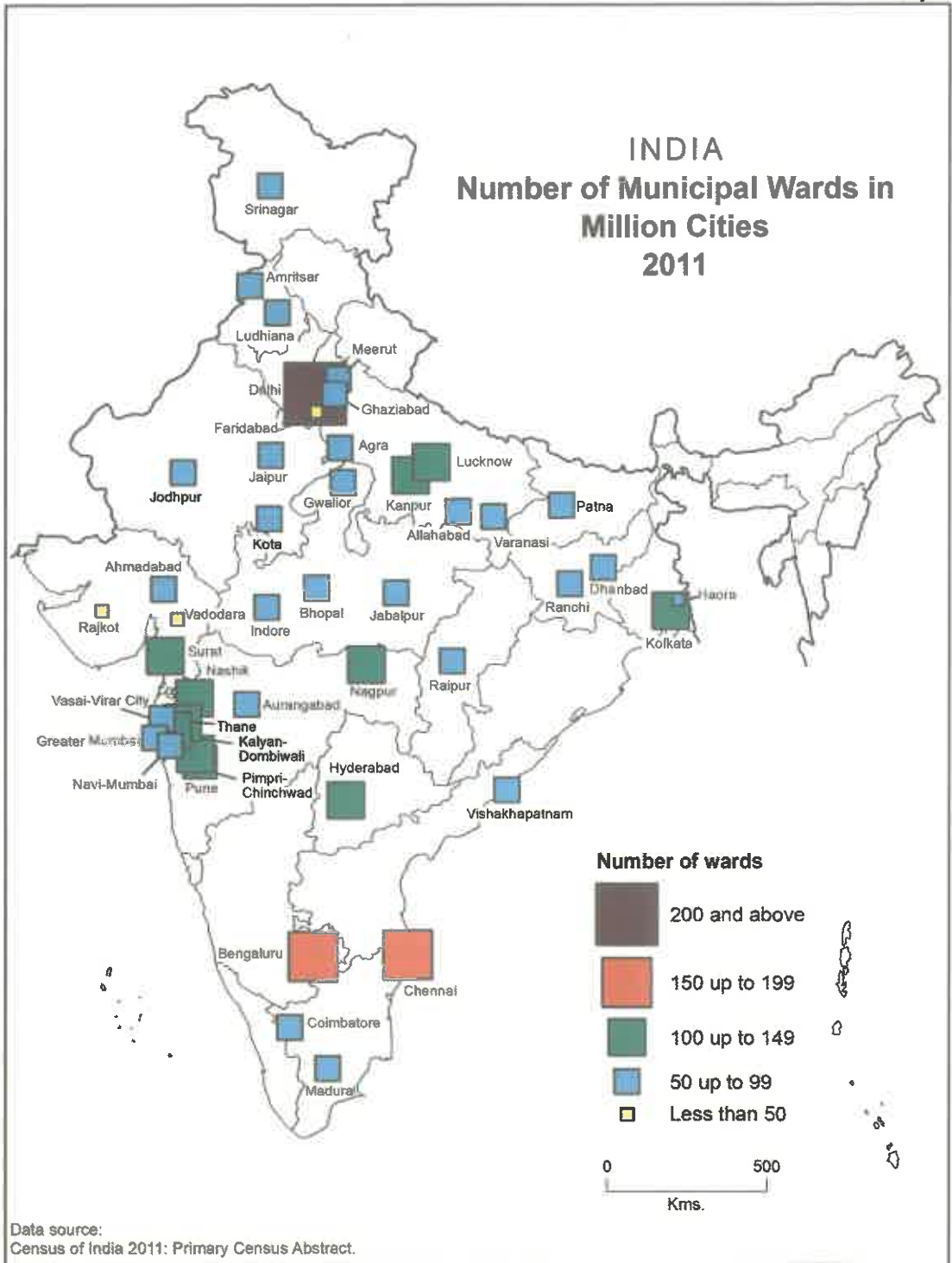
After independence in 1947, the municipal

wards assumed a well-defined role. In addition to being basic spatial units for management of urban services, these acquired the characterization of electoral wards in every statutory town or city. A firm and assured footing to the wards was provided by the enactment of the 74th Constitutional Amendment in 1992, which made regular elections mandatory for every municipal body. The Election Commission Act, 1996 (Act 51 of 1996) asked for constitution of a Demarcation Board in every state or union territory, which after consultation with the Election Commission, was to delimit all metropolitan and local municipalities and to carve these into wards for electoral purposes. It was envisaged that 'ward boundaries will be clear, distinct and easily identifiable and different wards will have almost equal population so that the value of the vote of every individual is the same'.

Municipal wards have, thus, gained prominence in the scheme of things. One of the imperatives of the urban electoral process is that there is an impartial and meaningful designing of electoral wards of municipal bodies. An electoral ward is expected to be socially cohesive marked by commonality of issues and concerns, geographically contiguous and compact, territorially manageable in population /area and neutral to any vested interest. The authenticity of an elected body is subject to the manner in which the electoral wards have been devised.

Ironically the demographic profiles of municipal wards in India have not received the research attention these deserve. The present New Map Series 7 intends to make a humble

Map 1



● Million cities located in South India are noted for larger number of municipal wards than those in North or Central India.

contribution in this direction. The objective here is to map and discuss the number and average population size of wards in all the 45 million cities of India. Evidently municipal wards in this case are relevant to only those million cities whose core component enjoys the status of a municipal corporation. There are cases, such as Thiruvanthapuram and Kochi in Kerala, whose core municipal corporation is smaller than a million in population though as an urban agglomeration these carry a population of more than a million. There are seven such cases in India. For obvious reasons, these have not been reckoned as million cities in the present exercise.

The requisite data for the purpose of mapping and discussion were picked from the Primary Census Abstract, India, States and Union Territories - Town/Village/Ward Level, Census of India 2011. The number of 'million cities', with the status of municipal corporation, was found as forty five. Among these, 32 had a population of one to two million, 9 of two to five million, and only 4 of more than five million. Greater Mumbai (12, 442, 373) was the largest and Kota (1,001,694), the smallest in population (Table 1). The median population size of million cities in India was worked out as 1.6 million.

As expected, the number of municipal wards in million cities marked a significant variation. It ranged from 217 in Delhi to 13 in Vadodara. This number was more than 100 in fourteen cities, 50 to 100 in twenty-eight cities and less than 50 in three cities. Eighty was the modal number of municipal wards in million cities. Broadly speaking, the number of wards was larger in million cities located in South India than in the North or Central India (Map 1). National capital,

namely Delhi, or state capitals, such as Bengaluru, were also noted for relatively large number of wards. This number was large also in the municipal bodies formed at an early stage, such as Chennai. Million cities located in former princely states, such as Vadodara, were marked for smaller number of wards. The coefficient of correlation ($r = 0.60$) between population size of million cities and respective number of their wards was significant but not strong.

The average population size of wards also displayed a wide range from 128,524 in Vadodara in Gujarat to only 11,657 in Kalyan-Dombivali in Maharashtra (Table 2). Rather in Vadodara and Greater Mumbai, a municipal ward is larger than a city, with at least one hundred thousand persons (Map 2). An average municipal ward in 21 million cities carries a population of a medium town, with twenty to hundred thousand persons. The remaining 22 million cities have municipal wards whose average population is in the nature of small towns, with a population of ten to twenty thousand. One would have expected a strong relationship between the population size of million cities and the average population size of their respective municipal wards but here again the coefficient of correlation ($r = 0.69$) falls slightly short of this description.

As it emerges, the equations between the population size of million cities and the respective number and demographics of their municipal wards have not been organized, by and large, on desired lines. Likewise variations in population size of different wards within any million cities are wide. That is a story which is left for another map series to tell.

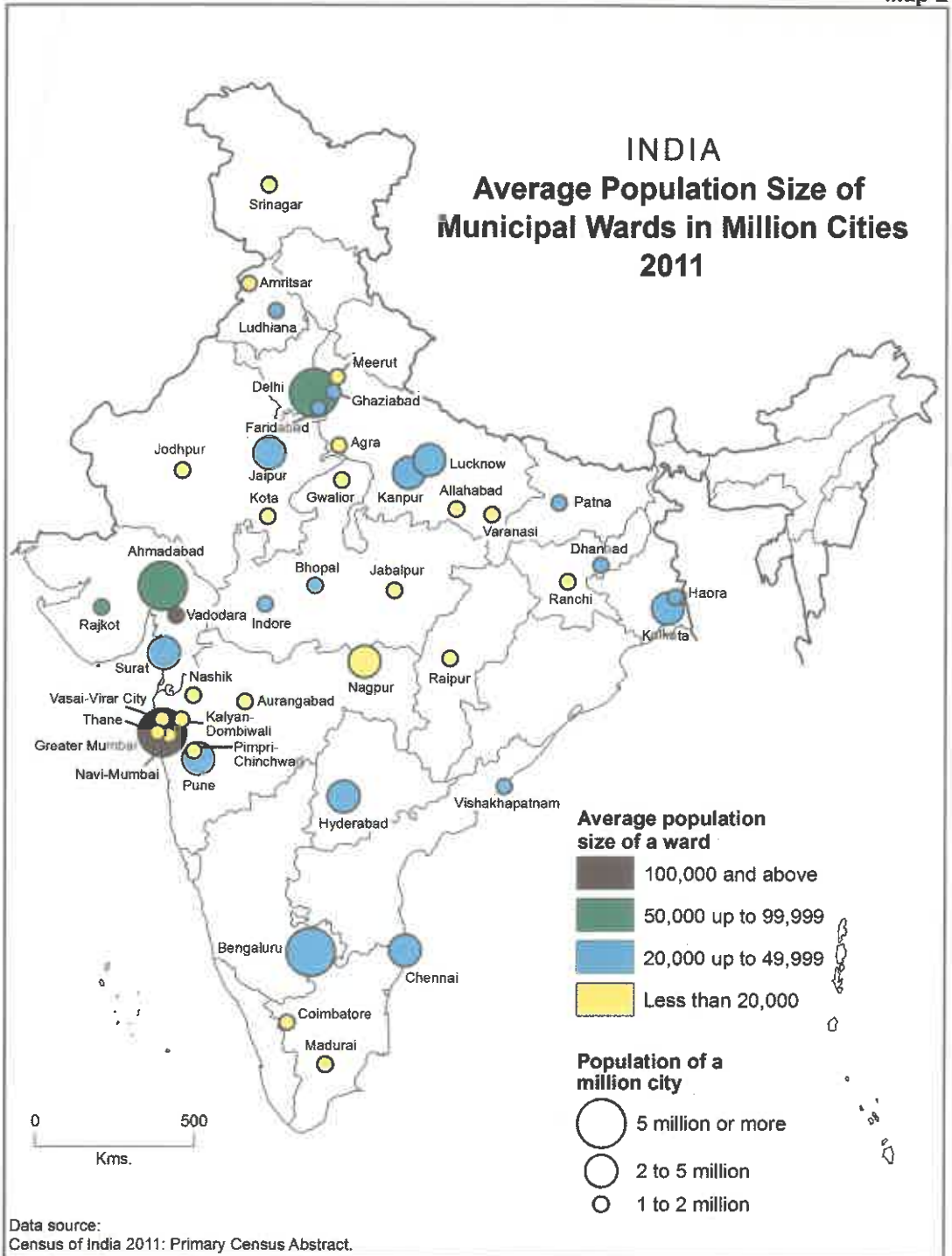
Table 1- India: Population and Number & Average Population Size of Municipal Wards in Million Cities, 2011

Rank	Million City	Population*	Number of wards	Average population size of a ward
1	Greater Mumbai	12,442,373	97	128272
2	Delhi	11,034,555	217	50850
3	Bengaluru	8,443,675	198	42645
4	Ahmadabad	5,577,940	57	97859
5	Chennai	4,646,732	155	29979
6	Kolkata	4,496,694	141	31891
7	Surat	4,467,797	102	43802
8	Hyderabad	3,718,651	149	24957
9	Pune	3,124,458	144	21698
10	Jaipur	3,046,163	77	39561
11	Lucknow	2,817,105	110	25610
12	Kanpur	2,765,348	110	25140
13	Nagpur	2,405,665	136	17689
14	Indore	1,964,086	69	28465
15	Thane	1,841,488	116	15875
16	Bhopal	1,798,218	70	25689
17	Visakhapatnam	1,728,128	72	24002
18	Pimpri-Chinchwad	1,727,692	106	16299
19	Patna	1,684,222	72	23392
20	Vadodara	1,670,806	13	128524
21	Ghaziabad	1,648,643	80	20608
22	Ludhiana	1,618,879	75	21585
23	Agra	1,585,704	90	17619
24	Nashik	1,486,053	108	13760
25	Faridabad	1,414,050	35	40401
26	Meerut	1,305,429	80	16318
27	Rajkot	1,286,678	23	55943
28	Kalyan-Dombivli	1,247,327	107	11657
29	Vasai-Virar City	1,222,390	89	13735
30	Varanasi	1,198,491	90	13317
31	Srinagar	1,180,570	68	17361
32	Aurangabad	1,175,116	99	11870
33	Dhanbad	1,162,472	55	21136
34	Amritsar	1,132,383	65	17421
35	Navi-Mumbai	1,120,547	89	12590
36	Allahabad	1,112,544	80	13907
37	Haora	1,077,075	50	21542
38	Ranchi	1,073,427	55	19517
39	Jabalpur	1,055,525	70	15079
40	Gwalior	1,054,420	60	17574
41	Coimbatore	1,050,721	72	14593
42	Jodhpur	1,033,756	65	15904
43	Madurai	1,017,865	72	14137
44	Raipur	1,010,433	70	14435
45	Kota	1,001,694	60	16695

* Arranged in descending order of population of million cities

Data source: Census of India 2011, Primary Census Abstract India, States and Union Territories – Town/Village/Ward Level.

Map 2



● The average population size of a municipal ward in 42 among 45 million cities of India meets the description of a medium town or a city.

Table 2- India: Number & Average Population Size of Municipal Wards in Million Cities, 2011

Rank	Million City*	Number of wards	Rank	Million City*	Average population size of a ward
1	Delhi	217	1	Vadodara	128524
2	Bengaluru	198	2	Greater Mumbai	128272
3	Chennai	155	3	Ahmadabad	97859
4	Hyderabad	149	4	Rajkot	55943
5	Pune	144	5	Delhi	50850
6	Kolkata	141	6	Surat	43802
7	Nagpur	136	7	Bengaluru	42645
8	Thane	116	8	Faridabad	40401
9	Lucknow	110	9	Jaipur	39561
10	Kanpur	110	10	Kolkata	31891
11	Nashik	108	11	Chennai	29979
12	Kalyan-Dombivli	107	12	Indore	28465
13	Pimpri-Chinchwad	106	13	Bhopal	25689
14	Surat	102	14	Lucknow	25610
15	Aurangabad	99	15	Kanpur	25140
16	Greater Mumbai	97	16	Hyderabad	24957
17	Agra	90	17	Visakhapatnam	24002
18	Varanasi	90	18	Patna	23392
19	Vasai-Virar City	89	19	Pune	21698
20	Navi-Mumbai	89	20	Ludhiana	21585
21	Ghaziabad	80	21	Haora	21542
22	Allahabad	80	22	Dhanbad	21136
23	Meerut	80	23	Ghaziabad	20608
24	Jaipur	77	24	Ranchi	19517
25	Ludhiana	75	25	Nagpur	17689
26	Visakhapatnam	72	26	Agra	17619
27	Patna	72	27	Gwalior	17574
28	Coimbatore	72	28	Amritsar	17421
29	Madurai	72	29	Srinagar	17361
30	Jabalpur	70	30	Kota	16695
31	Bhopal	70	31	Meerut	16318
32	Raipur	70	32	Pimpri-Chinchwad	16299
33	Indore	69	33	Jodhpur	15904
34	Srinagar	68	34	Thane	15875
35	Amritsar	65	35	Jabalpur	15079
36	Jodhpur	65	36	Coimbatore	14593
37	Gwalior	60	37	Raipur	14435
38	Kota	60	38	Madurai	14137
39	Ahmadabad	57	39	Allahabad	13907
40	Dhanbad	55	40	Nashik	13760
41	Ranchi	55	41	Vasai-Virar City	13735
42	Haora	50	42	Varanasi	13317
43	Faridabad	35	43	Navi-Mumbai	12590
44	Rajkot	23	44	Aurangabad	11870
45	Vadodara	13	45	Kalyan-Dombivli	11657

* Arranged in descending order of the number of wards

* Arranged in descending order of the average population size of a ward

Data source: Census of India 2011, Primary Census Abstract India, States and Union Territories – Town/Village/Ward Level.